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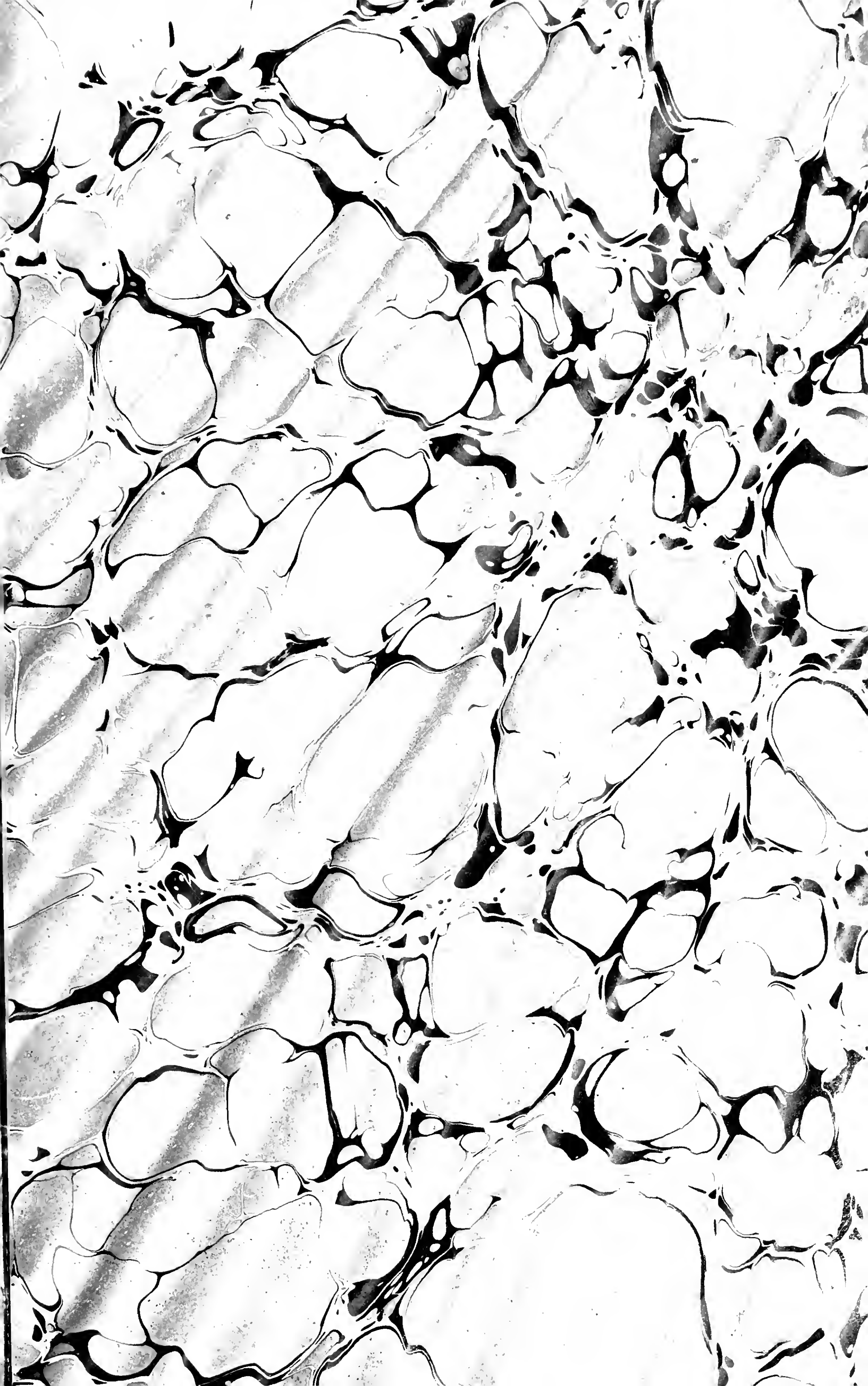

THE

FARMERS' REGISTER,

A MONTHLY PUBLICATION,

Devoted to the Improvement of the Practice

AND

SUPPORT OF THE INTERESTS OF AGRICULTURE.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

And he gave it for his opinion, "that whoever could make two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together." *Swift.*

VOL. VI.

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THE FARMERS' REGISTER.

Vol. VI. APRIL 1, 1838. No. 1.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

STATEMENTS OF [illegible] AND [illegible] RAL MANAGEMENT AND PRODUCT, IN [illegible].

[[illegible] figures [illegible] merely from the [illegible] that the wri- [illegible] in a high degree, the [illegible] which are necessary to constitute a good farmer. We had heard, long ago, that Commodore Jones had rendered valuable services to his country, by improving her soil, as well as by defending it in battle. It is hoped that this first communication to the Farmers' Register from his pen, is the precursor of others; and the evidence here exhibited of value, both in working and in writing on so small a space, shows that our correspondent cannot want either a field, or fit subjects, for more extended treatment.—Ed. Far. Reg.]

To the Editor of the Farmers' Register.

Prospect Hill, Va., February 16th, 1838.

Dear Sir:—Forced to take shelter in the house from the pelting storm now raging, and of course to suspend all out-door farming operations, I turned to my agricultural library, to seek in theory that which I may apply to practice, when the season for operation arrives. The January and February numbers of the Farmers' Register having just come to hand, I turned to the index, which directed me to your appeal to 'subscribers in arrear' at page 690, and after reading that article, I referred to the receipt of your collecting agent, who called on me in April last, and find that I did not then, as I had supposed, pay for the present vol. (the 5th) of the Register; consequently, I am not only indebted to you for the 5th vol., but soon shall be for the forthcoming, or sixth; to discharge which, in compliance with your terms, I send you a check on the Bank of the Metropolis at Washington, whose notes are current, I believe, all over Virginia, for ten dollars, which will square our *cash account* for a year to come. But how I, and the community at large, will ever pay the debt of gratitude we owe to the author of the 'Essay on Calcareous Manures,' and his efforts in the cause of agriculture, as displayed in the Farmers' Register, it is not easy for me to say. I feel my own indebtedness, and know not how to cancel it; for although a practical farmer for fifteen or sixteen years; although I have made "two ears of corn, and two blades of grass, to grow upon a spot of ground where only one grew before," still, from being of another profession, nothing that I could write or say would be deemed orthodox, by that class of Virginia farmers who stand most in need of new light in *practical farming*.

The subjoined statement of the treatment or management and product of a small piece of ground, being a fraction less than an acre, may be interesting to you at least; and I have now under somewhat similar treatment a good many more acres, no less productive, according to the advance in improvement. The acre here described, when taken in hand, had not for many years produced one barrel of corn. It is on the side of a hill, sloping to the north-west, and like most of the land adjoining me, is argillaceous; and, when ploughed deep, is retentive of moisture, but not subjecting grain to winter-killing, as many clay soils do. The surrounding country is undulating, hilly, and in some places broken; the original growth is red oak and hickory, with large white oak, yellow poplar, and some locust and walnut interspersed. When first cleared, it is fine tobacco land, and will produce five or six barrels of corn, and 12 or 15 bushels of wheat per acre for a few years, without manure, (which, until very recently, was not thought worthy of the attention of those who called themselves farmers.) But, as already observed, the land being hilly, generally ploughed shallow, *and without the least regard to the destructive consequences of washing*, the country around me presents, with some exceptions, a scene of barren hills and gullied valleys. But even these gullied hills, with good ploughing, or a single dressing of manure, become rich in the product of *grass* or *grain*, and are as easily kept so by the use of *lime*, plaster and clover, as any other lands in Virginia, *or elsewhere*, which are not alluvion, or which do not contain lime as a natural constituent.

To return then to the subject. My land was deeply ploughed, say 7 inches, in early spring of 1831. In May, sixty-two mule-cart loads of stable manure was carted on, regularly spread, and ploughed down, say 4 inches deep, and rolled with a heavy roller; in three weeks, it was cross-ploughed to the same depth, and so remained until the latter part, *say the 23d of July*, when it was again ploughed with the double-shovel plough, again rolled, and sown immediately with white Dutch and winter red top turnip seed of equal parts, and harrowed in with an iron-tooth two-horse seed-harrow. For products, and six years subsequent treatment, see the following table.

Memorandum of the culture and products of an acre of land in the County of Fairfax, for seven consecutive years.

In 1831. Produced 600 bushels of turnips, at 25 cents per bushel,	$150 00
" 1832. Oats, 72¾ bushels, sold at 45 " cents per bushel,	32 72
Stubble turned in and sowed with wheat and clover-seed in September.	
" 1833. Wheat, (lodged and did not fill well,) only 19 bushels, sold at $1 25 per bushel. Mowed the stubble in October, and got one and a half tons of cow food, worth $12,	35 75
" 1834. Clover; June cutting 3 tons, $36; September, 1½ tons, at $12,	48 00
Fallowed after 2d mowing and sowed with wheat, harrowing in *fifty bushels of quick-lime* at the same time.	
" 1835. Another bad wheat year, (blos- " som washed off by hard rains,) only " 22 bushels at $1 25. Mowed the " stubble in September, one and a half	

" tons of mixed hay, worth $12,	39 50
" 1836. Clover and herds' grass, 3½ tons	
" $15 per ton,	52 50
2d crop ploughed under, preparatory for corn.	
" 1837. Planted latter part of April with *Baden's twin corn*, 4 feet 2 inches each way; put a good handful of ashes, lime, and plaster of Paris combined, in each hill; product over ten barrels; say 10 at $3 50 per barrel,	35 00
	$394 27

The above land received from two to three bushels of gypsum, annually put on at various periods, but *never failing to follow the scythe with a good dressing of plaster.* Ground plaster costs from $7 to $9 per ton in Georgetown. Fresh lime, at kilns in Georgetown, in 1834, cost 15 cents per bushel; now, 12½ by the quantity. From these data, let the skeptic make any deductions he may think proper for expense of cultivation, at the highest wages for man and beast, and add interest on all cost and charges, and still there must remain a clear profit but little short of $50 per annum, from rather less than one acre of ground, which, previous to manuring in 1831, was utterly worthless, but is now considered rich. It has on it 30 flourishing young apple trees just getting into bearing, and promises a good crop of wheat seeded the last of October.

N. B. The labor I employ is slave labor. The putrescent manures are of course produced on the premises; and, with the exception of wheat and turnips, the above prices are commanded for drovers, and a relay of stage and other travelling horses which traverse the turnpike, and I get the manure gratis, besides a good rent for an* establishment which cost me about $800.

My location is just eight miles from Georgetown market-house; of course, I have a choice of the three markets of the District of Columbia, to sell or buy at, where every article which the *earth produces*, which enters into the use of man, commands, at all times, ready sale. Yet, I must tell you, that lands almost adjoining me, which pay a good *interest* on their estimated value, by sale of *wild berries*, &c. from the uncultivated fields, or from the product of dairies, where the cows depend upon the *woods* and the *commons* for a support three-fourths of the year, are rapidly depopulating, and running into barren waste, by reason of the mania, I must call it, which impels so many persons to abandon the homes of their fathers, and the enjoyment of health, comparative ease, and comfort, to seek their fortunes in the bogs and cane-brakes of the south and south-west.

When I sat down to write, I had not the least intention of thus persecuting you with a lengthy epistle, but the spirit seemed to move me, and I thought it best to give it vent; and if you cannot decypher this scrawl, you will not lose much by it, but perhaps save me some mortification hereafter.

With grateful return for what you have done, and are still doing, for the agricultural interest of the dear "old dominion," I subscribe myself your friend and servant,

THOS. AP. C. JONES.

*Illegible.---ED.

P. S. Can you not persuade Professor Rogers to take a look at this out-of-the-way corner of the state? We have many sorts of *stones* about here, (between the great and little falls of the Potomac,) and some say gold, some say lead, some coal, some copper, some have found limestone, &c. &c. &c.: but I say we abound in worn-out lands and bad farmers, who require the word of such a man as the professor, to make them set a proper value on their possessions, and the means within their reach of improving their lands.

T. A. C. J.

LIMING ON THE EASTERN SHORE OF MARYLAND.

To the Editor of the Farmers' Register.

Chestertown, Md., Feb. 17th, 1838.

* * * * *

It gives me great pleasure to have it in my power to say, that there is a great spirit of improvement amongst the farmers with us. In many places, you will see fine fields of clover, where, a few years ago, nothing but poverty grass was to be seen; and in almost every direction, now, the farmers appear to be turning their attention to the improvement of their land; and if they will only continue it, there is not much doubt but that they will be richly compensated for their trouble; for our lands are very susceptible of improvement, and with proper management, may be made to produce with any lands in the state. Within a few days past, there has been an agricultural society formed here; and if it can be conducted in the manner that we now have it in contemplation, I have no doubt but that it will be productive of much good to the farming interest.

I received a circular from you some time ago, but as it has only been within the last year or two past, that any shell marl, or green sand, has been carried out on our lands, I have been unable to get hold of any information which would enable me to give you any satisfactory answer to the queries it contained. As soon as there has been sufficient time to test the value of them, I will let you hear from me.

For several years past, many of the farmers of this county have been using the shell lime with great success. It has been used in various quantities, from 100 to upwards of 200 bushels per acre. The quantity depends upon the condition that the land was in. Where it was thin, it has been deemed advisable to give it a light dressing at first. There is a great difference of opinion with regard to the manner in which lime should be applied; some contending that it is better to spread it in the fall, on the land that is to go in corn the following spring; others, that it is better to apply it in the spring, after the ground had been broken up. For many years past, I have been using the shell lime with great effect, and have generally applied it in the spring, after the ground has been ploughed and the corn planted. I have been in the habit of carrying out, in the spring, the manure that was made in the farm-yard through the winter, and after having it put in the furrow, and the ground listed and ploughed out, I have had a shovel full of lime spread over the ridge from corn-hill to corn-hill; and if the season was tolerably good, have hardly ever failed to make a good crop of both wheat and corn, from land that was very thin before the application of the lime and manure. A part of the field that I had in cultivation on my farm in this county, in the year 1835, was land that, on account of its barrenness, had not been in cultivation for 8 or 10 years before, and when it was ploughed, it was covered with poverty grass. This piece of land, I treated in the following manner, viz.: In the spring, I had the manure, that was made in the farm-yard through the winter, carried out on it, and after having it put in the furrow, and the ground listed and ploughed out, (which was done as soon as the manure was spread,) and the corn had been planted, I had a shovel full of lime spread on the ridge from corn-hill to corn-hill. Shortly after, I used the large drag harrow, which appeared to mix the lime pretty well with the earth. In consequence of the heavy rains that we had in the months of May and June, and it being rather low stiff land, I was unable to give the corn the usual cultivation, and made little or none from it. In the fall of the year, it was seeded in wheat, and the spring following, clover was seeded on it. This piece of ground yielded me from 18 to 10 bushels of wheat to the acre, each bushel weighing 60 lbs.; and when the wheat was cut, the clover, that had been seeded in the spring, was about a foot high, as thick as I could have desired it, and the greater part in blossom. This fine growth of wheat and clover, I attribute in a great measure to the lime, for I have frequently tried the same kind of manure without the lime, and have never discovered much benefit from it. On my farm in Queen Ann's county, which is rather a light soil, I have been using the shell lime ever since the year 1822, and have generally applied it in the spring, after the ground has been ploughed, and it has always acted very finely. In the year 1828, I limed a piece of land, in one of the fields on this farm, which was covered with sorrel and poverty-grass. It did not appear to have any effect upon the corn crop, but the effect was very visible upon the wheat, which followed the corn; and after the wheat was taken off a fine growth of white clover come up in the place of the poverty-grass and sorrel, and ever since it has been producing fine crops, without the aid of any other manure. I am decidedly of the opinion, that it is better to apply the lime after the ground is broken up; for in this way, you keep it near the surface, and it also becomes more immediately and better incorporated with the earth; both of which, I think, are very desirable. The farmers are becoming sensible of the great importance of lime, and are very generally getting into the use of it.

GEO. S. HOLLYDAY.

From the Medico-Chirurgical Review.

THE RAIL ROAD STEAMER.

By James Johnston, M. D.

Were any of the ancients to rise from their tombs, and to behold a steam-ship, full of passengers, darting up the Thames, or a train of carriages, with a thousand people, flying along a rail road at the rate of 30 miles an hour, they would be very apt to doubt the fact of their revisit to the same planet they had left—since a thousand years in the grave may probably seem no longer than a short siesta after dinner. Their surprise would not be much lessened by the sight of a column of brilliant flame springing up from the middle of a street, or issuing from ten thousand metallic tubes, and turning the darkness of night into the glare of day! If, while gazing at these phenomena, they saw a man, or even a monkey, descend from the clouds, suspended as the pendulum of a huge umbrella, they would no longer doubt that they had got into "another, if not a better world," than that of their birth and death!

But to return to the *rail road steamer*. Without rudder or rein; without tug or tow-rope; without chart or compass; without impulse from *man*, or traction from *beast*—this maximum of power in minimum of space—this magic *automaton*, darts forward, on iron pinion, like an arrow from a bow, along its destined course. Devised by science, but devoted to industry; harmless as the dove, if unopposed; but fatal as the thunderbolt, if obstructed in its career; this astonishing offspring of human invention; this giant in strength, though a dwarf in stature, drags along, and apparently without effort, whole cargoes of commerce; merchants and their merchandize, artizans and their arts, travellers and their traffic, tourists and their tours (some of them *heavy* enough)—in short, every thing that can be chained to the tail of this herculean velocipede!

The steam-carriage nearly annihilates distance between the inhabitants of a state, and thereby converts, as it were, a whole country into a city, securing all the good effects of combination and concentration, without the detrimental consequences of a crowded population. By the rail road, Liverpool, Manchester, Birmingham, and the Metropolis, are constituted *contiguous* cities, while wide and fertile tracts of country intervene! Thus *steam* multiplies the products of human labor, by increasing their sale and diminishing their price. It will enable us to convert millions of acres from pasturage into cornfields, and consequently the provender of horses into food for man.

The whole transit of a *rail road steamer* is a series of miracles, which, in former days, would have been attributed to angels or demons. At starting, the mighty automaton suddenly suppresses his torrent of hissing steam, and belches forth a deep and hollow cough, which is reiterated at shorter and shorter periods, like a huge animal panting for breath, as the engine, with its train, labors up the ascent from Euston square. These belchings more nearly resemble the pantings of a lion or tiger than any other sound that I know of. With the slow motion, on any considerable ascent, the breathing of the animated machine appears to become more laborious, and the explosions more distinct, till at length the animal seems exhausted, and groans, as it were, under the tremendous effort. But the engine, having mastered the difficulty, acquires velocity before it plunges into the dark abyss of the tunnel under Primrose-hill. There the peal of thunder; the sudden immersion in cimmerian darkness; the clash of reverberated sounds in confined space; the atmospheric chill that rushes over the frame; all combine to induce a momentary shudder at the thought of some possible collison or catastrophe in this subterranean transit, which is increased rather than diminished y the gleams of dubious light that occasionally break in from above, or the sparks of fire that issue every instant from the chimney, rendering "darkness visible." On emerging from the gloomy and gelid cavern, every thing appears of dazzling brightness, and we breathe with delight the pure atmosphere of heaven.

The moment the highest point of elevation on any part of the road is gained, and a descent commences, the engine, with its long train, starts off with augmenting velocity, dashing along, like lightning, and with an uniform growl, or roar, like a continuous discharge of distant artillery or thunder. The scene is now grand—I had almost said terrific. Although it may be a complete calm, the wind appears like a hurricane; and, while the train is flying along the raised embankments, as near Watford, it is impossible not to feel some sense of danger, or an apprehension that some unexpected impediment may hurl the whole cavalcade into the yawning gulf below!

The meetings of the trains flying in opposite directions [on double tracks] are scarcely less agitating to the nerves than the transits through the tunnels. The velocity of their course—the propinquity, or apparent identity of the iron trajets along which these hissing meteors move, raise the involuntary but frightful thought of a possible collision, with all its horrible consequences! The period of suspense, however, is but momentary. An electrifying concussion, as it were, of sense, sight, and sound takes place, and, in a few seconds, the object of terror is out of view behind.

But such herculean labor cannot be carried on in so small a compass, without great expenditure. The *automaton* thirsts; he knows the places of refreshment; utters a loud and piercing whistle or note of preparation; slackens his pace; halts at the fountain, and ingurgiates a deluge of water to quench his burning drought. In five minutes he is able to renew his gigantic task!

The steam shriek is a new phenomenon on the rail road, and a very startling one it is. By opening a small valve in the boiler, a volume of steam is driven, with tremendous force and velocity, through a narrow aperture, in imitation of a throat, causing a shrill shriek, unlike the voice of man, or of any known animal, but so loud as to be heard two miles off. It is a most unearthly yell, or scream, or whistle: which was compared by a distinguished poet, who sat beside me,* to the cry of some monstrous animal while being gored to death. It forms an excellent alarum, to clear the road for the train, and apprise those at the stations, that the engine approaches.

The rail road travelling possesses many peculiarities, as well as advantages, over the common modes of conveyance. The velocity with which the train moves through the air is very refreshing, even in the hottest weather, where the run is for some miles. The vibratory, or rather oscillatory motion communicated to the human frame, is very different from the swinging and jolting motions of the stage coach, and is productive of more salutary effects. It equalizes the circulation, promotes digestion, tranquilizes the nerves (after the open country is gained,) and often causes sound sleep during the succeeding night, the exercise of this kind of travelling being unaccompanied by that lassitude, aching, and fatigue which, in weakly constitutions, prevents the nightly repose. The rail road bids fair to be a powerful remedial agent in many ailments to which the metropolitan and civic inhabitants are subject.

To those who are curious, and not very timid, the open carriages are far preferable to the closed ones, especially in fine weather. In bad weather, and particularly at first, invalids may travel with more advantage under cover. I have no doubt that to thousands and tens of thousands of valetudinarians in this overgrown Babylon, the run to Boxmoor, or Tring and back, twice or thrice a week, will prove a means of preserving health and prolonging life, more powerful than all the drugs in Apothecaries' Hall.

In fine, a man may travel from the pole to the equator—

"A Gadibus usque ad Gangem"—

without seeing any thing half so astonishing as the wonders of the rail road. The pangs of Etna, and the convulsions of the elements excite feelings of horror and terror, without any thing of pride. The magic—the miracles of the rail road, engender an exulting consciousness of superiority in the genius of man, more intense and conclusive than any effort of poet, painter, or philosopher.

The rail road journey, however, is not without its inconveniences, many of which may be prevented by a little ingenuity. The greatest is the discharge of cinders, some of them ignited, from the chimney, which are not only disagreeable, but occasionally dangerous to the eyes of those in the open carriages. This might be prevented by an awning—a protection which is adopted on some rail roads, and one that must ultimately be adopted on all. It is a protection from the elements of fire and water, which every company is bound to afford to the passengers, and is attended with trifling expense. Till then, glasses or a veil are necessary guards for the eyes.

The transits of the tunnels, in hot weather, causing a sudden vicissitude of temperature, to the extent of 20 degrees of the thermometer, or thereabouts, require some precaution on the part of sensitive invalids. A shawl or large handkerchief, thrown over the head, is a sufficient protection, and those who do not take this measure, should keep their eyes shut, during the passage, since sparks and cinders are, unavoidably, thrown in closer showers over the passengers here than in the open space.

To speculate on the normal, physical, political, and economical effects and consequences of rail roads and steam navigation, when carried to their full extent, is beyond my province—perhaps beyond the bounds of human foresight. If the semi-civilized peasants of the remotest isles of the Hebrides, of Orkney, and of Shetland, can even now, transmit, in a few hours, the produce of their huts, their mountains, their moors, and their farm-yards, to the markets of Glasgow and Edinburgh, so as, in three or four days, to pay the annual rents of their tenements and wildernesses, what may we not expect from the extension and perfection of this facility of intercommunication? In days of yore, the imponderable products of the intellect travelled as slowly as the material merchandize of mankind. They will now be diffused, from the centre to the periphery—from the remo-

* Campbell.

est outlines to the loci of society, with a rapidity little less than that of *thought* itself! ! The ultimate *consequences* cannot be appreciated at present: but we may safely conclude that the benevolent author of our existence did not endow the mind of *man* with such extraordinary powers of invention, without the *design* of final advantage to his physical wants, his social relations, and his spiritual nature.

THE TRADE FROM THE WEST, BY THE JAMES RIVER AND KANAWHA IMPROVEMENT.

Extract from the Report of the Chief Engineer, Charles Ellett esq., to the late General Meeting of the Company.

It is not my intention to indulge at this time in any general reflections on the probable result and prospective advantages of the improvement. Indeed it would be as unnecessary as it would be difficult, to attempt an examination of all the influences which a work of this nature exercises over the prosperity of a state. It would be to trace the consequences of a general diffusion of wealth and commercial prosperity through every department of business and every branch of trade. If we were anxious, we might arrive at a more accurate and useful result, by considering the present consequences of a stoppage of some great work in active operation—as, for instance, the Erie canal of New York; by reflecting on the consequences to the emporium of that state, and to her agricultural, manufacturing and mercantile interests, of cutting off the eight hundred thousands tons of produce and merchandise that annually pass through it; of destroying the improvement that created the line of towns and cities from Buffalo to Albany, and that forces every cultivated acre north of the Ohio and east of the Mississippi to contribute to the growth of her wealth and power.

During the last year a breach occurred on the long level of that work, and the New York papers informed us that before it was repaired *seven miles of canal boats* collected near the adjacent locks. And now to stop the Erie canal would be more withering to her prosperity than to close up the "Narrows" which admits her foreign commerce, and more fatal to her advancement than any misfortune she could experience, excepting the loss of the energy and enterprise of her population.

I am sensible that there are those who are sufficiently aware of the importance of that work to the state by which it was made, and who can appreciate the consequences of its destruction, but who are disposed to doubt whether the James river improvement can be regarded as an analogous project. These will admit, what is undeniable—that a considerable portion of the country traversed by the latter work is quite as fertile as that which contributes to the trade of the former, and that its mineral wealth is incomparably greater; but, by over-estimating the influence of the lake trade on the tolls of that improvement, are brought to a false comparison.

Notwithstanding the rapid and unparalleled progress of internal improvements in this country, our minds are still embarrassed by the mode of considering the subject applicable to prominent European examples. Works having there been long in successful operation, furnished us with the facts which were originally employed by the advocates of similar enterprises in this country; and it is not easy to change a habit of thinking which has been long established, and to which the mind has become attached by the indulgence.

But when we estimate the probable consequences, and value of an improvement adapted to the peculiar condition and grand divisions of this country, we must view the subject in an aspect different from that of a work connecting two lakes or towns, where the trade already is, and where the consequences of their connexion may be determined from existing facts. Here things are different; the improvement creates the trade, and the trade which it creates supports the work that brought it into existence. The value of a work here depends on the place *to* which it reaches but in a secondary degree; the primary considerations being, nearly always, the character of the soil *through* which it passes, and the length of the line of the improvement.

The Erie canal is not supported by the trade of the lakes; and until the last year, the influence of that trade on the revenue of the work was hardly appreciable.

In 1835, when that line paid into the treasury of New York nearly one million three hundred thousands dollars, the tonnage of western produce coming from other states to Buffalo, and that passing up the canal to the lake, *was but six per cent.* of the whole tonnage constituting the trade of the work. The residue—namely, the 94 per cent.—was made up along the line of the canal itself, and consisted of the produce of farms which were chiefly brought into cultivation by the improvement of the forests to which it became the out-let, of the mines which owe to it their value, and of the supplies of towns and cities on its banks, the very foundations of many of which were laid after the commencement of the construction of the work.

I by no means desire to depreciate the value of that western trade, which, notwithstanding its present inferiority, I regard as by far the most important of the prospective resources of the line, and the city which it sustains. The increase of its value in one year—the last year—was 71 per cent. over that of the preceding, and there is every reason to believe that the rate of its increase will continue to be progressive. The great country surrounding the lakes and the tributaries of the Ohio has but begun to receive the population which it is capable of sustaining, and has hardly begun to send off the surplus produce which is not required for the supply of the emigrants.

The hundred thousands persons who annually go westward by the packets on the Erie canal, and the unestimated thousands who cross the Alleghany by some other route, are almost lost in the forests and prairies. They are now but seeding the ground; and we may ask in admiration, what will be the effect of the Erie canal ten years hence, when the country is in some measure populated, and the reaping shall commence—and the splendid schemes of improvement now in contemplation or in progress, leading from the interior of Ohio, Indiana, Illinois, Michigan and Canada, have begun to pour the produce of those states, destined for the city of New York, into the lakes?

The trade of the Ohio, which is one of the objects sought by the improvement we have on hand, is not less important. Its tributaries, and those of the stream of which it is a tributary, spread over a still wider area, and penetrate a still richer country. The number of steamboats, which may be regarded as the measure of the trade, is many times more numerous, and increasing far more rapidly than the number of those on the lakes.

The Pennsylvania improvement last year, though operating under most unfavorable circumstances, and in only the third year of its existence, carried to and from Pittsburg, over the ten inclined planes and broken line, a quantity of goods and produce exceeding by a vast amount that which circulated between New York and Buffalo.

And this line through Pennsylvania, from the Ohio to tide water, is open and successful. This is not the time to draw a comparison between that work and the one which we are constructing; but they who are disposed to doubt the success of the James river and Kanawha improvement, or its ability to bring the trade of the Ohio to Richmond, and forward supplies to the west, would do well to examine the list of articles transported on that line. Perhaps they will find in the fact, that there were carried from Pittsburg to Philadelphia, the last year, more than *one million four hundred thousand* bushels of wheat, and *three hundred and thirty thousand* bushels of corn; and towards Pittsburg from Philadelphia and the intermediate places, *twenty thousand tons* of merchandize, and *nine thousand tons* of groceries; an argument worthy of their consideration.

Though these articles are among the most important carried on the line, they constitute but a small portion of the aggregate tonnage.

What will be the amount carried on the James and Kanawha improvement, or what influence the superiority of its termination on the Ohio, and the advantage of its climate may have on its success, we may leave for the event to determine, and for a rational public to anticipate. As things are, it remains but for this company to go on as they are going—to expend their present capital to the best advantage—and trust to the evidence which the works they finish will afford, and that perseverance to which they owe their present existence, for raising the balance.

THE NECESSITY FOR GREAT CARE, AND JUDGMENT, IN SELECTING STONE FOR LOCKS, AQUEDUCTS, AND OTHER PUBLIC WORKS.

Extract from the Proceedings of the James River and Kanawha Company.

To the President and Directors of the James River and Kanawha Company.

Gentlemen—the chief engineer has permittted me to peruse his report of the 19th instant, on the subject of a change of plan, by the substitution of wooden locks for stone, as a temporary measure, which was referred to him and myself by the board in October last.

By this report, it appears that the saving of outlay in the first instance, is about 8000 dollars per lock, and the real loss on a final result, about 370 dollars per lock. This view of the change is quite as favorable on the side of the stone locks as I could make it.

It is well known, that from a point a little above the Rivanna river to the Blue Ridge, along the valley of James river, or in the vicinity of it, there has not been found any stone fit for locks, with two or three exceptions—and these exceptions only gave stone of bad shape, and which worked into locks with great expense.

I have just returned from a visit along the Erie canal; and an examination of the locks (built 16 to 19 years past, of stone, which was then thought by all who examined them to be good,) has proved that we ought to be very particular in our selections of stone for locks or aqueducts. In many of those locks I now refer to, the stones have scaled off on the face, and become decomposed, so as to require blanking to keep them up, until new locks can be erected; and so particular are the board of commissioners of that canal, in their selection of stone for new locks, that they are transporting stone from 50 to 120 miles on the canal to build locks and aqueducts.

The aqueduct over Genesee river, consisting of nine or ten arches, of 50 feet chord each, was built of stone, which was approved at the time, and found in the quarries in the vicinity; they have failed entirely, and a new aqueduct is now building with stone brought 120 miles.

The masonry of a lock is the most trying and severe test in which stone can be placed—and the greatest care and caution should be taken in selecting them.

I believe it will be found, that by erecting wooden locks, and placing them on the hill side of the canal, so as to build a stone lock in its proper place next the towing path, and by taking time to select good stone, from a quarry near the canal, and of a quality that will come out with good parallel beds, and cut well, a lock can be built of such stone when brought 100 to 150 miles on the canal, cheaper than the locks can now be erected. And I add to this, that in the choice of good stone and good cement, and selected mechanics, it is probable the real worth of the lock would be double the value of such as we should be obliged to build, if we persist in the construction of stone locks now, under all disadvantages.

I passed through the Pennsylvania canal, between Pittsburg and Harrisburg, in June last—and found three fourths of their locks were wood, backed up with dry walls. These, I believe, are intended to be permanent, and to be repaired from time to time as the wood decays, which can be done in winter.

Taking a view of all the bearings of the question referred to the chief engineer and myself, I concur with him in recommending the wooden locks; and I would advise the board to have a model made of one inch to the foot, representing every piece of timber, and the manner it is put together—so that contractors cannot mistake the intention of the board, and may understand their own proposals.

Respectfully submitted.

BENJ. WRIGHT,
Consulting Engineer.

Richmond, Nov. 27, 1837.

For the Farmers' Register.

THE LAWS OF SUBSISTENCE AND OCCUPATION CONSIDERED, IN RELATION TO THE AGRICULTURAL IMPROVEMENT AND GENERAL WELFARE OF THE COUNTRY.

Of all the errors, (and there are many and grievous ones,) in the present system of political economy, there is none so great, and utterly fallacious and mischievous, as that of viewing manual operative *human* labor, as a mere dead or barter commodity; as if *its* compensation, value and demand, were merely regulated and required only by the wants of the few rich; as if *its consumption*, although forming the *mass* of mankind, had nothing whatever to do with the means, power and purpose of all human exertion and industry, existence and subsistence: just as if the few rich *choose* to *demand* it—very well; and if they do not, it must suffer and abide!!! and the rich receive no injury!!

In thus considering that three-fourths of mankind, and more, are not *men*, nothing can more lamentably show the withering, blasting effects of *aristocratic* feelings and principles; for *this* is the foundation of it all. The earth was created for the use of *man*, without any regard to any distinctions of wealth or poverty, manual or intellectual labor, size or color. In one respect, all are upon a perfect equality—*the stomach;* as this is filled, so are nations prosperous and advancing, or poor and declining. If the rich man has his venison, turtle, canvass-back ducks, wood-cock and asparagus, the operative *must have*, and with equal if not superior enjoyment, his fat beef, pork and mutton, bread, cabbage and potatoes. No *individual* can be cheated out of and deprived of his *natural* rights, without a corresponding loss to *all*. Feed the *mass* upon rice, indian corn, potatoes and dry bread, and what is the result?—the utter stagnation of agriculture; no flocks and herds to maintain, create and increase the fertility of the soil, and with the consequent due economy; no price, for there is no demand to justify improvement, no means to accomplish it; all is stagnant and dead, destructive and impoverishing. If agriculture is drooping and dead, what profession is alive and flourishing? None. Agriculture is the foundation of all prosperity, and its prosperity depends upon all men being able to subsist according to the natural law of subsistence. Set the people to work according to the law of occupation, that is, every one being employed according to his *natural* taste, capacity, and power, and then all will have the means of legitimate subsistence; food will then be produced according to the law of man's subsistence, and the consequent and attendant true principles of agriculture, and all will flourish together; deficiency of food and excess of population, will then be things to be talked of as occurrences gone by. Yet political economists seem to consider low wages and excess of population, as evils of the people's own making, and of which they alone are the sufferers; and hence the Malthusian theory of "moral restraint," for their exclusive practice and benefit! How ignorant was the founder of that wretched system of the true system of the laws of the occupation and subsistence of man, and of the production of his food!

Nothing is plainer and more obvious, to me at least, (and the world will understand it too, by-and-bye, to its immense advantage,) than that the *power and means* of the production of food, are in exact proportion to the *nature* and *extent* of consumption; the true law of the production of food, being in exact accordance with the law of *man's legitimate* subsistence. That if he subsists upon bread or potatoes, or rice or hominy, or animal food alone, which nature did not form him to do, just so are his means of procuring subsistence curtailed, with increase of population; but as he subsists upon animal and vegetable food in certain proportions, and upon all their varieties, as he was obviously organized to do, exactly and duly, so are the power and means of increasing his means of subsistence, with increase of population.

This is certainly a more comfortable doctrine than that of Malthus; that most hideous, blasphemous and atheistical of all theories ever broached by ignorant man; but not intentionally so: but it is founded upon the most consummate ignorance of first *principles*, and utter ignorance of any knowledge whatever of agriculture, grafted upon narrow, exclusive, aristocratic habits, actions and principles of thinking. Audacious and presumptuous man! professing, too, to be a teacher and follower of the doctrines of him "who condescended to assume the garb of a Galilean peasant;" did you believe that all this world's productions were made exclusively for the few, and not for *man?* Did you believe that the producers of them were only to have a mere existence? although the physical organization of all is identically the same as to subsistence. Did you discover any difference between the teeth, palate and stomach of the noble, the country-gentleman, the rich merchant, and the mechanic or cultivator of the soil? No; they are all in *this* respect the same. The rich man may have his beef, mutton and pork—venison, turtle and wood-cock—bread, potatoes and cauliflower, &c. Nature has evidently so ordained it. But the laborer cannot be pushed from the board of beef, mutton, pork, bread and potatoes, and many other necessaries, luxuries and comforts, with impunity. Nature has ordained this too. Man must have his *natural* rights, or the board, and all that is upon it and *about it*, will ultimately disappear together. The silent wrecks of the fraudful monopolizing exclusive system, are visible in every quarter of the globe. They are true and unerring land-marks, to guide us and many future ages, if we will only read them aright. But it is not the "cloistered philosophers," the "elegant historians" or the dillettante tourists, that are the men to do this. It must be done by men who have lived, worked, and fed with men; and these will tell the world, man cannot be cheated out of his natural rights, as man, with impunity.

It is very remarkable, that Malthus never once inquires—"Have nations fulfilled their duties so as to obtain the means of subsistence?" Nothing can explain this but his utter ignorance of the laws of occupation, subsistence, and the production of food, and their operations and effects on the one hand, and his strong political bias on the other. Such a man ought not to have written upon *this* greatest and most important of all questions. It was deeply criminal. No man ought to write upon it, who is not prepared to see, feel and understand, that *all* men are *men* equally with himself; he must be prepared to do his duty to himself and society, and at the same time believe that all other men are *formed* to do that duty to themselves, to each other, and to him; that they are *formed* to subsist as he subsists; and that they are to be occupied in their various callings, free and unshackled, as he is occupied; to obtain their legitimate subsistence as he obtains his: he will then probably come at something like the truth: but never with the ignorance (of first principles) and the political feelings of Malthus. Malthus has written a glorious book for the selfish—(forced to be by law) idle, rich, and titled: of course *they* cried up his monstrous, outrageous, and really blasphemous theory, as a master-piece of philosophy! To make the scorn and usurped superiority of the adventitious aristocrat a fixed and satisfied principle, is an act of fearful error and mischief.

The besetting fault, and the true cause of the utter fallacy and consequent complete failure of the operation of the laws and theories of statesmen, political economists, philosophers, philanthropists, &c. are in their viewing, partial and local things, as the sole and main causes of great and universal evils; and partial and local remedies, as the great and universal ones. Consequently, their remedies are ever in direct variance with the greatest and most important laws of nature; hence they cannot succeed. Deficiency of food and excess of population, affect the condition of *all;* they arise from the ignorance and errors of *all;* they must be removed and remedied by the just observance of the laws of nature by *all*. How then can *partially* checking population in *one* class, remedy the existence of universal deficiency of food and excess of population, when all are placed in utter disproportion of the law of occupation, and the mass with that of subsistence?—thus, all making the production of food for the mass defective and deficient. If the whole *non*, undue, disproportional and defective observance of the law of occupation, makes the production of food deficient, how then can any *partial* and *arbitrary* check to population, even if practicable, possibly remedy the evil, leaving the real causes still in full operation as before?

The production of population belongs to the laws of nature; man has nothing to do with either checking or regulating its increase, or otherwise. The more he does so, the more mischief he will create. His duties are to provide due and sufficient occupation; the food will then duly follow the consequent full and legitimate demand, and consequent just compensation (wages) for it. The power to do so being *then* fully equal to the force and extent of the demand, for as is the demand for food, so are the powers and means of creating it. Who can doubt that the laws of nature are in any degree inadequate to this purpose!

It is well put by H. C. Carey in his 'Essay on Wages,' that "the trade of population is the only one that has heretofore been free; and it is to be regretted, that those who are in favor of loosing the shackles which have bound all others, advocate restrictions upon that which has heretofore escaped." If the trade of population has always been free—and God forbid it should ever be (morally and legitimately) otherwise--well may there be deficiency of food and excess of population, whilst nations are restricted in all sorts of ways, both as to their natural subsistence and occupation! *Let population alone; duly and justly employ it; and it will then be duly fed.* If it is thus duly fed, the production of food will then be full and ample. Deficiency of food and excess of population, will then wholly cease and disappear. *Let* rich and poor marry as they may. All this, political economists and statesmen, and even farmers and manufacturers, have yet to learn and understand. If they do not know these (when known) very simple and very obvious *first* principles, what errors they must commit! Not knowing them, they have done so.

Malthus has clearly and most indisputably proved (with some facts innocently, because ignorantly, somewhat stretched as part of his theory,) that deficiency of food and consequent excess of population, poverty and misery have existed in all ages and countries: thus opening the door to the investigation of the greatest and most important subject which ever did or can engage the mind of man. But surely the cause cannot be what he has conceived it to be, and still less the remedy. He says man has a *tendency* to increase faster than his food; so have all living things, animal and vegetable, from the musquito to the elephant, from the thistle to the oak, the same *tendency*. If animals have a tendency to increase faster than plants, (if I may so express it in a sort of Irish fashion for want of a better,) plants have the same tendency to increase faster than animals. The shark has a tendency to depopulate the ocean; the herring has a tendency to fill it. The lion and tiger, the thistle and thousands of other plants and weeds, little things as well as great, have a tendency to drive man out of existence. Yet all these things remain as duly proportioned as ever. We *know* the sun and other forces are adequate to sustain, light and heat the globe itself, and therefore we *may know* that there are other laws, although we may not yet have discovered and brought them into action, equally and correspondingly, adequate to duly and fully support *human* life. Nature has equalized and adjusted all these things so exactly and truly, that there is nothing either to excite man's fears regarding them, or to require any *interference* of his to regulate them, or to make any *new laws* respecting them.

I believe no one has yet investigated the question and principles of how the *occupations* of a nation govern the means and modes of subsistence, and of how the powers and modes of subsistence govern the production of food.

The great essential means of the prosperity and well-being of mankind, are the due observance of the law of occupation. All being duly occupied, they will be duly paid, and consequently, duly subsisted; the true principles and practice of agriculture will then consequently follow. With these, education must go hand in hand; and to establish these, there must be good government. If these laws are not duly observed and established, how nugatory must be all compulsory laws of government, directing and controlling the people! And how unnecessary, if they are observed and established!

Every man is born with certain powers and abilities to enable him, not only fully to support his own existence, but likewise that of his children; that is, provided all other men duly exercise their powers and abilities, and all duly and equitably exchange the products of their labors with each other. If the sexes, rates of increase, kinds and quantities of food, animals, plants, fishes, birds, land and water, heat and light, seasons, *every thing*

—are all duly and exactly proportioned to each other, surely the natural tastes and abilities of all *human* individuals, are as justly and equally proportioned to each other, so as to duly, fully, exactly, and proportionately, supply each other's wants. Whether a certain piece or kind of timber, or a certain other piece or kind, is made into a table, a chair, a box, or a coffin, or something else, or any thing else, *may* be of no sort of consequence; but not so whether a *man* is *made* a ditcher or an idle lacquey, whom nature intended to have been a blacksmith or a carpenter; or is made a farmer, who ought to have been a cotton-spinner; or is made a clergyman, who ought to have been a butcher; or a lawyer or physician, who ought to have been a drayman; or is *made and forced to be a lord*, whom nature intended for a stage-coachman or ostler; or who is made a beggar and convict, who ought to have been a secretary of state; and so on with all others out of their places, and in no places.

No man can ever be truly happy, virtuous, industrious, healthy in body and mind, and in all things truly right and securely and fully successful in life, who is out of the place or profession assigned him by his *natural* tastes, capacity, and powers. How wrong, then, are all artificial distinctions, privileges and powers, slavery, &c.! It is this which causes excess of population, keeps wages below the power of the observance of the law of subsistence, consequently depresses agriculture to the lowest possible condition. Slavery makes nations poor, stationary and retrograde, because it makes the different classes to supply each other's wants so unduly disproportioned to each other. *It is this disproportion*, which is the real source and immediate cause of all the poverty, idleness, and consequent misery, and crime of Ireland.

Were all placed in their natural and legitimate stations, violent revulsions in trade could never occur, and bankruptcies very rarely; "competition" in trade, the curse of society and the destruction of honesty, integrity and fair dealing, could have no existence. Trade, commerce, the law, medicine, and the church, &c. are called very uncertain and precarious professions; and why? They are not inherently so; but because the folly of ignorance, pride, prejudice, caste, &c. are ever unduly filling their ranks. No wonder then the endless and periodical failures in them, from two such causes as undue numbers, consequent undue and ruinous competition and speculation in some, and the unfitness of individuals in all.

It is the due proportions of the population in the different professions which is the cause of the prosperity and high wages in nations and colonies in their infancy. It is the infraction of this great law, (the law of occupation,) produced by evil laws, institutions, opinions, and habits, which creates excess of unemployed population, consequent low wages; these causing the destruction of agriculture, manufactures, and commerce, and consequent national old age, decrepitude, and decay. Prosperity ought to be the greatest, and wages the highest, in the oldest countries; and would be so were the law of occupation duly and fully observed, and the observance duly proportioned. Political economists may, yet awhile longer, tell us this cannot be. When I see the ocean filled with nothing but putrid herrings at one time, and at another, with nothing but sharks devouring each other—and the buffalo chasing the lion—the vulture skimming the air in pursuit of insects—and the swallows flying away with lambs and kids—when I see the orange and the pine apple perish in the south, and more plentiful in the north than grass and wheat—I, for one, will believe them.

All national prosperity, stability and permanence, as well as all individual well-being, are dependent upon the different branches of *productive* industry being duly proportioned to each other. As this happy state of society is becoming more and more established, nations will become more and more prosperous, industrious, civilized, happy, stable and permanent: and as they go on, more and more so, and interlocked and identified with each other in the interchange of the various productions of the different *latitudes*, by means of commerce, (the great civilizing power,) promoting each other's prosperity, wealth and happiness —wars, (idleness, poverty, misdirection of occupation and non-intercourse, being the cause of them,) poverty, deficiency of food, excess of population, &c. &c. will gradually cease, and be no more.

Could we but ascertain merely the proportions of the different professions of the populations of the once vast and powerful, but now wholly extinct, empires of the east, from their rising to their setting, we should at once see the real cause of their "decline and fall." In all ancient empires, neither national nor individual legitimate industry, powers and means, were called into action; they had no legitimate existence or direction whatever. All and every thing were ropes of sand; there were no bonds of union, domestic or foreign, none were dependent upon each other's industry; all was consequently brute force, violence, fraud, oppression and aggression; and consequently, they fell, not by the acts of any individuals, for individuals have no such power, but by the radical and inherent defects of their whole national and individual relations. They had only five classes; soldiers—the idle unproductive rich—slaves—what may be termed the idle productives—the builders of temples, pyramids, pillars, tombs, mausoleums, theatres, &c.—*and the miserable cultivators of the soil.* Their fate was inevitable. How entirely different are the conditions and relations of modern nations, both internally and with regard to each other! Yet how far from what they ought to be!

In the immense mass of public buildings in ancient times, there are none which, after their erection, added any thing to the national wealth, or opened, in any degree, the channels of productive industry. This was an immense and incalculable evil. An ancient emperor, or patrician, fed hundreds of wild beasts; hundreds of modern agriculturists and manufacturers consume the *same quantity* of food. The former left nothing but their skins; the latter add millions to the national wealth, and create means for the support of thousands in perpetuity.

What a wretched political economist is he who says, that he who builds palaces, keeps dogs, hunters, race-horses, gives expensive entertainments, &c. employs the poor, and benefits hundreds! and that every man has a right to spend his income as he likes! Is there any error so great and mischievous as this doctrine? The Duke of Bridgewater laid out his fortune in making his canal. George IV. and many nobles, spent the products of other men's industry upon palaces. Who can calculate the difference of the effects of each, upon the national industry and wealth for a hundred years afterward? The canal employs thousands and millions, directly and indirectly, in *productive* industry, for ever afterwards; the palaces engage thousands in consuming idle, unproductive existence only; destroying the products of the industry of others, without rendering any equivalent productive return.

When we view the hordes of the idle rich and the idle poor—the unemployed, and the wrong and unproductively employed—the useless in all professions—the tax-gatherers—soldiers and naval sailors—the useless hangers-on and dependants of nobility—beggars—thieves---convicts---gamblers—horse-jockeys—the army of government officers and laborers—the government aristocrats, (the fund-holders)—the sick, &c. &c. we shall find, in England at least, that it is not the industrious many who support the idle few, but the really industrious productive few, who support the idle and unproductive many. The really improving productives in England and the United States, are greater than in any other countries; hence their present condition. If *all* were any thing like productively occupied, and industrious, the danger would be of far too much production of food, instead of too little, and constant unconsumed *excess*, instead of *deficiency*, would then be the result, *were the observance of the law of occupation not duly proportioned;* this being the means of duly proportioned production, and the check to undue and excess of production of some things, and deficiency of others. For the want of the observance of the law of occupation, even now excess of production often takes place in agriculture, and particularly in manufactures. Before the establishment of manufactures in the United States, agricultural produce was sometimes almost wholly unsaleable.

With the law of occupation, the law of primogeniture is wholly inconsistent, and consequently the law of subsistence is violated, and the true principles of agriculture cannot be practised and developed. How can any right, real improvement of the soil, to the proper extent, take place in England, with the law of primogeniture and entail? Under the operation of these laws, neither the tenant nor landlord can do justice to the soil. The tenant, at will or under lease, and in both cases at exorbitant rent, with no permanent interest in the soil, with all he does, being of no advantage whatever to his children, but the contrary—will he, can he, ought he, to improve the soil? Will the landlords do it? No. In ninety-nine instances in a hundred, they are unfitted by nature, and in all, almost wholly unfitted by education, habits, pursuits, &c.; spending their means upon palaces, living in London or abroad, horse-racing, hunting, gambling, &c. Then how have the improvements in England, as far as they have gone, (and much has been really and wonderfully done,) been accomplished? By the force of the demand of the *non-agricultural* population, by the vast demands of the manufacturing, mining and commercial population. What would have been the results had the occupiers been the owners of the soil, and the owners the occupiers?

Why have the owners of the soil in England, who have been the occupiers, not in general improved their estates better, equally and proportionately with the tenantry? for it is a fact that they have not done so: because they are generally the *hereditary* owners, *rarely fitted by nature for the occupation*, and still less so by their education, associations, habits, and other pursuits. The *hereditary* owner of a moderate estate, in the midst of large hereditary estates, is placed in a most perilous and dangerous situation; his habits are those of the opulent aristocracy by which he is surrounded, and having no rent to pay, he fancies himself a great deal more secure than he really is. He identifies himself far more with the rich owners of the soil, than with the tenant occupiers.

To investigate the real positive utility of, in themselves, an *idle, unproductive, hereditary aristocracy*, would be a curious and most important inquiry. They promote literature, the fine arts, *certain* forms of good manners and civilization, morals and habits, cleanliness, &c. What more? Are monarchies and aristocracies to restrain and suppress the effects of ignorance? to govern society by *fear* and subservience in the *absence* of knowledge, morals and principles? It would appear to be so.

The primary, and great source, and cause, of the real impediment to the right advancement and prosperity of the national and individual interests in the United States, (and all other countries,) at the present moment, are the *deficient* proportions of productive industry and occupation to the agricultural portion of the community, and the too great proportion of the soil in cultivation to the *existing* population. And though little suspected or thought of, these are the main causes of the present deranged state of all the commercial relations. No country, and the currency of it, can be in a healthy and stable condition, until all the manufacturing and other branches of productive industry are duly proportioned to the agricultural, and until the soil in due cultivation is duly proportioned to the legitimate wants of the existing population.

The present condition of the United States, is a transition one, from a purely agricultural state (the worst possible a nation can be in, next to the purely savage and pastoral,) to *varied* occupation. There are yet too many farmers and too few of other productive professions; yet now sufficient of the latter to press upon the existing deficient means and defective system of subsistence, induced by the excess of agriculturists and the deficiency of a healthy productive non-agricultural population. The remedy: More non-agricultural productives, to produce a *consequent* improved system of agriculture upon the soil now occupied, (*vide* England) which will be in no degree promoted by importing grain from countries which ought to consume it at home. To encourage the importation of food, (the *defrauded* surplus of unduly fed populations abroad,) to lessen and check the existance, growth and extension of home non-agricultural industry and production, with a view to increase, or in any otherwise to increase, the already by far too great extent of the occupation (for cultivation it cannot be called) of the soil, would betray the utmost extent of legislative ignorance of the true interests of society. To those entirely unacquainted with agriculture, it would obviously appear, that the more of a population is employed exclusively in agriculture, the greater would be the production of food. The reverse is the fact. The more agricultural a nation is, and the worse and more unproductive is and must be its agriculture. There is a sad and most fallacious view of this sort in the late report of the Secretary of the Treasury, (1837.) The true productive, and *increasingly* productive, and *really economical* system of agriculture, *can* only exist with the bulk of the population otherwise productively employed than in agriculture. To those who understand the true principles of agriculture, all this is abundantly evident; to those who do not, the example of England will abundantly prove it. No country was in a lower condition than England when purely agricultural, and that at no distant date. She was sunk in poverty and barbarism, when Italy was prosperous, wealthy and civilized. As the agricultural population proportionately diminished, and other productive professions increased, exactly did her prosperity, wealth and power increase, with at the same time endless and most heavy drawbacks and burthens upon agriculture. What would have been the condition of England now, had there been a just and economical government, and the soil had been placed upon an equal footing of freedom and security with her manufactures and commerce.

The scarcity of food of late in the United States, I foretold many years ago. But not because there are too few employed in agriculture, as hinted at by the Secretary of the Treasury, but because the system of agriculture created during the period of the nation being an almost purely agricultural one, is still pursued with an increasing non-agricultural population. The agriculture of the country has not yet improved with and by means of the non-agricultural population; but it will most assuredly do so, if that population is not *madly destroyed and perverted from its present occupations.*

The view taken by the present political economists of *wages* and *human* labor, its supply and demand; of deficiency of food, excess of population, their causes, operations and effects, are most fallacious and mischievous, and will ever be so, so long as the *labor of man* is merely viewed as a common dead commodity. A far higher view than this must be taken of its operations and effects. They have yet to learn that *low wages* are the primary cause of excess of supply of labor, and not the effect in the first instance. The two unquestionably become cause and effect upon each other.

The causes of too low wages are the ignorance of the people, the *equal* and corresponding ignorance, and the narrow, selfish, short-sighted views of capitalists, as to their own true and permanent interests and those of the operatives—the interests of both being intimately and indissolubly bound together—but above all, from the undue, disproportioned, and non-observance of the law of occupation. *High wages* are advantageous to all, more or less so directly and indirectly, but to none so much so as to the farmer; they give him better prices, they enable him to cultivate the soil by the only true means of improvement and increasing fertility, and with the greatest economy of labor, *in requiring the due proportions of grain and cattle crops, &c.* The farmer who advocates low wages, commits a quadruple suicide. The manufacturer who advocates the same, cuts the throats of the far greatest *majority* of his customers. The manufacturer who pays low wages, sells a diminished quantity at a diminished price only; but the farmer who pays low wages, cuts up his power and means of production root and branch, for he destroys the fertility of his soil, and possesses no power to maintain and increase it; that is, if wages are *below* the bread and meat power of subsistence, which is the natural law of subsistence. The profits of the farmer will be the greatest and highest, when all have the power and means of obtaining all that is essential for the due, healthy, legitimate existence of man; for then will prices be the highest, or in other words, the most duly proportioned, and the labor required, the least possible. The prices of all the different productions are always proportioned to each other exactly as the law of occupation is observed. All the other productive professions have always been the least duly proportioned to the agricultural, (the latter being in excess and the former deficient,) so have the profits of the farmers been usually the least.

Were the different professions all duly proportioned to each other, far less land would be in cultivation in proportion to any existing population, than now is; but the land in cultivation would be many times more productive than before, and at much less expense. All this may appear paradoxical enough to those who have not studied and investigated the operations and effects of the due observance of the laws of occupation, subsistence, and the production of food.

With most political economists, (and farmers as well,) "capital" is every thing—the panacea, the power, the means, the end, the object, the pursuit, the every thing, the all-in-all. Capital is certainly a good and essential power, the product of skill, knowledge and industry; but it is not the first of all essentials in national prosperity, but only a very secondary one. The first is *system*—the primary *unbought* power and means of production. Of what avail is capital to the agriculturist, if the laws of occupation and subsistence are not duly and legitimately proportioned and observed? He may build, make fences, drain, lime, and apply what are foolishly called artificial manures, &c. &c. and the nature and extent of the public demand *compels* him to have a large undue proportion of exhausting crops, and the same crops too frequently repeated, (the greatest of all errors in agriculture,) and withholds from him the means of duly maintaining and increasing the fertility of the soil, stock being far too little in demand. It is *system* which is the all-in-all to him, and this he must be enabled to pursue, by the just and full demand of a legitimately occupied, and consequently, legitimately fed population. Without this, capital is of no avail. It is this which will create it; aad which has done so, so largely, in England, and might have done so a hundred-fold more, were the laws of occupation and subsistence more legitimately observed than they have been, and are.

The true system of agriculture would be—*all the grass* crops in succession, according to their respective periods of duration, with *all* the crops for the subsistence of man and stock, and for clothing, &c. intervening; all according to the *latitudes* to which they belong. All those crops which return the most to the soil, are required to be grown the most, and *vice versa.* The grasses stand at the head. This would require a period of from 15 to perhaps 40 years, before the repetition of any one crop. By a wise and beautiful provision of nature, it is obvious that those crops which return the most to the soil both in vegetable and animal manure, are required to be grown the most. Again, those crops which return the most to the soil, are the least expensive in their cultivation; those which return the least are the most expensive. Nothing is plainer, than that the crops for stock must be grown in the largest proportions. The more the grass crops are cultivated under the convertible husbandry, the more will be the *whole* produce, although the arable crops will be so much less in acres, and the less will be the expense and labor. Nature has been peculiarly bountiful, kind and considerate to the farmer, if he and society will only obey and observe her laws.

The great purpose and secret in agriculture, is *system*—that is, the right and proper rotations of crops; these being right, the gradual, increasing and permanent perfect full fertility of the soil, will be mainly accomplished, at no labor and expense whatever; nature producing the intended and required effects, by the silent, costless operation of her own laws, the crops themselves producing the means of subsisting each other. If the rotation is wrong, no expense and labor will remedy the consequent errors and defects. Machinery is of very limited application in agriculture, therefore nature has given the farmer similar advantages to the use of it in other professions, by *system.* All the essential wants of human nature, are justly belonging to all, therefore if not attainable by all by means of manual labor, there are clearly means of making them so, by machinery, system, &c. Knowledge is essential to all; this could never be communicated by writing, therefore some cheap method was attainable, which is printing. There is no better guide than this principle in attempting any new discoveries: that is, in all we do we must begin with first principles.

As a proof (amongst hundreds) of how little principle and system are even yet understood and practised by the farmers in England, we shall often see them employing a *very large additional temporary* force in harvest; sowing and hoeing turnips; weeding grain crops, &c.; and, if they can afford it, even boasting of having employed a more than usual *temporary* force in some particular operation, deeming it an act most meritorious and skilful! Again, how often do we hear farmers say, "but I farm differently from others; I buy a great deal of manure, I keep stage-horses upon my farm, and I can farm as I please! I can take two or three crops of wheat together!" The fact is, the *true principles* of agriculture are the same every where, and under all circumstances. Animal manure is not the only indispensable principle—the sole panacea. If one farmer can procure double the quantity of manure another can make, this does not do away with the necessity for practising the same system. Rightly applied, this increased quantity of manure, would greatly increase the crops—but the farmer who presumes upon this aid alone, to depart from the true principles of agriculture, will find himself, eventually, a severe sufferer. The farmer who has no fixed, steady, undeviating principles of action, whatever may be his means of procuring manure, (of any kind,) is in the infancy of his profession. How wild, random, and unsettled are, as yet, the best *apparent* practices of agriculture! What would be thought of the commander of a ship, who steered now here, the next day there—one week required 10 men and the next 100—and so with others? Yet this, and far worse, is the every-day practice of farmers. I know, as yet, no reason why a farm should not be carried on with the same fixed steady principles as a ship or manufactory. If we read the works on agriculture, if we examine the voluminous reports of the English parliament, we shall find no two men agreeing upon the same principles. It is surely time that all this ignorance, for it is nothing else, *should begin to have an end.*

Manure is only one principle in agriculture; the important one, vegetable matter, (grass and other roots,) is another, and succession of crops is a third. Of all the principles in agriculture, still so obscure, hidden, and little understood, none is apparently so obvious and clear as the imperative demand of nature, that crops should be varied to the extent of all the different kinds in existence. Yet we continue to cultivate not a tythe of them, and repeat them everlastingly; and bitterly do we pay for our wilful ignorance and wretched arrogance and presumption. Even in the United States, *from the population being too purely agricultural,* during the French revolutionary war, (although wages were very high, and the people fully employed in agriculture, commerce, building, making roads, bridges, &c.) and the demands of Europe being chiefly for *bread-stuffs*—a system of almost exclusive *arable* cultivation, and consequent destructive one, was introduced and established, which will require years and years to remedy and counteract. That war, with the home exclusive agricultural population, was as destructive of the fertility of the soil, and the means and powers of its improvement in the northern states, as is the present system in the southern states, of supplying Europe, &c. with cotton, together with its present exclusively agricultural population.

I attribute the extensive and disastrous failure of the turnips, potatoes and clover in England, of late years, to the deficiency of vegetable matter, (grass) and the too close repetition of them. The crops are diseased, and consequently are attacked by insects, which are supposed to be the cause of all the mischief! This is a very shallow and very common way of investigating things, viewing the *last* effects as the *primary* cause.

The true successful period of sowing and planting all arable crops is very short; therefore, manure can only be directly applied to them with great expense and additional labor, and risk of failure by consequently sowing too late; therefore it must be wrong so to apply it, however otherwise advantageous the direct and immediate application of manure might be, which it consequently is not. Manure is much more economically and better applied to grass than to any other crops. By applying manure in the spring and fall to the grass crops, there is the least possible waste of it; the greatest possible quantity of grass is raised at the least expense, and the soil put in the best possible condition at the least expense, for the subsequent arable and grain crops.

Is straw an essential, profitable, economical and advantageous food for stock? Clearly and most obviously not. In all our investigations, we must begin with first principles. On no well regulated farm, is there more straw than will keep the requisite stock clean, dry and warm, and thus preserve the manure. Straw contains little nutriment, and is very indigestible; and if any manure is lost by the use of it as food, it is obviously the most costly and unprofitable food a farmer can consume. I know of no more speedy and certain method of bringing a farm into the hands of the sheriff, than growing an undue proportion of tillage crops, and using the straw as food.

Take *all* the crops formed for the use of man and stock in succession, the grasses intervening one to ——— years. between one arable crop for stock, and one arable grain crop for man—never more than three arable crops together—two the best.

Every crop to be repeated as distantly as possible.

Sow clover with every arable cattle crop, to plough in for the next crop.

Manure no arable crops excepting Indian corn, potatoes, turnips, millet, &c.; and applied on the surface as long as possible before planting, and applied very moderately.

The rest of the manure, with lime and plaster applied to the *young* grass; after mowing the grain stubbles, applied very moderately.

Lose no manure of any kind, liquid or solid.

Never apply any labor to destroy weeds; they will go of themselves, if the due supply of *vegetable* matter is created by the *grass* crops. Weeds are a true test of agriculture.

Although agriculture is in reality the first and most important of all human occupations, and the foundation of all others, and the first means of all human existance, all other legitimate productive occupations are the foundation of it. It is the first, yet it is the last, which can be fully perfect. The improvements and labors of individuals in all professions and sciences, are utterly vain and nugatory, unless the condition of the population is equal to sustain those improvements and labors; hence in countries where rank and titles are yet worshipped and looked up to, credit is given for many accomplished and created results, to individuals, which are due alone to the condition and well being of the public. Discoveries, and the developement of science and knowledge, are not made so much by superiority of intellect, as by developed previous knowledge arising from the pre-existing and existing wants of society, affording a guide and clue to them. The most brilliant Greek or Roman never could have discovered the steam-engine, steam-boats, coal-gas, rail-roads, &c. &c. &c.; they had no previous guiding power, influence and knowledge, to lead them on to do so. Discoverers have never been willing to admit and acknowledge this influence and directing power over their minds; credit is given them for much more merit and talent than they possess. I am fully aware of the full effect of this power and influence in my own discoveries, respecting the use of weeds, the law of human subsistence and occupation, and the discovery of (as I believe) the true system of rotation of crops consequent to them; and the discovery of the true cause of the fly in the wheat, the worm in the peach, the failure of the turnip and potatoe crops, the true system of manuring, &c. &c. My knowledge obtained in England, and then seeing the wants and state of society in the United States, made the developement of all this easy and consequetive. I have not a whit more talent than certain other men; they had, and have, no more talent than I have; previous certain knowledge, constitutional organization, and existing circumstances, place all discoverers upon a level.

Socrates and Plato would have been fools in conversation and knowledge respecting manufactures and many other subjects, with the most stupid and illiterate cotton-spinner in Manchester.

That must be the truest and best system of agriculture:

Which requires the least labor comparatively and positively.

Which requires the least *additional occasional* labor. (A very sure test.)

Which returns the greatest quantity of stock, grain, material for clothing, &c. together.

Which furnishes sufficient manure for *all* the *young grasses*, the corn, turnips, potatoes, millet, &c.

Which permits all the crops to be sown, planted and harvested in due season, without hurry, and with the least *additional* labor. By this rule, the surest and best, much of the agriculture of England is exceedingly defective.

Which permits the greatest quantity of stock and produce to be sold without creating any deficiency of manure.

Which is yearly improving and increasing the crops, and the fertility of the soil; and without essentially increasing the labor.

Which produces improving quality as well as quantity of produce.

Which diminishes the growth of weeds without any labor being expressly and exclusively applied for *their* destruction.

Which makes the crops more and more independent of seasons, and proof against the attacks of insects.

Which returns the greatest possible quantity of vegetable matter and animal manure to the soil, without at all curtailing the sale of the just and due proportions and quantities of produce, in accordance with the *legitimate* wants and demands of society. If sufficient manure *cannot* be made, either the crops are very unduly proportioned, or they are still deficient.

In short, that is the true system which will furnish food to all in accordance with the law of man's subsistence, as he is organized to subsist. The true principles of agriculture must be, and are, in accordance with that law. And man's organization must be, and is, in accordance with the true principles of the law of the production of his food; and the law of his occupation must be and is in accordance with both these.

George Henry Walker.

From the Nantucket Inquirer.

PEAT.

Peat is of vegetable origin, and is formed in cold, moist situations, where vegetables may be decomposed without putrefaction. Hence, in the torrid zone it is never found; but as we advance north it occurs, and on the borders of frigid regions it is found in great abundance; a cold humid atmosphere being peculiarly favorable to its generation.

Peat is composed of aquatic plants, such as reeds, rushes, etc., but a species of moss (Sphagnum Palustre) is generally found more abundant than any of the former class; it having the property of sprouting, and continuing to grow, while its roots are decaying.

In some peat, (as is the case with our own,) plants are found with their organization so distinct, that we can even determine their species. As is said in one of the Bridgewater Treatises, "that we may almost seize nature in the act of making coal before the process is completed," so it may be said in regard to peat; for the rude fragments of undecomposed plants we trace the process to perfectly formed peat, where a complete decomposition has taken place; and from thence to anthracite.

There is, however, a striking difference between the periods in which the vegetable depositions that form anthracite and peat took place.

Geologists agree in assigning the epoch to be antediluvian in which the vegetable deposits that form coal were made; and they also conclude, that the temperature of the earth was much higher than at present; for fossil ferns are found in coal formations, of the astonishing length of fifty feet, and other plants bear the same ratio. Now plants of this species in the torrid zone are found to approach this size at the present time; but coal is found in the temperate and frigid zones—consequently, we are led to suppose, that a higher temperature once existed in those regions.

But peat is of recent origin, as may be shown by the following facts. In Hatfield, England, as in many other places in Great Britain, Roman roads have been discovered eight feet below the peat; and their arms, axes, coins, etc. have been found in the same situation, showing that these peat bogs have been formed since the invasion of Cæsar. Nor can any traces of the great forests spoken of by this general in his 'Commentaries,' be discovered, except by their fragments, which are found in peat. And De Luc has ascertained, that the very positions of the forests spoken of by Cæsar, viz. Hercinia, Semana, Ardennes, and others, are now occupied by peat-bogs.

As orders were given by Severus and other Roman emperors, to destroy all the forests in the conquered provinces, it is evident why the remains of these once majestic tracts are found imbedded in peat: for when they were prostrated, their trunks, limbs and leaves, would check a free drainage of the water falling from the atmosphere, and also prevent in some measure its evaporation. Consequently, a decomposition of the foliage and branches of the trees would commence—aquatic plants would spring up, and decaying, add to the mass which is found in time completely to envelope the pristine forests.

An occurrence of the recent formation of peat took place in Roos-shire, Eng. During a violent storm, a forest was overthrown, and in fifty years, the people dug peat, from a mass occasioned by this overthrow.

On examining some of the peat formations which are so extensively scattered over our island, we have observed large stumps, trunks, and limbs of trees completely immured in peat. There seems to have been a deposition of shrubs, flags, and other plants, which we find but partially decomposed.

After this formation had taken place, forests sprang up, which have been cut down, probably within a century, and their fragments have aided in forming our peat bogs, which are now discovered from one to fourteen feet in depth. Without doubt, most of our peat formations have taken place since the pristine forests were destroyed, and are comparatively of recent origin. We will further state what seems a curious, but is a well ascertained fact, that not only here, but wherever the peat is discovered, it is generally found to occupy the position of ancient forests. For in most bogs, stumps, and trunks of trees are found surrounded by peat, while their roots remain in their natural position, immured in clay, or some other soil.

In some countries, peat mosses are found of great extent. One mentioned by Dr. Boate on the Shannon, was fifty miles; and Blavier speaks of one at the mouth of the Loire, more than fifty leagues in circumference.

The texture of peat is such, that it absorbs large quantities of water; and it has often happened, when bogs were very much swollen, that they have burst and deluged the surrounding country with their contents. We are informed by Deguer that the remains of ships, nautical instruments, and oars, have been found in many of the Dutch mosses; and Gerard in his history of the valley of Somme, mentions that in the lowest tier of that moss, a boat was found loaded with bricks, proving that these morasses were at one period navigable lakes, and arms of the sea, as were also many on the coast of Picardy, Ireland, and Friesland, from which soda and salt are procured. "The canoes, stone hatchets, and stone arrow heads found in peat in different parts of Great Britain, lead to similar conclusions."

One more fact in relation to peat is worthy of our notice. It is the preservation of animal substances which have been buried in it. A great many instances are recorded, which go to prove this property; a few, however, will only be mentioned.

"In June, 1717, the body of a woman was found six feet deep, in a peat moor in the isle of Axholm, in Lincolnshire, England. The antique sandals on her feet afforded evidence of her having been buried for many ages; yet her nails, hair, and skin are described as having shown hardly any marks of decay. In the 'Philosophical Transactions,' we find an example recorded of the bodies of two persons having been buried in moist peat, in Derbyshire, in 1674, about a yard deep, which were examined twenty-eight years and nine months afterwards; the color of their skin was fair and natural, their flesh soft as that of persons newly dead." At the battle of Solway in the time of Henry VII. (1542,) when the Scotch army commanded by Oliver Sinclair was routed, an unfortunate troop of horse, driven by their fears, plunged into Solway morass, which instantly closed upon them. The tale was traditional, but it is now authenticated; a man and horse in complete armor having been found by peat diggers, in the place where it was always supposed the event had happened. The skeleton of each was well preserved, and the different parts of the armor easily distinguished.—*Obs. on Picturesque Beauty*, 1772.

For the Farmer's Register.

THE WIRE WORM.

March 13th, 1838.

For the last fifteen or twenty years, our crops of corn have been materially shortened, and especially has the labor of making them stand, been much increased, by the attacks of a small worm, not unaptly (from its size and form) called the wire worm—by some called the web-worm. This little animal lives during the winter in the pith of weeds; especially the stick-weed, and has been known in this part of the state only since the practice of enclosing and non-grazing. I can remember well its first appearance. It is not the cut-worm, so injurious to newly planted tobacco and young cabbage plants; nor does it work its injury in the same way; but it assails the corn as soon as it comes up, just in the bud, where the roots and stalk spring out, and eats into the bud; not always *entirely* killing the plant—but so enfeebling it as to render it worthless. Every one remembers how fatal this little worm proved to be last year; and, no doubt, any plan proposed to avert the evil will be tried, if it be neither expensive nor troublesome. Such is one I suggest now, viz:—simply to steep the seed-corn twenty-four hours in a strong decoction of tobacco; any refuse tobacco, or even stalks, will answer. Having suffered exceedingly from this worm last year, and finding that two of my neighbors did not suffer at all, I inquired the cause, and was informed that the use of tobacco juice as recommended above had the only assignable cause for their exemption from the injury so severely felt by me and many others. I understand from them, they had used this remedy for some time, by the advice of Mr. William Skipwith, formerly of Cumberland county, whom I had long known as a good cultivator; and whose land, from a long continued system of enclosing and not grazing, was peculiarly foul, and liable to injury from the worm.

One of the numbers of your Register, some time last spring, spoke of the great injury sustained by Mr. Carter of Shirley, from this or a similar worm. If Mr. Carter will use the preventive, I propose, and it should prove effectual, I shall be well rewarded for the little trouble of making this communication, by the reflection that he has been (however inadequately) rewarded for the great benefits he has conferred on agriculture, both through your paper and by his example.

ARATOR.

From Dr. Granville's Report to the Thames' Improvement Company.

ON THE VALUE OF HUMAN EXCREMENTS AS MANURE.

This very question having been submitted a few years since to the consideration of the late Professor Hembstadt, of Berlin, by the Saxon and Prussian authorities, who were desirous to apply the contents of the city drains and cess-pools to the recovery of barren and sandy lands, in the environs of Berlin and Dresden—that eminent agriculturist undertook, in conjunction with other learned men and practical farmers, a series of experiments, which were carried on for a great length of time, and were varied in every possible way, in order to avoid all sources of fallacy. The results of those experiments, Hembstadt afterwards published, and they led to extensive agricultural operations, all of which proved successful. Professor Scnübler, the writer of the most esteemed and certainly most able 'Treatise on Agronomia,' or the best mode of knowing and treating every species of land, repeated and added to the experiments of Hembstadt, from which he obtained alike results. These he published in a tabular form, which has since passed into the hands of all the large practical farmers in Germany, and have formed the basis of instruction on manuring, in the hands of professors of agriculture, whom many of the continen al governments have, with infinite advantage, established in institutions purposely formed to disseminate useful and practical truths in the art of arming. From that table the following facts may be collected.

If a given quantity of land sown, and without manure, yields three times the seed employed, then the same quantity of land will produce

5 times the quantity of sown, when manured with old herbage, putrid grass or leaves, garden stuff, &c.
7 times with cow dung,
9 times with pigeon's dung.
10 times with horse dung,
12 times with human urine,
12 times with goat's dung,
12 times with sheep's dung, and
14 times with human manure, or bullock's blood.

But if the land be of such quality as to produce, without manure, five times the sown quantity—then the horse dung manure will yield fourteen, and human manure nineteen and two-thirds the sown quantity. *

In addition to this information, it was ascertained that the most important crops—those, I mean, which yield most profit—such as flax, for example, so extensively cultivated in both Flanders, can only be obtained in abundance, and of the finest quality, by employing human manure.

But by far the most important point of practical knowledge in this matter, put forward by the same great authorities, and the truth of which was afterwards confirmed to me by more than one great farmer in East Elanders, is, that while the manuring with human soil has produced fourteen times the quantity sown, where horse horse dung has yielded ten—the proportion of the human or Flemish manure employed, was to that of the horse dung, as one to five only; so that with one ton of the Flemish, a larger produce is obtained, than with five tons of stable manure. These indisputable truths being once ascertained, let us see how they would work practically in this country.

In England a ton of good stable manure sells for five shillings. Now an acre of arable land in an ordinary state of cultivation in England, is ma-

* It is curious how this corresponds with one of the experiments made by Mr. Burrows, an intelligent Norfolk farmer, who received the gold medal from the Society of Arts, for them. On four acres of broadcast wheat, Mr. Burrows obtained 14 quarters and a fraction of wheat, hoving emploped one quarter as seed. Had he manured his land with Flemish manure, instead of 14 quarters, he would have obtained 19 2-3 quarters for the one he employed.

nured with 20 tons of horse or stable dung every fourth year, according to Professor Coventry, and consequently entails an expenditure of £5 in that year. It then produces ten times the quantity of wheat sown. But an acre of the same land, similarly sown and manured with Flemish manure, would require only four tons of it; and entail, at the price we have fixed for that manure, an expense of £2 8s. It would, then, produce fourteen times the quantity of wheat sown.

Supposing the produce of the acre manured with horse or stable dung to be five quarters of wheat, † and sell for £15, that of the acre manured with Flemish manure, will be seven quarters, and sell for £21.

The end of this comparative farming operation therefore would be,

1st, a saving in manure, £2 12s. per acre,
2nd, a surplus produced, £6 0s. do. in money,

Total £8 12s. per acre.

A sum which the employment of the Flemish manure would put into the pocket of the farmer, above the largest numerical result he can obtain by his mode of cultivation. Thus far as to his private interest; but in this operation the public would also be a gainer, inasmuch as by means of it, two more quarters of wheat per acre would be sent into the market—a circumstance, which in the year 1832, would have prevented the necessity of importing into this country 463.502 quarters of foreign wheat, as appears from a return made to an order of the House of Commons in 1833.

But even this marvellous result of Flemish manuring, in the cultivation of wheat lands, falls into insignificance, when compared to that which it yields when applied to other cultivations, the produce of which, as I ascertained by minute personal inquiries at some of the largest farming establishments in Belgium, instead of being nine only, above the ordinary produce, as before mentioned, rises as high as 12, 15, 20 and even 40 per arpent. The same may be said of it, when applied to lands completely barren, and which, having been originally rented for one florin the arpent, have, in the course of four years, been improved, through Flemish manuring, into an easy rent of 30 florins per arpent. Examples of this sort are numerous, and many such were furnished me by the authorities at Brussels, La Haye, Rotterdam, and Berlin.

† This is assuming a most favorable return, since I find in a report on the "Allotments," in the parish of Missenden, (as a fact of which they seem proud) that the land would, under the plough, in an average year, produce only 20 bushels of wheat, or 2½ quarters; and even Mr. Burrows, in his first-rate experiment of four acres of drilled wheat, obtained no more than sixteen quarters and three bushels, making four quarters and less than one bushel per acre. Now I have it in my notes, taken under the distation of Mr. Smet, a great farmer in East Flanders, that a measure of wheat land corresponding to an English acre, manured with Flemish manure, produced last year 7½ sacks of wheat of the best quality. The sack contains four measures each, weighing 180 lbs. of 16 ounces; consequently there grew upon that acre 5,400 lbs. of wheat. Whereas, taking the Winchester bushel of wheat to weigh 60 lbs.; the acre of wheat land among the "Allotments" at Missenden, produced only 1,200 lbs. and the experiment of Mr Burrows 1,980 lbs.; while admitting even my assumption of five quarters to be correct, the acre in England would yield no more than 2,400 lbs., being less than the half of the Flemish produce.

From the St. Louis Bulletin.

THE RAFT IN RED RIVER.

The obstruction originally occupied a space of upwards of two hundred miles; and, there is sufficient evidence that it has existed for ages before the discovery of the country, while its banks exhibit indubitable proof, that it once extended not within fifty miles of the confluence of that river with the Mississippi. The annual increasement has been estimated at two miles; and once formed, the serpentine course of the stream forbids all possibility of removal, except by artificial measures, or the slow process of decay. In some places the raft is condensed to an astonishing depth, and forms what is called "the sunken raft:" a single strong log removed will sometimes liberate hundreds. The raft region may now be considered under three divisions; that from which the raft is entirely removed, extending 140 miles from the commencement; that in which the raft is cut up and pulled in pieces, and not floated off—for which nothing is wanted but a strong current, which must immediately take place—33 miles in extent; and that, lastly, which has not yet been commenced. The water expelled from the channel by the raft into the lakes, parallel to the banks as the obstruction is removed, turns and deepens the bed of the stream. At the commencement of the raft there is little or no current. This has added much to the labor in romoving the obstruction; and many of the logs removed, have floated back subsequently by a rise in the Mississippi. The removal now of a few yards of solid raft causes a fall of eighteen inches above it, and a rise six feet below. There remains only about four miles of the raft to be removed, and, when the channel is once clear, the current will be powerful and deep, and the banks on either side will be lofty and firm. Capt. Shreve declares, that all can be accomplished in *three months*, after a suitable appropriation from Congress is made.

The magnitude of this undertaking, and the results which must ensue from its accomplishment, cannot be too highly appreciated. The river is navigable for more than 2,000 miles above the raft, and through a region unrivalled in fertility Though now thinly settled, it is rapidly populating—hundreds await the removal of the raft as a signal for entering the country—and all its vast resources and natural wealth must soon be developed. The result of this undertaking once involved in doubt, as well as the permanent advantages which must ensue, are no longer problematical. The indefatigable industry, the untiring enterprise—the indomitable perseverance, and the enlarged and truly scientific designs of Capt. M. Shrieve, the projector and accomplisher of this noble national work, can never be estimated beyond their merits. His history is identified with that of the empire of the west; and his fame will endure so long as the magnificent streams with which his name is associated, shall continue to roll on their volumed waters to the deep.

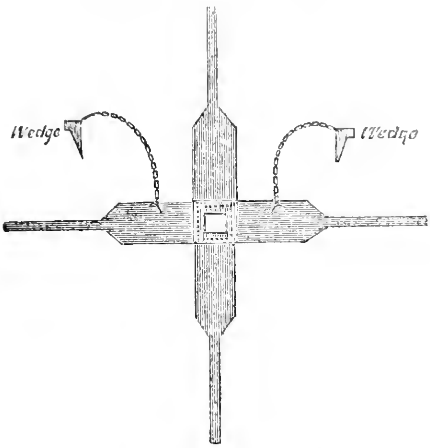
JOHNSTONE'S 'TREATISE ON DRAINING, EMBANKMENTS,' &c.

(Continued, from page 728, of Vol. V, and concluded.)

Plate XIX. *Implements for draining—described or referred to, in preceding pages of the Treatis*

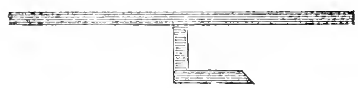
PARTS AND APPENDAGES OF THE AUGERS.

Double Wooden Handle, having an iron plate on both sides, to strengthen the hole for the rods.



Iron Key.

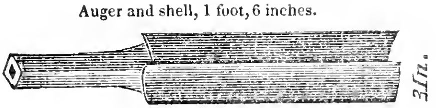
Iron key Handle.



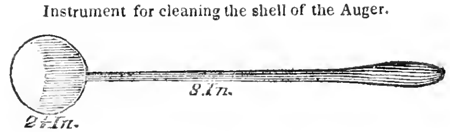
Rod—4 feet long.

Chisel faced with steel.

Auger and shell, 1 foot, 6 inches.



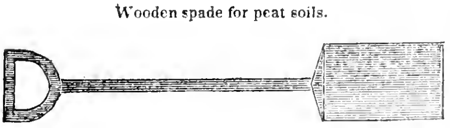
Instrument for cleaning the shell of the Auger.



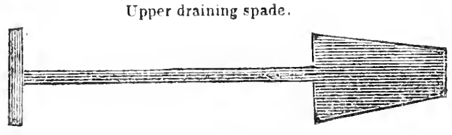
Punch with steel point.

OTHER IMPLEMENTS FOR DRAINING.

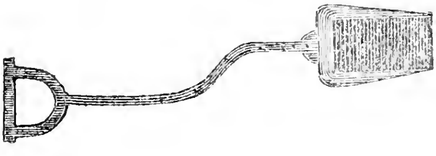
Wooden spade for peat soils.



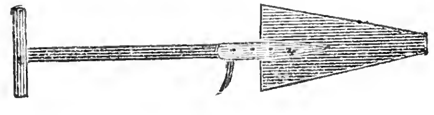
Upper draining spade.



Bottom shovel, with edges turned up.



Draining spade pointed at the end.



Scoop for smoothing and cleaning out the bottom of the drains.

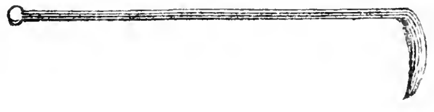
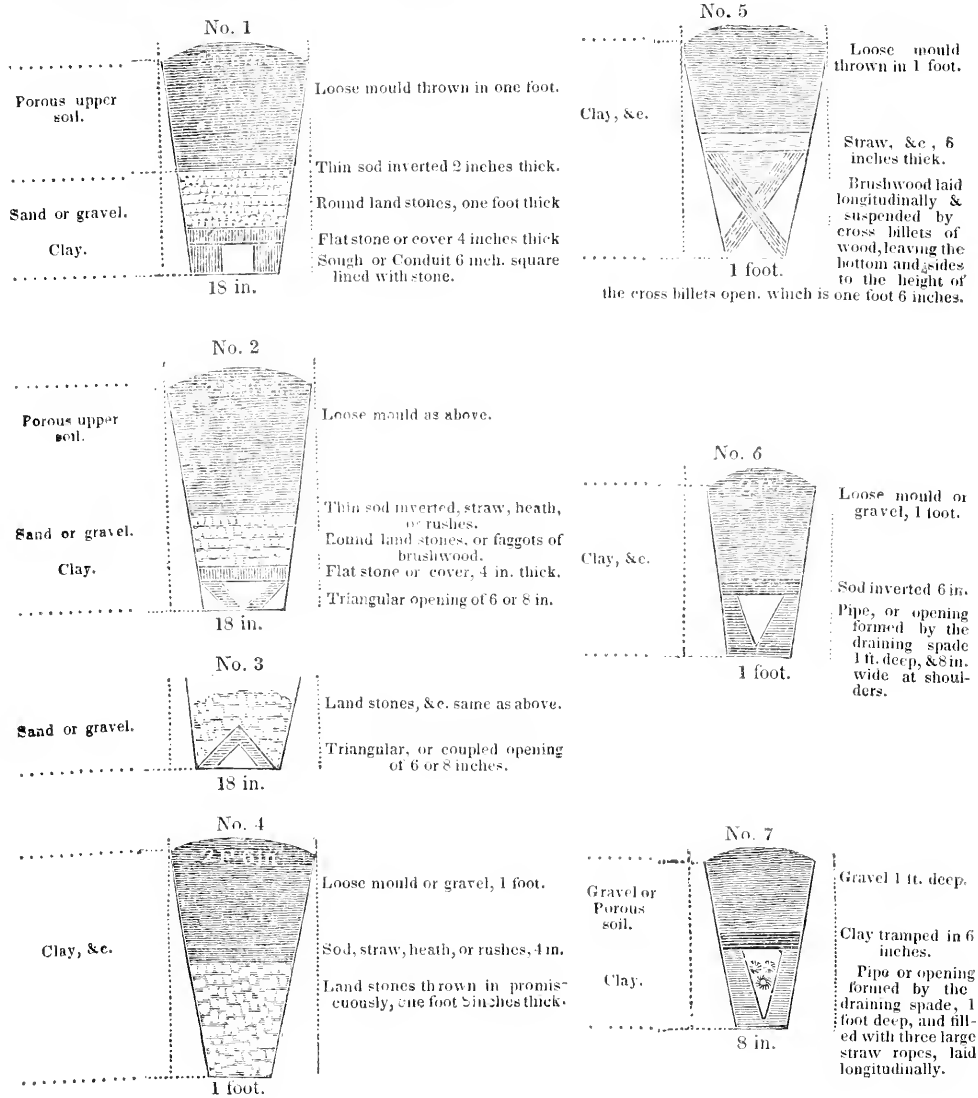
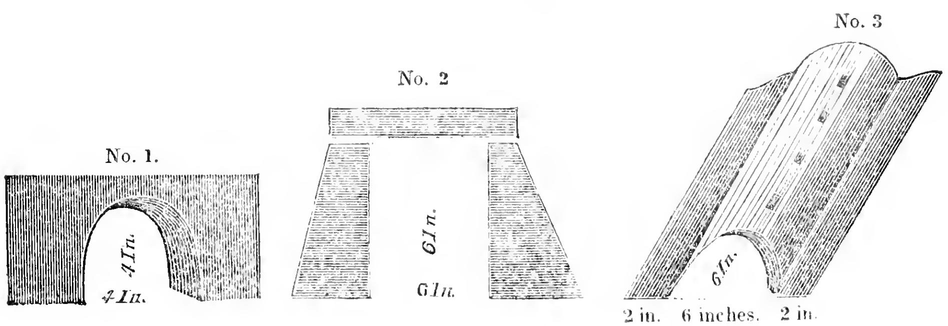


Plate XX. *Sections representing the Mode of filling the various kinds of covered Drains, &c.*



The depth of the above Drains is mostly three feet, but as the nature of the soil may require, the depth may be more or less; and the materials and mode of filling proportioned accordingly.

Draining Bricks.



ON EMBANKMENTS.

Introduction.

The object of these introductory observations is, to show the importance of embankments, in all situations where practicable, by pointing out the advantages to be gained—the losses sustained by want of them—the causes that produce these losses—and the necessity and means of preventing them.

The object and advantages of embanking are two-fold:—*First*, to defend and protect useful land, exposed to encroachment from the sea and from rivers, where the water, in high tides, and in time of floods, commits ravages upon the banks, by undermining and carrying away the earth and soil, and by overflowing and inundating the low ground adjacent. *Secondly*, to reclaim from the sea, and from large rivers, an acquisition of ground, where the same may be gained without future risk, and at an expense to be repaid by the value of the land so acquired.

Every one knows, that in Holland, the works of this kind that have been accomplished are almost incredible; and are a proof of what human industry is capaple, when its exertions are called into action, and when self-protection and interest are the objects in view.

In England, also, the valuable territory that has been acquired by means of embanking, is well known; particularly in the fens and lowlands of Lincolnshire, Cambridgeshire, Yorkshire. Cheshire, &c. and lately in Wales. In these, and in several other English districts, some hundred thousands of acres have been recovered from the sea, and from rivers.

In Scotland, little has yet been acquired from the sea by embankment; but a great deal has been done in preventing inundation, and by protecting useful land from the influx of high tides, and from the overflowing and ravages of large rivers. On the western coast of Scotland, and in the Hebridean Isles, some acquisitions have already been made; but it is calculated, that above 20,000 acres still remain to be reclaimed from the sea; and along the shores of the whole northern part of the island, in the bays, and at the entrance of large rivers, and likewise by the side of lakes, immense tracts still remain under the power of water. There is reason also to believe, that many thousand acres in the bays of Wigton, Kincardine, Aberlady, Kirkcudbright, &c. could be embanked at a reasonable expense. It may be farther noticed, that there is scarcely a river in all the country, that flows through flat land, which, for want of proper embankments, does not commit, every season, great devastations upon its banks, either rendering large tracts unproductive, or sweeping away the harvest they have reared. On the rivers Forth, Tay, Spey, Don, Beauly, Cree, Nith, Carron, and several others of inferior note, many thousand acres have already been recovered and protected; but much remains to be done in the same way, as will be more particularly noticed in the sequel. *

Land, situated on the borders of rivers, is exposed to injury from them, in several ways: by the banks being broke down, and the soil carried away; the crop injured, and sometimes swept off in time of floods; and from the rivers, when swelled with rain, flowing back into the channels and streams that conduct the water from the upper grounds into them, these smaller streams are also made to overflow their banks, and do similar injury. From the nature of its soil, its situation and climate, such land is more productive than any other. To secure its produce, therefore, is of the first importance.

From the general advantages attending embankments, it seems just to conclude, that in a country like Britain, whose inhabitants are remarkable for intelligence, and for their spirit of enterprise, and where agricultural improvements have attracted such general attention, embankments, on a large and comprehensive scale, would no longer remain neglected; especially when so great an acquisition might, by their means, be added to the productive territory of the country.

Notwithstanding the general indolence, and seeming aversion that appears, respecting the acquisition of land that might be gained by embanking; yet there are many intelligent and public-spirited individuals in both parts of the kingdom, possessing property capable of this improvement, who are fully sensible of its advantages, and have already had the advice of professional men respecting it. By this means, they can form a judgment whether the acquiring a large addition to their estates in this manner, is an object of prudence, or one adequate to the expense attending it.

In attempting to mark out the causes of this general neglect or indolence, it is impossible to join with some writers, who endeavor to trace it to the facility with which this country has always obtained supplies from abroad; or to any general impression of security which may have prevailed in that respect. There is no instance in which individuals were ever found to be guided by such general and distant considerations of policy in their private conduct. Every man is sufficiently anxious to secure the harvest of his labor, and to protect his lands from encroachment; as well as readily disposed to adopt any measure, that offers a fair prospect of territorial acquisition; and it is folly to imagine, that his endeavors will, in the smallest degree, be increased by any impression of what the country might either suffer from his negligence, or gain by his enterprise.

Perhaps a more immediate cause of the inattention to embankments may be found in the general prosperity of our manufactures and commerce, which, by affording a quicker return of profit than any other branch of industry, have hitherto attracted the bulk of the national capital. For, when we consider the great expense, and in some cases hazard, that attends embankments on an extensive scale, and particularly those against the sea, there can be no doubt that a want of capital must have operated more severely against this, than any other branch of rural improvement. At the same time, a great deal must be attributed to the inattention of landed individuals to their property; to a narrow jealousy of the prosperity of tenants; and to a want of co-operation among adjoining proprietors, arising from opposite views of interest, or different feelings of enterprise.

* The author, not being so well acquainted with the bays and shores of the English coast, does not take into calculation what may be reclaimed by embankments in that part of the kingdom.

It is, however, to be hoped, that as agriculture is every day becoming a more favorite object of pursuit—that as proprietors are now in general bestowing more attention to the improvement of their estates than formerly, and of course imbibing more just ideas of things, that the system of embankment will be as generally adopted, as, from its importance, it merits.

If a law to regulate *common drainage* should ever come under the consideration of the legislature, as has been pointed out and recommended in the Section on 'Obstacles to Draining;' one, respecting *general embankments*, would also be an object of no less importance to their nation.

In the course of this Treatise, various situations will be mentioned, both where successful embankments have been made, and where others are practicable; with such directions for executing the different kinds of *sea-dikes* and *water-banks*,* as may be applicable to them; and such drawings, including plans and sections, as will explain their form and construction, according to the situation, the extent of ground they are to defend, and the pressure of water they are required to resist.

PART I.

EMBANKMENTS ON SEA-SHORES.

SECTION I.

On defending shores from the encroachment of the sea; and protecting land upon the coast from inundation by the overflowing of high tides.

Embankments, or (perhaps more properly) bulwarks, for preventing encroachments by the sea, are, in most cases, both difficult and expensive in the execution, and often precarious in point of permanency. The power of water, when violently agitated, is not easily resisted; and when the sea is to be contended with, the means for repelling it must be of the strongest and most effectual kind. Barriers for this purpose require to be constructed with care and stability; as many circumstances occur to obstruct their execution, and to overturn the work when completed.

The sea may commit injury upon the land in two ways:—By breaking down and encroaching upon the coast, when too perpendicularly elevated above its level, and composed of loose, soft, and penetrable materials; and, by overflowing land upon the shore, which, from its low situation, is liable to be inundated by high tides.

It is necessary, therefore, in the *first* place, to point out the proper modes of guarding against, and protecting from its ravages, such parts of the coast where the soil is valuable, and where it is carried away or injured by the sea at high tides.

That water, when violently agitated, can more easily be resisted, by yielding gently to its influence, than by directly opposing its impulse, is so far consistent with truth, that it should always be kept in view, in every operation, where that powerful agent is to be managed. According to this principle, it happens, that where the beach is low, the sea is generally found rather to recede from the land, than to encroach upon it, and, on the contrary, where the shore is steep, the sea makes encroachments upon the land, more or less, according to the nature of the barrier that opposes it. Rock may remain impenetrable for ages; and although immense masses are sometimes overturned by the fury of extraordinary tides, and the incessant beating of the waves against it, yet the progress, in such cases, is slow and scarcely perceptible. But, where the sea is bounded by perpendicular cliffs of clay, or penetrable mould, intermixed with loose stones, its ravages are more rapid, and the effect of one furious tide often occasions very serious damage. This is particularly the case, with that part of the shore on the Frith of Forth, both below and above Newhaven, and to the east of Leith. The artificial barriers, both of stone, and those of wood and stone, that have been erected at these places, have failed to provide security, by their being too perpendicularly constructed, and improperly founded. The general mode that has hitherto been attempted, to stop the progress of encroachment, in these and in similar cases, is, to construct a bulwark of stone, in front of the bank, laying the stones above one another, to the height of the adjoining surface, as carefully as possible, and, forming such a slope, as to give them security. This bulwark is liable to be deranged, and often destroyed, by one or other of the following circumstances, or by a combination of the whole. First, where property is divided, and when one individual fortifies his share, and those on one or both sides of him neglect to do the same, the bulwark is thus exposed, at one or both ends, and the fury of the sea acting upon it at these open, unguarded points, soon brings it to destruction. Secondly, where this may not be the case, and the bulwark may extend along the whole line of exposed bank, the waves, when the sea is violently agitated, ascend the inclined plane, and as they return with still greater force, this body of water, rushing over the stones like a cascade, forcibly displaces them, and the whole bulwark is in time hurled down. Thirdly, the water thrown up, finds its way between the stones and the bank at top, at the place where they unite, and there scoops out the earth from behind them, by which means, the stones, thus exposed, are soon brought down by the agitation of the tide, and dashing of the waves. In order, therefore, to render such kinds of bulwark invulnerable, the base should be broader, the slope greater, and the building should be so high, as to be above the reach of any extraordinary tide. And, as a further security to the bulwark, the most effectual expedient that can be adopted is, to drive piles into the shore in front of it, to break the force of the waves. Of the efficacy of this barrier, a very strong example is given by Mr. Beatson, in his 'Observations on Embankments:'—"Some years ago," he says, "when I was on duty as an engineer at a fort near Portsmouth, built on a point of land much exposed to the sea, the waves made such havoc, that the walls on that side were constantly giving way, although built in the most substantial manner, and having bulwarks of large heavy stones besides, to protect the foundation; however, all would not do—those bulwarks were soon knocked to pieces, and several times the wall itself. At length, it

* Distinctive terms, as used in Scotland. In England, all go under the general name of Embankments.

was proposed to drive a number of piles, about forty to fifty yards from the fort. Those piles were twelve or fifteen inches in diameter, and driven in about one diameter from each other, nearly in a straight line, parallel to the wall where the waves did so much damage. They were driven into the ground with a pile engine, till perfectly firm, perhaps eight or nine feet deep, and about two feet of the top of them left above the level of high-water mark.

"After this was done, the walls received no further injury, the space between the piles and the fort being always perfectly smooth, however tempestuous the waves might be without."

Fig. I. of Plate I. is a section of such a bulwark, showing the natural perpendicular face of the shore, and how the same should be sloped, so as to resist the impression of the water most effectually. That portion of the bank marked A, should be removed, and placed in the angular point at B, so as to form a gradually inclined plane, to be faced with stone or turf, as high as the point C, or as far as D, if high tides reach that mark.

Where it may be too expensive to procure stone of the proper form and size, and where the force of the tide is not extraordinarily great, by giving the face of the bank a greater degree of slope, small stones, broke like those used for metalling roads, coarse gravel, or broken brick, may be spread upon the suface, about a foot thick; which, if well beaten down, will make a safe and durable fence. Brushwood, also, spread on the face of the bank, and well fastened down with hooked pegs, is found to answer well, when properly done at first, and carefully attended to. These last methods have been practised on the banks of the Carron at Grangemouth, and answer the purpose sufficiently well. * The wood is subject to decay, and re-

*As directed by the author, on the property of Lord Dundas.

Plate I. *Sections of Sea Dikes, and Embankments.*

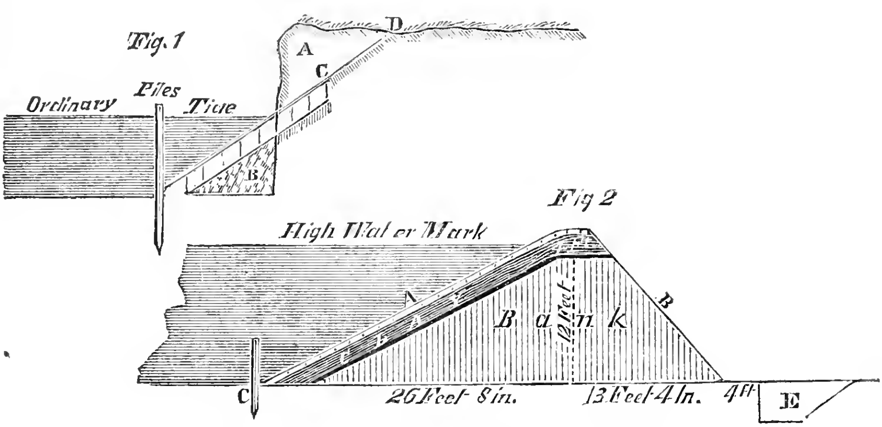
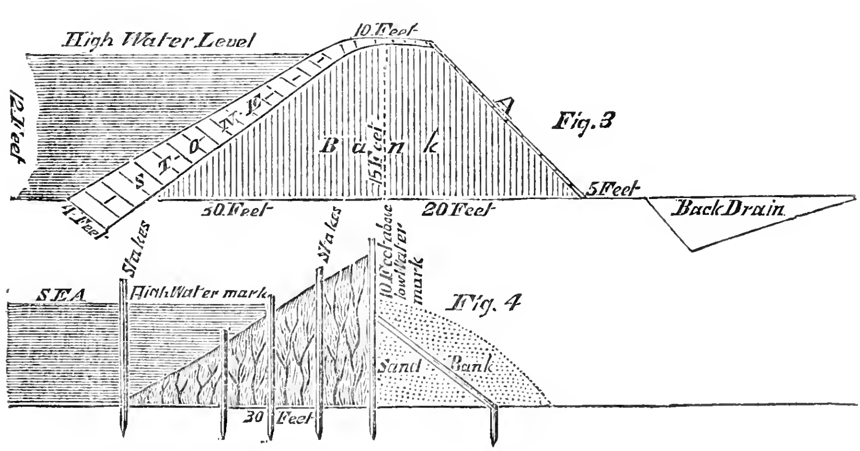


Fig. 2—A. Surface covered with turf or small stones.
B, sown with grass seeds.
C, Stake and rice.
E, Back drain.



Fig, 3—A, faced with turf,
Fig. 4—A, faced with turf,

quires to be frequently renewed; but where it can easily be procured, the expense is not great.

This much may suffice for the first branch of this Section. It is now necessary to give some directions respecting the embankment of such low parts of the coast, as are subjected to inundation, by the flowing of high tides. The land here alluded to is not those bare shores that are only left dry at low water, but the flat *lands, salt-marshes,* or *sea-greens* (as they are variously called), composed of an accumulation of deposited mud of a rich quality, formed partly of the soil washed down from the upper grounds, and partly of such substances as are thrown towards the land by the tide. As these soils and substances accumulate, the surface rises so much in height, as only to be flooded by the highest spring-tides. Such have originally been the rich carses on the rivers Forth, Tay, and others, where, by embankment, and the gradual increase of soil by cultivation and manure, these extensive tracts are now become the most valuable and productive land in this part of the kingdom. The first thing to be observed, in embankments of this kind, is, to ascertain the exact height of the highest flood-tides, so that the embankment be raised, at least two feet above what these may ever approach to. When this is done, the level must be taken, and stakes fixed to the proper height, along the whole line to be embanked. Two frames of wood, of the exact form of the bank, should be made, and set up at the distance of twenty or thirty feet from each other, *exactly on the same level,* to guide and direct the height and dimensions of its construction; and the same level must be kept throughout the whole line. This is more requisite than in the case of rivers, that have a descent in their current, and where the height of the bank is regulated by the fall of the steam; for the surface of the sea-water, *being all on a level,* the top of the embankment requires to be exactly parallel to the horizon, without a rise or declension in any part.

As the pressure of the water upon an embankment against the tide, is different from that in the current of a river, it is not necessary to have it so straight, or of that uniform smoothness, which is requisite where a running stream is to glide along the side of it. It is unnecessary, however, to give it such turns and windings, or to embrace all the points and indentures of the verge next the water, which would lengthen its course, and increase the expense; but it may be carried as near the edge of the land as it is possible to obtain a safe and permanent foundation for the bank. Where it crosses any creeks or hollows, formed by the agitation and working of the tide, or by runs of water from the land, it will be necessary to increase the width of the base, in proportion to the depth at such places.

In forming the bank, the breadth, height, and strength, must be made in proportion to the depth and weight of water it may have to resist; and, in order to obviate resistance, and to lessen the pressure, the more the slope towards the water approaches to a degree of flatness, the greater will be the firmness and durability of the structure. In difficult cases, it is advisable that the surface next the water should form an angle to a perpendicular line, of from forty to sixty degrees, according to the force to be opposed, and the nature of the materials of which the mound is to be constructed. See Fig. 2. of Plate I. Where the foundation is firm and solid, the natural earth of the ground where it is erected may be employed; and will answer perfectly well for the body of the bank, and for the inner surface likewise; and where the pressure or force of the water is not very violent, the slope next it may be formed of the same materials. But in cases where the force of the tide and waves, by its exposure to strong winds, operates more violently against the bank, the outer slope should be formed, to the depth of two feet, with clay, or the strongest earth that can be most conveniently got; and that, as well as the top, covered with well swarded turf. The inner slope, or that next the field, may be sown with grass-seeds.

The stuff, for forming the bank, should be mostly taken from the side next the water, that as little of the surface within may be broke as possible —only by what is taken from the back-cut, or drain, that is necessary along the embankment on that side.

No stones should be left near the foot of the embankment; for the tide, forming eddies round them, would soon make holes, and break through the bank. To guard the bank from the impression of the water, a fence, *of stake and rice,* may be made along the bottom of it next the sea, which will last till the surface on that side is sufficiently swarded, and the mound properly consolidated. Lastly, attention must be paid to diverting any streams, or runs of water that may pass through the ground embanked, and to collect these, if possible, into one or few channels, and to give them an outlet at the lowest and most convenient part of the bank. This must be done by a sufficient tunnel, box, or pipe, according to the quantity of water to be discharged, and which must have a proper flood-gate or valve, fixed to the mouth of it by hinges on the upper side.

SECTION II.

On reclaiming land from the sea, by embankment.

It is necessary to premise, that, under this head, are included those rivers that have broad estuaries, and where the tide flows for a considerable way, leaving dry, at low water, extensive shoals, *sleeches,* or tracts of surface, which it is in the power of embankments to exclude from the tide; and where the quality of the surface is such, that, at no extraordinary expense, it may be reclaimed and converted into arable soil. Such are the Friths of Forth, Tay, Clyde, Cree, Beauly, &c. where great acquisitions of land might yet be made, at a moderate expense.

The first object to be considered, before attempting to reclaim land which at low water is left uncovered by the sea, is, whether or not the quality of the surface to be gained is such as to be capable of cultivation, and fit for the other purposes of agriculture; for, in many cases, what is exposed at low water, and might easily be banked out, is an accumulation, to a great depth, of barren sand or gravel, unfit for any useful purpose.

On many parts of the coast, however, where the sea at low water recedes so far, as to leave dry large portions of surface in the bays and creeks of the shore, the soil is of a rich and fertile kind, being rather a deposition of fine earth washed down from the land, than of poorer substances thrown out by the sea. In the friths above mentioned, and at the entrance of other large rivers, whose estuaries are wide, and in which the tide ebbs and flows, immense tracts are left bare at low water, and where the land that might be gained would amply repay the expense of embanking it. The mouth of the South Esk, in the Bay of Montrose, deserves particularly to be mentioned, as one of the most extensive and practicable instances of this kind. Indeed, this tract was undertaken to be embanked by Dutchmen, many years ago; but owing to a dispute amongst the proprietors, respecting their rights and boundaries, the undertaking was abandoned. On the other rivers that have been mentioned, much has already been done, and there is now land let at five pounds sterling per acre, that, not many years ago, was covered to a considerable depth with water.

At the mouth of the Eden near St. Andrews, much land has, of late years, been reclaimed: and much may still be gained there, by extending these embankments, on a *stronger* scale, farther into the tide-way.

Where it is intended to reclaim a piece of land that is covered every tide, either in a bay of the sea, or on the side of a large river, where the tide ebbs and flows, the undertaking will be more or less difficult, according to the depth of water, rapidity of the current, and prevalence of the winds in that quarter. Embanking, so as to exclude the sea in these situations, will also be more or less tedious and expensive, according to the nature of the materials of which the beach is composed, whether the soil is of a sandy or loose texture, which is most frequently the case; or of a clayey substance, where there will be less labor in its construction, and more certainty of its remaining secure.

Where the materials on the spot, of which the bank is to be formed, are of a sandy consistence, it is absolutely necessary to face it with stone on the side next the sea; otherwise, the impression of the waves would soon make breaches in it, and overturn the whole, in the course of a few high tides. It is necessary to give it a very considerable slope, and, at the foundation, to have the stones bedded and laid so that they bind well together. The height of the embankment should, in all cases, be two feet more than that of the highest tide. Fig. 3 of plate No. 1. represents the section of an embankment of this kind.

Where the materials of which the bank is formed are of a clayey or adhesive nature, strong turf may answer the purpose of facing the bank, and these should be well beat and pinned down as soon as laid. With regard to laying the turf, Mr. Beatson observes—"The inside slope should also be faced with turf, which may be laid with the green side downwards, as in building any common sod wall. Some expert sodders can finish this kind of work extremely neat, by setting the sod on edge, according to the slope intended to be given, and with proper mallets and beetles, they ram the earth hard behind, which consolidates the work as it advances, and tends very much to its durability. When the first or lower course is finished, they pare the upper edge of the sods with a sharp knife, quite even, by laying a rule to them, and then they go on with the second course, which they finish in the same manner, and so proceed till the whole height is completed, which, when finished properly, looks very beautiful and smooth, not a joint between the turfs being seen."

"If turf is to be used in covering the outside slope, it must all be laid with the grass uppermost, and well beaten down with a flat sod beetle made for that purpose: and for their better security, it may be proper to drive a small stake of about eighteen inches long, or more, through every sod. The sods for this purpose should at first be carefully taken up, and traced by a line, all of the same breadth, and their edges cut as even as possible, that they may make the closer joints, which will tend very much to their security till they grow properly together."

In some sandy shores, embankments may be made entirely of wicker-work. Three or four rows may be made, of different heights, and the intervals betwixt them filled with brushwood, furze, &c., forming a slope towards the water, as shown by Fig. 4. in plate No. 1. These materials would collect and retain the sand, as the tide passed through; and this accumulating and consolidating, would in time rise in height, so as to exclude the influx of the tide at all times.

When the sea is found to encroach upon a low shore, it will be proper, before attempting to execute any regular embankment, to make a careful survey of the coast which is injured, in order to ascertain if there be any local circumstances that can help to raise a natural barrier against the encroachment. Every person must have observed, that in many places the sea is continually stirring up, and driving against the coast, quantities of sand and other materials, which either remain, and serve to form either small hills or flat downs; or, are carried back by the ebbing of the same tide which brought them. In general, where the materials are of a more adhesive and solid nature, as shells, plants or slime, they rest and accumulate, and raise the land above the danger of any encroachment from the sea. But where the shore consists entirely of sand, whatever quantities may be pushed forward at each tide, are immediately dispersed to and fro by the winds, and the shore remains open and exposed to every high swell of the sea. In such a case, however, as this, means may easily be adopted for collecting and fixing the flying particles of sand; and it is certainly proper to prefer so economical an expedient, to an expensive regular embankment.

From an account of a work of this kind,* performed upon the estate of the Earl of Ashburnham, at Bembrey in the county of Caermarthen, useful information may be obtained of the manner in which such bulwarks ought to be raised.

Mr. Tatlow, who suggested the expedient in this case, and carried it into execution, remarks, that for many years the sea had been making encroachments; "and, particularly, in October 1795, had broke in and covered many hundred acres, damaged the houses, buildings, stack-yards, and gardens; and it was the general opinion, that a regular embankment must be formed, which would cost some thousand pounds, the Earl having several miles of coast."—The view," he proceeds, "that I first took was, upon a very windy day, and the shore an entire sand, which extended at

* Communications to the Board

low-water many miles. In riding along, I perceived that any piece of wood, or accidental impediment to the course of the sand, raised a hill: it immediately occurred to me, that by making a hedge at the weak and low places, with wings to catch the sand as the wind blew it in different directions, I should obtain the desired effect. I therefore directed stakes, nine feet long, to be cut and drove one foot and a half into the sand, at two feet and a half distance from each other; betwixt which I had furze interwoven, so as to form a regular furze hedge, seven feet and a half high. Of this, since last June, I have done eleven hundred and thirty-seven yards; and in October last, when I was there, a great deal of the hedge was covered: and since that time, I am informed by letter, that a great deal more of it is so, and that the neighboring inhabitants draw great comfort to themselves, from the security my furze embankment gives them, as its present appearance plainly evinces, that, at a trifling expense, I can secure Lord Ashburnham's estate from being inundated; for whenever the first hedge is not high enough to prevent the sea overflowing, another may be built upon the sand formed by that hedge, and so on in succession, till it is perfectly safe."

Even when a regular embankment is required against the sea, it is proper, a year or more before it is erected, to fix fascines of brushwood down in the clay, by strong palisades, in the line in which the bank is meant to be raised. By this line, the mud and vegetables, which would otherwise be washed away, are arrested, and a most valuable addition made to the soil.

In raising regular embankments to exclude the sea from low tracts of ground, it is necessary to distinguish between those cases in which the water only overflows during spring-tides, and those in which the land is covered every tide. In the one, the operation is easy; but in the other, attended with considerable difficulty.

When the land is only overflowed during spring-tides, there is time in the intervals, either to complete the embankment required, or to finish it in such a manner, that the flowing of the tide can do it no injury. But if the sea ebbs and flows every tide upon the land which is to be reclaimed, only small pieces of the work can be executed at a time, and the force of the water, at the flowing of each tide, is apt to destroy all that has been previously performed.

In either case, when only a part of the embankment can be executed before the return of the flood, it is proper that what is done should be done in a finished manner. Thus, supposing a length of thirty or forty feet, or yards, can be completed in one tide, it is better to raise it to its intended height, and to face the slopes well with turf, than to commence a greater extent of bank, and leave it in an unfinished state, exposed to the violence of the waves. It may be further remarked, that in low-flooded lands of the kind under notice, there are always several hollows or water-runs, formed by the regress of the tide; and where the embankment has to be executed in different portions, it may be proper to build in the first place, across the spaces between these water-runs, so that the sea, having its usual channels of evacuation left open, will have the less tendency to injure the work. The spaces, thus left unembanked, may be filled up during the intervals between spring-tides.

All the inconveniences, however, which arise from the interruption given by the sea to the progress of building embankments, may be effectually avoided by the following plan, devised and explained by Mr. J. Loudon, the ingenious author, compiler, and editor of many useful books:—

"Let triangular trusses of wood be prepared and placed at low water, surrounding a part of the foundation of the proposed embankment; the hypothenuse or sloping side of the trusses fronting the side all round, which side is next to be covered with boards, say about five feet broad, twenty long, composed of deals neatly joined; and one board is placed upright to prevent the spray from coming over; or, the trusses being placed and fixed upright by cross rafters, the whole may be laid over with single deals, without being closely joined, and then covered with oiled canvas or pitched sailcloth, neatly fastened on, and cemented at the joinings with a composition made of tar and clay; and this will be a more economical mode.

"The barrier being thus constructed and placed, it is evident, that as the tide flows, the water will surround it; and the higher it rises on it, provided it does not rise higher than fifteen or sixteen feet (about the general height of spring-tides), it will only press it down the more, and render it firmer than it would be, if only half of it were covered with water.

"If the embankment is to be made of clay or earth, or the same materials upon which it is founded, a space must be inclosed of sufficient width to allow these to be dug out from the land side of the bank; or if it is to be wholly built of stone, or any distant material, these may be laid down beside, or upon, the spot to be built on, before it is surrounded by the barrier.

"When the length of the wall contained within one of these enclosures is finished, the barrier must be moved along, so as to take in another space, which must be built upon as before. The barrier must then be again taken down and replaced, &c.; and so on, until the whole line of embankment is finished.

"The original expense of this barrier may be from £100 to £400, and it may be moved and replaced for twenty or thirty shillings each time; and as the wood of which it is made will generally be of considerable value after the bank is finished, the total expense of this barrier will not be so great as at first sight may be imagined.

"By means of this barrier, it is evident, that embankments may be made as far out as the sea retires; and even beyond that, buildings of any kind may be constructed within it, with ease and safety. The only additional expense, when the barrier was placed *among* water, would be that of pumping it out, which could easily be accomplished by a wind-mill, or any other such simple contrivance."

In some instances, where the sea overflows the piece of land to be reclaimed, to a great depth, a different mode of operation from any that has been described, has been adopted. The line of embankment being marked out by poles, quantities of stone and clay mixed, are conveyed in flat-bottomed boats or punts, and thrown overboard, until a bank is accumulated. This mode, it is believed, is common in Holland.

The materials of a proper bank, and the mode of constructing them, have already been explained. Its elevation and slope should depend upon the degree of exposure to the winds and tides, and the height to which the greatest tides are accustomed to rise. The elevation may vary from five to fifteen feet, and the front slope from twenty inches to five feet for every foot of height; the back slope being generally one half less than the other. In every case, the bank should be at least two feet higher than the water during the greatest spring-tides. In determining the slope, great care must be taken to proportion it to the force of the sea, as nothing can be more ruinous than to make the bank too bold or upright. It has been well remarked, that a wave which falls on a flat surface dies without a struggle, while one that is stemmed by an abrupt rock strikes with tenfold force. The evil of not estimating properly the force of the sea, is remarkably exemplified in the case of some extensive embankments at the mouth of the river Cree, in the county of Wigton. The banks on both sides of this river were made of the same dimensions, being about four feet and a half high, and nine feet broad in the base, without adverting, that the northern bank is exposed to the south-west winds, which in that quarter always bring up the highest tides. It happened, accordingly, that at the first high tide, the embankments on the northern side were almost totally destroyed, while only a few breaches were made on those of the southern. To have enabled the former to withstand the superior force which assailed them, the dimensions ought perhaps to have been double those of the latter.

Along the back of all sea-banks, trenches should be made in the same manner as in river embankments, and sluices erected at different parts, to shut of themselves against any external water, and to open when the tide ebbs, to let out any water from within.

In every case, where an external valve is required for the discharge of the surface-water of an embanked area, and where it is liable to be choked up with sand or gravel, as behind a shifting beach, or in front of the open sea, means must be taken to defend the valve from stoppage, or great attention be given to keep it clear. In some situations, the valve is so liable to be buried, and the channel closed up, by every spring-tide, or gale of wind, that the only effectual remedy is to make a covered channel through the line or ridge of the beach into the sea; and this must be made strong enough to sustain the weight of the heaviest breakers. This expedient has been adopted upon Lord Cawdor's estate in Pembrokeshire; and though found extremely expensive, yet the advantage gained is so great, as to render the undertaking profitable. In cases of less extremity, the valve might be sufficiently guarded by a pile fence or a pier, carried out from the foot of the embankment, across the known drift of the beach, the sand, which might accumulate behind this fence, being removed from time to time. Where the sea reaches to the foot of the embankment, it has been found necessary to erect two flood-gates, the one within to secure the outfall channel, and the other on the outside to ward off the waves, and prevent them injuring the inner works. The outer gate may in this case be lifted; but though a considerable quantity of water should be admitted, yet its force being broken, the inner valve will remain undisturbed.

It sometimes happens, that salt marshes, particularly those at the sides of estuaries, are situated so low as to lie constantly under water. In cases of this kind, the following mode of drainage and embankment, practised on a marsh near Marazion, in Cornwall, may with propriety be adopted.

The marsh in question was situated on the bank of a river, and separated from the sea by a tract of sand consisting of about seventeen acres. It lay always under two or three feet of water, and the sea flowed over it at spring-tides. As it was found impossible to take off all the surface-water by the river, a square wooden pipe of nine inches diameter was carried through below the tract of sand above mentioned, from the edge of the marsh to that part of the shore called *half-ebb*, which was eight feet lower than the surface of the marsh. At the mouth of this pipe, a reservoir, of 18 feet square and eight feet deep, was cut out, and from this reservoir a trench of three feet deep and five wide was extended on each side, between the sandy soil and the marsh. At the distance of every sixty yards, cuts were made from this main trench across the marsh, by which the whole area was divided into oblong square fields. By means of these trenches, all the surface-water was conveyed into the reservoir, and from the reservoir conducted by the pipe into the sea. At both extremities, the pipe was guarded by valves, which shut at the approach of the tide, and opened upon its regress, to let off the water which had collected in the interval; and before the valves, iron bars were also placed, to prevent the intrusion of extraneous bodies. When the surface-water of the marsh had been thus removed, a strong embankment of turf was erected on those sides of the marsh where it was exposed to the influx of the sea; and, by a judicious course of management, the ground became, in the course of a few seasons, covered with rich crops. The reporter remarks, that the whole of this improved ground, including the marsh, the sand tract next the sea, and a piece of croft or elevated ground behind the marsh, "has been productive of considerable advantages to the public, particularly to the poor. Four hundred persons yearly receive turf from it, two hundred and fifty are fed most plentifully with potatoes, which are planted here by very poor people, who are, in consequence of having land given them, become uncommonly industrious; and the whole neighborhood, by its drainage, have got rid of low nervous fevers and agues, with which it was commonly pestered."

The tracts of salt marshy ground, which have been reclaimed in Scotland, are not very numerous; but it is hoped the profit which these have afforded, may tend to induce further exertions in this branch of improvement. Perhaps there is no place in which more valuable acquisitions have been made in this manner, than in the island of Islay, under the direction of its intelligent proprietor, Mr. Campbell of Shawfield. At the head of an arm of the sea called Loch Gruinart, an embankment has been executed, by which four hundred acres of land, which formerly composed an useless salt marsh, have been brought under the plough. In making this embankment, it was found that a considerable stream, which discharged itself into the head of the loch, impeded the operation of the flood-gates; and, as the only effectual method of removing this serious inconvenience, Mr. Campbell had recourse to the expensive and arduous expedient of totally reversing the course of the stream, by withdrawing it from its old channel, and leading it through the opposite side of the country into Lochindaal. The whole of this embankment was executed in one summer. The total expense was about £600. The ground which was reclaimed was let at an additional rent of £235; so that, estimating this at thirty years purchase, the immediate gain by the embankment was £7050 sterling. Mr. Campbell has finished a similar embankment against the sea at the head of Lochindaal.

Along the shores of the Forth, some important acquisitions may also be noticed. "The whole tract of land," says the reporter of Stirlingshire, "which stretches along the Forth, appears evidently to have been covered, at some remote period, with the waters of the sea, which, gradually retiring, have left this soil the richest in Scotland, exposed and fit for the operations of agriculture. These carse lands are very little elevated above flood-mark; and all along the coast the frith is so shallow, that, at low water, many hundreds of acres are left dry, the soil of which, when recovered from the sea by embankments, is equally valuable with that which had been long under cultivation.

"The idea of recovering this fertile soil from the sea, seems to have been originally suggested by a Dutchman, about the beginning of the last century. In the parish of Borrowstounness, he proposed to acquire by this method a tract of two thousand acres, upon condition of his being allowed the possession of it for forty years, and timber from the woods of Kinneil necessary for erecting the dikes. The proposal was rejected. Had this proposal been accepted, it is evident, that, at the current rent for which such lands are now let, the proprietor might have enjoyed at this day an additional income of £10,000 a-year.

"The proprietors of the adjacent shores in Stirlingshire have at length awakened to a just sense of their interest in this important species of improvement. A considerable deal *has been done* in embanking, but much more *remains to be done*, in the parishes St. Ninian's, Airth, Bothkennar, and Falkirk."

The number of acres of carse soil lately recovered from the Frith of Forth in Stirlingshire alone, has been ascertained as follows, viz.

	Acres.
Reclaimed by Lord Dundas, - -	200
" by the Earl of Dunmore,	200
" by other proprietors, -	200
	600

Thus it appears, that within these few years, there have been recovered, in one district alone, by embankments against the sea, no less than six hundred acres of the richest soil in Scotland, now let at five guineas per acre.

On Lord Dandas's estate, five hundred acres more may be easily reclaimed in the same manner. The writer of this Treatise has inspected the ground, and seen the estimate of a respectable undertaker, which shows that the expense would not exceed £20 per acre. Thus the whole expense would amount to about £10,000; and the return, at the ordinary rent of £5 per acre, would be £2500 a-year, or about four year's purchase of the soil. Two hundred acres more of the same quality adjoining it, might be recovered at a similar expense.

On Lord Dundas's estates of Clackmannan and of Bambriech in Fife, a considerable extent of land has also been embanked from the overflowing of the rivers Forth and Tay, and is now let at £5 per acre. On the estate of Kincardine,* adjoining that of Clackmannan, similar successful embankments have been made; and it is proposed to extend these still farther into the channel of the Forth.

Besides the private emolument which would accrue to individuals from the spirited prosecution of these embankments, a very important public benefit would also arise. Were they completed, the navigation of the Forth and Carron would be greatly improved; the waters of the frith, which are now spread over a large surface, would be confined within a narrow channel; and the depth would be so much increased at full tide, as to admit vessels of a larger burden.

Wherever, on the other hand these embankments are neglected, the sea is gradually gaining upon the land, and washing off the most valuable soil; a striking instance of which has been observed to the north of the confluence of the Carron.

But there is reason to hope, that many years will not be allowed to pass, till, on the shores of Stirling, Linlithgowshire, and many others, there shall be added many thousand acres to the carse soil of Scotland.

The Duke of Hamilton, some years ago, engaged in the embankment of about 300 acres on the estate of Kinneil, near Borrowstounness; but after two years' trial the attempt failed. It is, however, perfectly practicable, if the proper plan were prosecuted, which it is hoped, the present enlightened proprietor will not hesitate to carry into effect.

It is a fact worthy of remark, that all along the shores of the Forth, the sleech has increased very much, and is increasing every year, by the accumulated deposition of moss brought down from Blair-Drummond, by the floating it away from that extensive tract, which has undergone so great improvement since the commencement of that operation by the late Lord Kames. This is one great inducement to the prosecution of that scheme of embankment, which is so practicable all along the course of that river. The land that has lately been embanked by Lord Dundas, (according to a plan, and under the direction of the author,) was, fifty years ago, covered to the depth of nearly thirty feet at high water, where the depth would not now have been more than five feet at the highest tides, owing to the gradual deposition of the floated moss.

The banks of the Clyde present, in the same manner, more striking instances of what may be done, than of actual improvement, by embankment. The following example deserves notice, as it shows both the facility and cheapness with which such works may be raised, and the petty interests which too often impede and defeat the best

* Belonging to the Countess Flahault.

schemes of improvement:—"From a charter granted to the burgh of Dumbarton, in the year 1609, it appears, that a great part of the lands belonging to the community had been recently overflowed by an inundation of the Clyde and Leven, and even the foundations of many houses and gardens overturned. No less than 37,000 merks Scots (a large sum in those days) is granted "for the purpose of erecting *dikes* or *bulwarks*, to confine the river Leven within its old bounds." Though vestiges of a mound of large stones are still discernible, and afford proof that some attempt was made to reclaim the land thus lost, the attempt appears to have been unsuccessful. The whole common, extending to about two hundred acres, is often nearly overflowed. Even the highest part of it is insulated every tide, and the remainder consists of bare sand, covered with water twice a-day. The only use to which it is put, is pasturing a few cows belonging to burgesses, with which it is at all times greatly overstocked, yielding a trifle to the town's treasury, and not much profit to individuals. About the year 1788, Mr. Whitworth the engineer, who superintended the finishing of the Forth and Clyde Canal, was employed to survey this piece of ground, with a view to its being embanked. He accordingly made out a profile of the embankment necessary, with an estimate of the expense; which, after making an ample allowance for unforeseen accidents, did not exceed £1400. This would have amounted to no more £7 for each acre; but though it should have cost double that sum, it would have been a trifling price for such excellent land, created, as it would in a great measure have been, by this operation. The plan, however, has not been carried into execution, owing probably to the narrow revenue of the burgh, and the difficulty of satisfying the claims, and reconciling the competing interests of the burgesses, many of whom would not readily consent to relinquish their ancient right of pasturage, or exchange the insignificant profit derived from it, for the contingent benefit resulting from the melioration of the common on which it is exercised. It is scarcely probable that it will be set about in earnest, till a recurrence of violent floods and high tides, which former experience has shown to be not impossible, shall endanger the existence of the town, and compel the inhabitants to unite in this work as a measure of self-preservation."

The last branch of sea embanking, of which it is necessary to take notice, is that for recovering tracts of land, unnecessarily occupied at the estuaries or mouths of rivers. In consequence of the regorging action of the sea, all streams spread greatly at their mouths, and the earth they bring down is deposited there, and accumulates into shoals and islets. The soil which is thus formed, is invariably of the richest kind, and the recovery of it becomes of course an object of proportional advantage.

The most advisable and effectual plan for this purpose, when it can be executed at a remunerating expense, is to alter the course of the river altogether, and make it discharge itself at some new point of the coast, where the land that would be occupied by its channel, might be of less value, and its discharge less exposed to be choked or shifted by the regorging action of the tide. Where this has been done, it has been found, that the old channel, in the course of a few years, was filled up, and the sea quite excluded. If such a complete change cannot however be effected, the whole river should be collected into one stream, the channel should be deepened, to make the water flow with celerity; and embankments should be raised on each side, to prevent it from spreading in future, over a space that may be converted into useful land.

PART II.

EMBANKMENT ON RIVERS.

SECTION I.

On protecting land from the encroachment of rivers, by defending and securing their banks, &c.

A river that flows in a confined channel, is apt to commit ravages on adjoining land, by the continued action of the stream gradually breaking down, and carrying away the banks, where they are of a soft, loose, and friable or penetrable nature. The danger of the soil being carried away in floods, is increased or diminished, according to circumstances; such as the form of the banks; the nature of the soil; the rapidity of the current; and the quantity of water that, after floods, lodges on the margin of the banks, or falls over them into the river.

When the banks of a river are perpendicular, or nearly so, if the soil be of a sandy or mouldering quality, the danger of their being washed down and carried away by floods, is greater than where they slope gently, from the surface of the field to the bed of the river. But, if the soil and sub-soil be of a clayey or adhesive loam, and the current presses equally, and not more upon one part than upon another, a simple and efficacious improvement may be made, by sloping the bank so, that it forms an easy declivity, from the surface of the field to the bed of the stream. This slope soon becomes closely coated with grass, and the water, by gliding gently along, is in no danger of making a breach or encroachmeent at in any part of it.

As a proof of this, it always appears, that wherever there is a gradual slope upon the bank of the river, and the grass growing upon it naturally, that the greatest flood makes no impression, nor does it any injury; as the water passes over it gently; and, not being confined or opposed, has room to expand. On the contrary, when it comes against a ragged or abrupt bank of earth, it soon undermines, and brings it down in great quantities. This is so obvious to the slightest observer, that it is astonishing so simple and easy a remedy should not be resorted to, in all cases where the banks are of this last description.

A stream of water having naturally a greater inclination to recede from, than to surmount the obstacles it meets, it always takes an angular or serpentine course; and it is in consequence of the river thus dashing from side to side, that injury is done to the banks. Were a river to flow in a straight line, or nearly so, which it would invariably do, if not interrupted, it would make no encroachment on its banks.

The most effectual remedy, in such cases, must, therefore, be to *straighten the course of the stream.*

This is an operation, which, in respect of natural circumstance, might in many cases be performed with little difficulty and expense; and, where most essential, usually with the greatest facility. But the smallest improvement of this kind, is in general rendered impracticable by minute divisions of property, and other attendant causes. A river is considered to be so far a common subject, that while a proprietor is entitled to take every natural advantage of the stream in passing, he is interdicted from executing any operation upon it, which can prove injurious to the other individuals who possess lands upon its banks. For example, if by ponds or dams, he throws back the water upon a superior property; or by juttees, directs its strength upon the opposite bank; or by straightening the channel, makes the river rush with more than usual violence upon the inferior lands: he will commit an injury in each case, of which his neighbor has a right to complain. There is, in fact, in every situation, such a collision of interests, that it is seldom possible to reconcile them to any extraordinary alteration on a river; and above all, in so *direct* and *radical* a one as that of straightening the channel.

The case in which this measure may be recommended as most expedient, is that of those mountain streams which intersect the haughs, or hollows between the different ranges of hills or high lands. All these haughs are composed of soil of the richest kind, formed of particles of earth washed down from the heights; and thus are the most valuable portions of land, both in the low country and in the highlands. But, in consequence of the streams that intersect them being allowed to roam at pleasure, a great portion of soil is, in such instances, unnecessarily lost; and what remains is so constantly liable to be broken up and destroyed, that the produce of haugh lands rests altogether upon a most precarious tenure. To explain these facts, it may be remarked, that when a stream is permitted to *wander at will* through such hollows, it occupies, by its devious course, four or five times the quantity of ground which it would do, if carried in a straight line; that, in consequence of the angular outline of the banks, the water strikes against them with violence, and continually makes encroachments; and that, by the circuitous direction of the stream, and the turbulence which that occasions, the evil effects of every flood are greatly increased.

The advantages of straightening such a stream are, accordingly—1. That a great addition of valuable soil will be obtained; 2. That the stream will be rendered more placid; less capable of doing injury to the banks; and less extensive in its inundations, and in its ravages.

The execution of the operation is moreover much easier in this than in other cases. The streams which takes their course through haugh lands, are in general nearly exhausted, sometimes enirely so, during the summer months; so that an alteration of the channel at that period of the year may be accomplished with comparative facility. And further, the soil, as well as substratum of haugh lands, consists generally of loose and incohesive materials, which are easily dug out and removed.

The great object, in improving the course of a haugh stream, should be, to lead it as straight forward as possible. If the haugh be winding, or there be obstructions, which prevent a cut from being made in a straight line from the entrance to the outfall, the stream should be led from to side of the haugh in straight reaches; always endeavoring to make some prominent rock, or point of sufficient firmness to resist the current, the vertex of each angle; or, where such cannot be found, raising an artificial bulwark of stones in its place; it may be led along the foot of the bank all the way, by which means the haugh will be kept entire, and the natural bank will be a barrier on the one side; and the earth thrown out of the cut, will be sufficient to form an embankment on the other, and to fill up the old channel also.

When a new channel is designed to be cut, its breadth may be less than that of the old, while its depth ought to be greater; because the narrower and deeper a channel is, the water always flows with greater ease and regularity. The lines of the intended banks being marked out, the earth should first be dug out from the middle of the inclosed space, to the full depth proposed; and on each side, the depth of the excavation should be gradually lessened, so as to form a convex slope to the tops of the banks, this form being of all others the best fitted for diminishing the pressure of the water, either in ordinary or extraordinary floods.

To secure the new banks against the action of the stream, they should be carefully faced with stones or turf. The former compose the best defence, and may, in most cases be employed; as abundance of stones is generally to be found on the banks of mountain streams. At the bottom of the facing, the stones should be of the largest sort, and sunk well into the ground, to prevent the water from undermining them. In carrying up the rest of the wall, the stones should be laid *endways; i. e.* their inner ends pointing to the same centre like the stones of an arch, and earth or gravel should be rammed firmly in behind, as the work proceeds. Between the stone-work and the green sward on the top of the bank, there should be several layers of thick tough sods or turf, which will not only serve to bind the stones, but make the junction of work with the natural bank smooth and compact. When the whole facing is executed, the stones and sods should be forcibly beaten into the bank with mallets and rammers, in order to make it more firm and secure. If any fissures still appear, long splinters of stone should be driven in, which will not only fill up the vacant spaces, but act as wedges to fasten and consolidate the rest of the work. When sods are employed to make the facing instead of stones, the foundation ought at all events to be defended by large stones; and it may also be proper to drive a single or double line of stakes into the bank to prevent the current from tearing away the sods, or even disarranging the stones.

In the case either of stone or turf facings, it has been found useful to scatter a quantity of coarse hay seeds over them; as they vegetate quickly, and tend greatly to fasten the work The firmness of the bank may also be considerably increased, by setting willows or other aquatic plants along the top. *

The most difficult branch of the whole operation, is that of leading the stream out of the old

*These should never be allowed to grow up as trees; but be cut over occasionally, so as their roots may spread, and they may not be shaken and affected by the wind.

into the new channel. When the mouth of the new cut can be made to fall in with a bend of the old channel, the change may be made with comparative ease, as the current will flow into the new channel in a straight line. In this case, the materials dug out in forming the mouth of the new cut, may be sufficient, when thrown across the old stream, to turn its course. But if the alteration of the channel be abrupt, and the stream strong, it will be requisite to raise a pier of stone upon the bank of the old channel, to direct the current forward to the new one: a water-tight dam being formed between the point of the pier and the new bank.

The materials dug out from the new channel may either be employed in filling up the old one, and thus facilitating its future conversion into arable or pasture land; or if the stream be liable to high floods, they may be used in erecting embankments on each side of the new channel.

In the case of *vale* rivers,* the expedient of straightening the channel is equally advisable, though not so easily practicable, as it is upon *alpine* streams. In the latter case, a cut three or four feet deep may frequently suffice, and stones for erecting piers, and facing the banks, are found in abundance; while in the former, a depth of from six to twelve feet is sometimes necessary, and stones are not obtained without considerable difficulty, There may, nevertheless, often be situations where the extent of ground to be acquired by a new cut through a valley, will amply repay every expense and trouble attending the operation.

Of many similar instances, the following is one, where nearly 1000 acres have been secured in this way, at a very trifling expense; and, as a particular description of it may be useful, in directing the execution of operations of the same kind, it is given at length. In the parish of Kilsyth, Stirlingshire, the river has its course, for upwards of four miles, over a plain of small declivity, and of a soft loamy soil. It formerly straggled in many directions over this plain, in a channel of very little depth. At every turn it took, it was gorged up into a pool, and was overgrown with aquatic vegetables. At every flood, the whole valley presented the appearance of a lake; the hay and corn harvests were frequently ruined; and several fields, naturally of a rich soil, were rendered incapable of cultivation.

About the year 1793, Sir Archibald Edmonstone, of Duntreath, Bart. who was proprietor of the lands on the north side of the river, for more than four miles, employed Mr. Whitworth, an eminent engineer, to form the plan of a new cut sufficient at all times to contain the waters of the river, and as nearly in a straight line as the situation of the grounds and the course of the river would admit. To induce the proprietors on the south side to join in this useful undertaking, he generously offered to lay out two-thirds of the expense himself. So slow, however, are persons of unenlightened minds in discerning their own interest, that only a few of them, at that period, acceded to these advantageous terms. During the first year, only about a mile and three quarters of the new cut were executed. But the advantages of this partial improvement soon become so obvious, that the greatest part of the conterminous heritors concurred with Sir Archibald, in prosecuting the plan, though not altogether upon such liberal terms, as a just sense of their own interest might have dictated. Early in the course of the second year, the cut was completed.

The dimensions of this cut were varied judiciously, according to the gradual increment which the river receives in its course. For the *first* mile from above, where the river is of considerable extent, it is from eighteen to twenty feet wide at the surface, by ten to twelve at the bottom. Throughout the second mile, it is from twenty-two to twenty-four feet wide at the surface, by fourteen or sixteen at the bottom. Throughout the the remaining part, it is about twenty-eight feet at the surface, by sixteen to eighteen at the bottom.

The first part of this cut was undertaken by the contractor at two-pence per cubic yard; but he was only bound to lay down the earth regularly at the distance of a yard from the cut, without any obligation to form it into a regular sloping bank. It was understood that the conterminous heritors would execute this part of the operation. As they, however, proved negligent in this respect, it was found necessary to enlarge the contract; and two-pence farthing per cubic yard was allowed for cutting, and for forming the bank. The low rate at which this contract was entered into, may be accounted for at this day, not merely from the facility of working in a rich loam or clay, but chiefly from the well-known, and by many severely-felt, depreciation of money at that period. Such a work would not probably be now undertaken for less than fourpence per cubic yard. The expense of the whole of this cut did not exceed £600.

The embankment on the sides of the cut is erected about three feet from the brink, and is, for the most part, somewhat more than three feet in height; and could contain nearly double the quantity of water than now runs in the new channel.

The improvement, which has been now described, has been productive of very important advantages in this naturally fertile district. The declivity or fall of the river, throughout the tract, is about eighteen feet. The waters which formerly, in their crooked course, were almost wholly stagnated, now run at the ordinary rate of the declivity which is given them. They never overflow their banks. Cattle can now pasture upon those grounds, in which they would have formerly been swamped. The surface of the water being now, for the most part, four, and sometimes six feet below that of the adjacent fields, this cut serves as a general drain to the whole valley; so that three hundred acres of meadow may be converted into arable land; sixty acres of moss may be converted into meadow; and five hundred acres of arable land are already rendered of double value.

If the windings of a river cannot be altered, either from natural obstacles, or from the opposing interests of proprietors—or if the expense of the alteration be such as to render it unprofitable—it becomes the duty of proprietors then to consider, how far the subsisting channel can be improved, so as to lessen the ravages of the stream; or what means can be adopted for guarding their own lands, without injuring those of their neighbors.

As the impediments a river meets are the cause

* Those flowing through holms, haughs, or meadows, in the *low country*.

of its being turbulent, the first and most obvious thing to be done, is to remove all heaps of mud, stones, trees, or bushes, which are collected in the channel, and obstruct the course of the water.

At those places where the river encroaches, the means which may be used to defend the banks are various. In some instances, bulwarks of stone, laid regularly in wooden frames, have been raised: but though such wooden frames facilitate the construction of the work, they prove ultimately injurious to it; for in consequence of being alternately wet and dry, they soon rot and give way, leaving wide gaps, through which the water enters, and breaks up the embankment. In some places, large sloping cairns, or structures of loose stones, have been employed: but where the extent of the bank to be defended is great, or timber scarce, such a bulwark is expensive, while it is at best only temporary.

Another method has been recommended by Dr. Walker, in his 'Economical History of the Hebrides,' as preferable to either of these:—"Form a single or double line of stakes in the bed, or on the bank of the river, of the branches of trees. These stakes may be from the thickness of one's wrist to that of man's leg: they are to be driven into the soil between two and four feet deep, and reach above the ground, or above the water a little higher than the rise of the greatest flood. They may be from six to twelve inches distant from each other; and if there is a double row, they are to be placed in the quincunx order.

"Such stakes, thus situated, can neither be displaced nor shaken by any force of water. They stop and entangle every sort of refuse brought down by the river. They intercept the mud and the gravel, which gradually form a bank, and force the river to establish a barrier against its own incursions—a barrier likewise far more efficacious and more permanent, than any that can be formed by art, with earth and stones.

"It is an obvious property of this mode of defence against the encroachments of rivers, that it is easily and quickly executed, and at a mere trifle of expense. A single cart load of such stakes, in some situations, might effectually preserve many acres of rich land. Every river, by the above method, may be thus turned and directed in its course at will. It would always be advantageous, if the stakes employed in this way were of the different sorts of willows.

"These take root, grow, and form a strong living fence against the river. But if stakes of willows cannot be provided, cuttings, or truncheons of willows, ought to be sunk in along with the stakes, and intermixed with them.

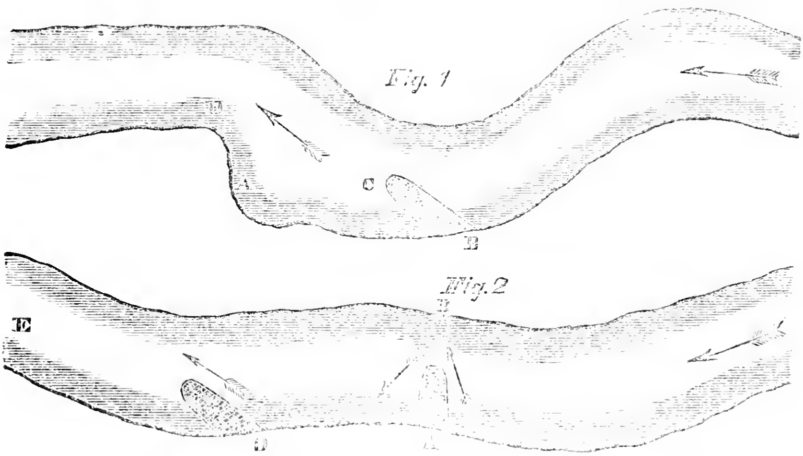
"For which purpose, the shrubby and low-growing willows are more proper than the most willow, the osier, the crack willow, or any others which grow up to a tree."

This mode of defence is judicious; but the difficulty of executing it in a proper manner, may perhaps exclude it from general adoption. To enable the piles to withstand the force of the river, they must be sunk a greater depth into the ground than it is possible for any mallet to drive them. Dr. Walker mentions from two to four feet of depth as sufficient; but from the experience of others, it appears, that at least eight or nine feet is necessary, to render the piles firm; and to this depth they cannot be driven by any thing else than a pile engine, which in many situations it is difficult, and in all circumstances expensive, to procure. The inability of mallets to drive the piles, was particularly shown by the experiments of Mr. Miller of Dalswinton, upon the river Nith, in Dumfries-shire. In order to prevent the encroachment of this river upon part of his property, he drove in a number of piles at a little distance from the bank, and wattled them with the branches of willows, &c. The piles were driven with heavy mallets apparently firm into the ground; they continued so for some months, till a heavy fall of rain having swelled the river, the piles were undermined and carried away.

When there is an opportunity of executing a bulwark of piles properly, the method adopted by Mr. Miller, of wattling them with willows, &c. will be extremely useful in intercepting the mud and refuse brought down by the stream.

A more easy and effectual device, than any which has yet been mentioned, for defending the banks of a river, is that of stone piers or juttees. The object of these is, to throw off the stream from those places on which it threatens to make encroachments, to others where it can commit no injury. Thus, if a river be encroaching on one its banks at A, Fig. 1, of Plate II. a jutty of

PLATE II. *Plan representing Juttees for the defence of River Banks.*



stone, a little way up the river, in the direction B C, will direct the current towards D, and prevent any farther injury.

A jut y of this kind ought to be carried out in an oblique direction, so as to force the current gradually towards the intended point. If formed too much at right angles with the stream, as at A. Fig. 2, it will throw the stream with violence on the opposite bank, at B, from which it will revert with double force upon C, the place immediately below the pier; so that, instead of diminishing, it would increase the destructive effects of the stream. But, if the jutty is placed obliquely as at D, it will force the current gradually towards E; in which position, one jutty may do more good, than several placed improperly at right angles. It may be further remarked, that when a pier is abruptly intruded into the natural channel, it requires from five to ten times more strength of structure than one which deviates gradually from the direction of the stream: in the one case, there is both the weight and force of the water, while in the other there is merely its weight, to withstand. And, above all, it is important to consider, that by making the pier in the direction prescribed, it cannot occasion any injury to the opposite bank.

The materials for constructing a guide of this nature, depend upon the magnitude of the stream to be directed. If it be small, a ridge of stones thrown loosely in may suffice; a barrier of this sort is both cheap and effectual, and when injured by any extraordinary flood, is easily repaired. When the land through which it passes is very valuable, and in the vicinity of a town, and the river is large and rapid, so that a pier of considerable height is necessary, it is proper if the expense be not excessive, to construct the pier of stone and mortar. In other situations, where masonry is too expensive, and the ground of less value, it may serve the purpose to employ casoons formed with piles and planks, or strong cases of wicker-work, and either of these filled with small stones or gravel, in order to give them stability; and they should be sunk along the edge of the banks, in as regular and firm a position as possible. These last expedients have been practised most successfully on several parts of the river Spey, and at Careston, on the banks of the river South Esk, in Forfarshire.

As the Spey is one of the most rapid and impetuous rivers in Scotland, and as the methods of embanking it is have been various and expensive, the following description of these operations, in its course through the Park of Gordon Castle, where it most ungovernable, may be useful in similar cases, and is given from the 'Agricultural Survey of the County of Banff.'

"It is believed, that the Spey first began to make encroachments on the skirts of the Park of Gordon Castle in September 1768, by the violence of the highest flood which tradition has kept on record. The first kind of embankments which were thereupon attempted, were expensive bulwarks of stone, built by the mason, but without motar. Their appearance, indeed, bespoke both efficiency and duration; but, like other fair appearances, "*it smiled deceitful;*" and, notwithstanding the continuance of expensive operations, the river, frequently levelling the works, maintained the contest with sucess, and on the whole, gained ground, when the opposing power was placed under the direction of the late Mr. Smeaton, who, on a brief survey, disapproved of all the costly bulwarks, and directed nothing more expensive than mounds of stone, loosely thrown together, almost at random, from the bed of the river, with no other art than to be raised higher than the water could, at any time, surpass, and to form a sloping shore, shelving back from the channel of the river. The embankments constructed on this principle, have been, almost to a wish, successful. The river, now is, as it were, entirely subdued; and the highest floods, although their violence in a thaw be exasperated by heavy masses of floating ice, hasten harmlessly along, dashing onwards directly into the sea.

"On some occasions there has been a departure in practice from Mr. Smeaton's theory, by forming a kind of mole of stakes, in collateral rows, to the breadth of four or six feet, driven firm into the gravel by the powerful repeated strokes of an appropriate engine. The stakes were bound together near the top by transverse bars, and supported by stones thrown in to fill up nearly all the vacuities. This kind of embankment was more expensive than the former, although the timber was furnished without price from the forest on the other side of the Park; and it was less efficient, because, instead of diminishing the power of the stream upon the gradual shelving of the slope, it was increased by direct accumulation against the perpendicular side of the mole; and, instead of adding any depositions of gravel, and turning the channel thereby to a greater distance from the shore, the torrent was brought to bear harder on the pile, and any gravel which had been left there before was swept bare off. The ordinary bed of the river was established along the course of this kind of pier; and it somehow not admitting easily of repair, brought the case into a worse state, almost, than it had been before.

"To render this kind of mole efficient, therefore, it would be necessary to add also the shelving slope of stone along the base of the pile, forming that gradually rising shore, which the river itself, on some occasions, exhibits, and which no power of the flood thenceforth ever injures; as if nature would thereby teach us the only secure mode of guarding against the robberies of the torrent." *

When the pier consists of masonry, it has been found prudent to throw in a number of large rough stones against the foundation, in order to prevent the stream from undermining it. Opposite to the head and outer point of the piers, piles should also be driven into the channel, to break the force of the water, and secure these important parts of the work from dilapidation.

There is another evil that piers are exposed to during floods, of which it is proper also to take notice. When the river surmounts the pier, the body of water which falls over, naturally scoops out a pit in the ground behind, and undermines the precipice over which it tumbles. This evil may be wholly removed, by raising the pier so high as to prevent any overfall; but this is a remedy too extreme to be often advisable. The most

* The author inspected these embankmets, and reported his opinion of several improvements, to the late Duke of Gordon, when making a survey for the drainage of the Huntly Estate, in 1811.

prudent plan is to endeavor to break the strength of the fall, or to shield the ground from its violence. For the former purpose, the back part of the pier may be made with a shelving or flatly inclining surface; for the latter, a strong convex floor paved with stone, may be made behind the pier, to receive the fall of the water. Of the efficacy of this last method, Mr. Marshall gives a strong example. * "Some ten or twelve years ago," he says, "finding that the foundation of a sea-wall, (or strong stone-facing against a wide open estuary), over which a large body of water, in times of floods, falls six or eight feet perpendicular, was constantly under repair, though every known expedient had been used to counteract the effect, I directed a convex floor nearly in the form of a shield, to be laid with strong rough stones, edgeway, its margins being secured with the largest stones, as butments to the arch; the broad end of the shield buts against the foundation of the wall, and receives the water on its stongest part, the point gently declining to lead off the water smoothly into the sea. It still remains perfectly firm; perhaps, indeed, firmer than when it was first put down." This is a case, where, its being a protection from the sea, it required more particular strength, and consequently would be more expensive, than what is necessary in the case of rivers.

The expedient of juttees, which has been already explained, is certainly preferable to any other mode of defending the banks of a rapid river, both in point of ease and efficacy, and deserves to be more generally adopted than it is. A strong instance of its superiority occurred in the case of the river Nith, formerly mentioned. After the piles which Mr. Miller raised had failed, he resorted to the use of juttees, and found them to succeed completely. Those which he has erected have a convexical slope on the side next the current, in order to diminish the pressure of the water, and strong planks are also firmly set on edge among the stones, their ends pointed towards the river; so that to commit the smallest injury; the stream must move the whole body of stones on the line of each plank.

Where a river flows slowly, and its banks are of a soft earthy nature, the mode of resisting encroachments should be different from, and will be less expensive than, any which has yet been mentioned. Let a large quantity of the smallest branches of trees, of broom, whins, brambles, or such-like brush-wood, be placed in the river, near the side where it threatens to encroach. If the river runs slow, they require merely to be thrown in; but, if its current is considerable, they must be stuck into the bottom, and fastened with stakes driven through them into the sides of the bank. This heap of rubbish intercepts the slime and mud of the river, which quickly accumulates towards the bank, and becomes a most effectual defence against any further encroachment in that quarter.

Such are the principal methods that have been successfully employed for protecting and securing the banks of rivers in Scotland, and which the writer has had an opportunity of observing. There may be other expedients; but these being of less efficacy, and only temporary in their duration, it is unnecessary either to describe, or recommend them to practice.

* On Landed Property.

SECTION II.

On the embankment of low ground on the side of rivers, to prevent inundation.

In those wide and extensive regions that lie under a warm climate, the rivers are generally *periodical* in their inundations, from the rains falling only at certain periods of the year; and the regularity of the floods is greater, in proportion as the rivers are extensive in their course. Thus the Nile, the Niger, the Pegu, the Ganges, the Euphrates, and the Plata, are distinguished for their regular and annual floods.

In these cases, an inundation, instead of spreading ruin in its progress, is the source of extraordinary benefit. The mud and slime which it deposits, form a regular supply of the richest manure. The soil is raised to the highest degree of fertility; and being constantly recruited, can never be exhausted. The inhabitants, too, being always aware of the precise time at which the inundation will take place, have it in their power to provide against its doing injury, and to prepare the ground for receiving the nutriment with which the water is stored.

But in countries like Britain, which are narrow in extent, overspread with mountains, and exposed to a variable and humid climate, the rivers are short in their progress, and liable to be *suddenly* swollen. A flood, then, invariably commits wide and severe ravages. Sometimes it entirely strips the land of its vegetable soil; at others, covers it with a thick bed of sand and gravel. Not unfrequently the water loses its usual course, and cuts a new channel through rich and cultivated fields; and the most disastrous scene of all, is to behold valuable crops, and sometimes herds of cattle, swept off by the flood, thus graphically described by the poet of 'The Seasons:'—

> "Wide o'er the brim, with many a torrent swell'd,
> And the mixed ruin of its banks o'erspread,
> At last the rous'd-up river pours along;
> Resistless, roaring, dreadful, down it comes,
> From the rude mountain, and the mossy wild,
> Tumbling through rocks abrupt, and sounding far;
> Then o'er the sanded valley floating spreads,
> Calm, sluggish, silent."*

The flat *haughs* (as they are called in Scotland), or low ground, lying on the sides of rivers, and particularly near their entrance into the sea, are, for the most part, composed of the richest and most fertilized particles of earth, brought down by the stream from the adjacent country, through which it flows. These, from their situation, are often exposed to devastation, by their banks being encroached upon, and carried away in time of floods, whereby a portion of valuable soil is lost, and a bank of sand or gravel lodged on the opposite side, in its stead. But, besides the gradual injury which the adjoining land sustains (which

* In a highly embellished book, published by Sir Thomas Dick Lauder, Bart. an interesting, faithful, and picturesque account is given of the *great floods* occasioned by the overflowing of the river Spey, and others, in the counties of Moray, Nairn, Banff, &c. in 1829, which, in their melancholy consequences, confirm the justness of the above poetical quotation, the author being well acquainted with the different localities which Sir Thomas so forcibly describes.

is, in many situations, of considerable extent), from this operation of the current on the edge of the banks, (as has been explained in section 1.), the surface of the whole fields, thus situated, is exposed to inundation, when the river is swollen by the rain, and the torrents which descend from the neighboring heights: often sweeping away the crop, and deteriorating the soil, by the lodging of sand and gravel at one place, and the carrying away the mould at another. A sudden and rapid flood has also the effect of changing the course of a river; making it abandon the old, and take a new channel, through part of the ground, perhaps more valuable, by its being better cultivated, and on that account more loose, and easily acted upon by the current. In this case, the loss is aggravated, by the old channel being left a useless waste, in addition to the space occupied by the new course which the water has taken.

Accounts of havoc, committed by such inundations, abound in all the county reports, and imperiously enforce the necessity of adopting measures to prevent them. From the following detail of the evils committed in one district, a judgment may be formed of the general loss sustained by the country at large:—"The haughs of Isla," says the surveyor of Perthshire, "from Ruthven bank to the mouth of that river, a distance of ten miles, are exposed to inundations which are great and destructive. In the glens lying north of the Stormont, floods do great havoc among the hay and other crops. In Athol, at Bun-rannoch, in Glendochart and Glenlochy, torrents from the mountains swell the rivers so suddenly, that they spread far and wide, in many places beyond their banks, and frequently sweep off almost the whole labors of the year. The Tay and the Earn, the Devon, the Allan, and almost every river within low banks, which takes its course through flat land, brings desolation on the finest fields, which lie on its sides."

In the northern counties of Scotland, inundations are not so frequent as in the southern. The reason is, that where a channel is rocky, which is the case with most of the highland rivers, it is generally deep, and the river seldom overflows its banks; but where the intersected strata is of a soft and gravelly kind, and the expanse of the flat or haugh-land of greater extent, as in the low country, the channel is invariably shallow, quickly filled, and soon overflowed.

The manner in which inundations proceed, deserves particular attention, because, from observing this, we will be the better able to discover the proper remedy. "When a river swells," says the learned Buffon, "its celerity uniformly increases, till it begins to overflow the banks. From that moment its rapidity is checked, which is the reason why inundations always continue several days; for, though the quantity of water should be diminished after the commencement of the inundation, it would, notwithsanding, continue to overflow; because this circumstance depends more on the celerity than the quantity of water. If it were otherwise, rivers would often overflow their banks for an hour or two, and then retire to their channels, which never does happen. An inundation, on the contrary, always lasts some days, supposing the rains have ceased; and less water runs in the river, because the overflowing of waters diminishes their celerity; and, consequently, although the same quantity of water arrives not in the same time as formerly, the effect is the same as if a larger quantity had been brought down."

Farther, it may be observed on the motion of water, that, mathematically speaking, if a river runs on a bottom having an equal descent, the velocity of the water will increase, the farther it runs. Thus, suppose the descent to be one foot per mile, after the first mile the water will have acquired a velocity of eight feet per second; after four miles, its velocity would be sixteen feet per second; and at the end of sixteen miles, it would run at the rate of thirty-two feet per second—its velocity at every point being the same proportionally, as would be acquired by a body falling the same perpendicular height. These rules, with regard to the motion of rivers, cannot however be so accurately observed, on account of the perpetual obstruction the water meets with against the sides and bottom of the channel it flows in, which counteracts the power of gravity, and reduces the water to an uniform motion, where the declivity of the bottom and sides are regular. Supposing a given quantity of water is to be carried off, the smaller the descent, the width and depth, or section of the river, must be the greater; for the water, running in a large body, and slower, meets with a less proportional obstruction from the sides and bottom. Also, supposing the same quantity to be discharged, the larger the body it runs in, and the slower the motion, the more liable its course is to be obstructed by stones, mud, weeds, &c.

Large and deep rivers run *sufficiently* swift, and discharge vast quantities of water, with a descent of one foot per mile.

Small rivers and *large burns* require about two feet per mile. *Small burns* scarcely keep a free course under four feet per mile.

When a cut or channel, therefore, is to be made for a river or stream of water, through a tract of level ground, it is preferable to make it deeper at the lower extremity, in order to give a greater descent upon the bottom all the way, than to make a broad and less deep channel all the way upon a less descent; for the former method is attended with less expense of digging, and is better calculated to keep an open course.

From this explanation, it is obvious that the leading principle of all operations, to prevent a river from overflowing, should be *to increase and preserve its celerity.*

For this purpose, it may be first observed, that it is much better to deepen than to widen a channel. A contrary advice is given by some writers,* but, it is apprehended, without a sufficient attention to circumstances. If a river were always equally full, there can be no doubt that to widen its channel would prove a most effectual method to confine it within its banks. But as the quantity of water is constantly fluctuating, the widening of the channel would produce the following bad effects:—1. That when the stream happened to be small, it would scoop out a winding bed for itself in the middle of the channel; and upon swelling, would follow the direction of this bed, and thereby strike with violence against the banks. 2. That by lessening the depth of the river, its celerity would be diminished, and its liability to overflow of course increased; for it is an established fact,

* Beatson, Marshall, &c.

that celerity depends less upon the declivity of the channel than upon the weight of water. The importance of this objection is confirmed by this remarkable fact, that when once a river acquires a great celerity, it will both preserve it while running through a level country, and even surmount heights without spreading much to a side, or, at least, without producing any inundation of any moment.* 3. That by diminishing the celerity of the river, it would be more liable to be warped and impeded, as a greater quantity of *sulliage*† would thus be deposited in the channel.

At the same time, a caution must be given against carrying the principle here laid down to an extreme. It is as ineffectual to confine a river within too narrow bounds, as it is to give it too large an expanse. The width of the channel, therefore, should be such as will admit the water to flow freely, and maintain a *proper* or *safe* velocity.

To deepen the channel of a river, all the means which have been recommended for defending banks from encroachments—the removal of obstructions, and the erection of bulwarks to prevent the stream from spreading—will be found extremely conducive. In some instances, these operations may even preclude the necessity of embanking.

Where rivers flow through a very flat country, and their current is consequently less rapid, their overflowing, instead of being destructive, often produces beneficial effects, by depositing mud and other rich sediment, which tends to fertilize the soil in a very high degree. Where this is the case, embankment has a double advantage; for by means of sluices, a portion of the water can be admitted at the upper side, and retained at pleasure, by which means the influence of its effects can be regulated as circumstances require. Those large rivers that flow through valleys of wide expanse, have always a lengthened and crooked course, occasioned by the frequent changes that take place, by floods acting against the soil of which the low ground is composed. To make new and straight channels for such rivers, would be the most effectual improvement; but this, in many cases, would be attended with an expense much greater than the advantages to be gained. In others, however, it would be advisable to straighten such parts as are *very* crooked, and where the length of cutting would be short, and the expense moderate. By this means, the length of embankment would be shortened, and kept in a straight line, which is a great desideratum. Indeed, the line of embankment should be kept as straight as possible, even if the course of the river be crooked; for it is against the bends and turns that the water has greatest weight, and is most apt to burst through the bank. The loss of this ground, by its being excluded from culture, is counterbalanced by the security which it provides, in giving the water more room, and consequently lessening its force and pressure; and though not accessible to the plough, is valuable as meadow or pasture. The annexed plan, No. III. will further explain these positions.

In all smaller streams, or *burns** (as they are called in Scotland), straightening, widening, and deepening the channel, is the first and greatest improvement; and, in many cases, these operations alone may be sufficient to confine the whole body of water in a flood, and so render any embankment or further defence unnecessary. If the capacity of the channel is not sufficiently enlarged by these means, the width between the embankments will require to be the greater, and their

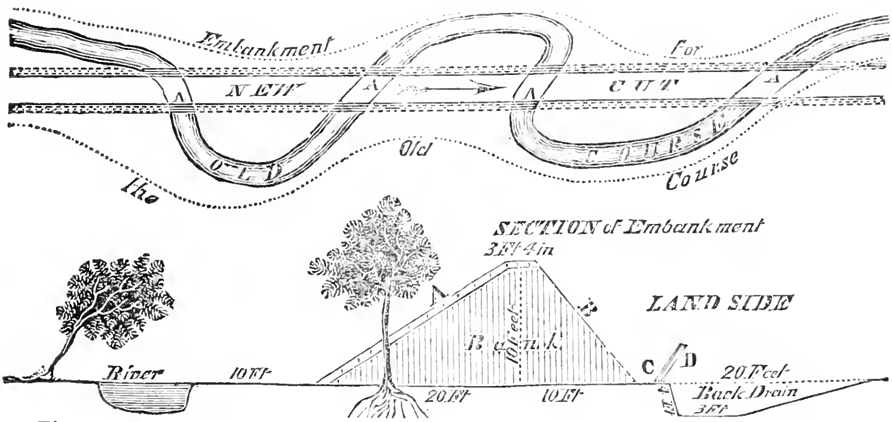
* Buffon on rivers.

† Slimy, sandy, or other earthy deposit.

* *Brooks*, in England.

Plate III. *Plan and Section representing a New Channel and Embankment for a River.*

The Points at A should be guarded by a facing of Stones or by Piles of Wood.



The embankments for the new cut is represented by the straight double rows of dotted lines, and should be 10 feet distant from the edge of the cut. The dimensions of the new cut should be 30 feet wide at top, 10 feet at bottom, and 6 feet deep, or in these proportions, according to the size of the stream.

Section.—A, Slope faced with turf. B, Sown with grass. C, Scarcement three feet broad. D, Paling.——Trees must be removed by the roots.

height, and breadth at the base, greater also in proportion. By examining the flood-marks, and measuring their height, that of the embankment may be ascertained; but it should always be raised from one to two feet higher than the greatest flood: for the materials of which it may be formed subside considerably after it has been constructed: and that according to their height. In general, it will be found that rivers which flow freely, and have no interruption in their course, even during the greatest floods, do not rise more than five or six feet above their ordinary level; so that, in most cases, a bank of six or seven feet in elevation will be perfectly adequate for every purpose of security.

The slope of an embankment should always be greater towards the river, than to the land side, in order to avoid that lateral pressure which is so destructive when the bank is formed too upright. The sloping of the bank is of great use in rendering it firm and secure; as it makes the resistance indirect, and of course lessens the pressure of the stream. On the north side of the Tay, between Errol and Invergowrie, there are some old embankments of stone, which rise nearly in a perpendicular line from the water. From being built in this injudicious manner, they have been found so insufficient, that it has been necessary to erect piers or juttees, to protect them from the violence of the current.

The base of an embankment should be *three* times the breadth of its height; and its width at top should be *one-third* of that height, as shown by the section of plate No. III. The line of embankment should be kept at a proper distance from the edge of the river bank, and the stuff of which it is formed should *all* be taken from the land side, to prevent breaking and loosening the surface on that next the river, which would expose it to encroachment from the current. If there are any heights in the field adjoining, within a short distance, the earth may be partly taken from these, and from the cut that may be necessary at the back of the embankment, for receiving the surface-water from the fields. The earth from this cut should be removed with a gradual slope backwards, so as to give an easy descent from the surface to the bottom of the drain. All trees and brushwood should be removed from the space betwixt the embankment and the stream, to give no interruption to the current, or throw the force of the water against the mound. Any tree or bush, in the line of the bank, should be removed by the root; otherwise, it may shake and keep the mound loose at that place, and give admission to the water. A wooden frame of the exact shape and size of the bank should be made, that the workmen may execute it with accuracy; for it is of consequence to have the mound formed regularly, and as even and smooth as possible, that the water may meet with no obstruction, nor take hold of any inequality on the surface of the side next it. In constructing the bank, the earth should be well tramped, and beaten down with heavy mallets, and that part of it of the firmest consistence should be used on the side next the river. That side should also be faced with well swarded turf, as soon as the slope is finished. It may be necessary to pin down the lowermost layers of turf, and to water them (if a dry season), that they may adhere the more firmly, and prevent the grass from decay. The side next the field may be sown with grass seeds, which may also be sown upon the other side, to close the interstices between the turfs, and to thicken the sward.

In executing an embankment, it should always be begun at the upper end, and proceeded with downwards; finishing, if possible, the portion of work for the day, in case of any sudden swell of the river injuring it, if left irregular and not completed. It is not necessary to found the bank any lower than the adjoining surface; the turf only may be taken off, which will be useful in covering the slope, and the earth will unite more readily than it would do otherwise. A *scarcement*, or unbroken space, of two or three feet must be left between the edge of the embankment and the trench that is cut along the back of it. A paling should be erected along the inner side of the scarcement, to prevent cattle from going up, trampling upon, and breaking down the bank, till it be fully consolidated, and swarded with grass.

Embankments are usually executed by contract, and may cost from fourpence to sixpence the cubic yard. The contractor, for the sake of greater security in the execution of the work, should be bound to uphold them for the first two years.

All the water that may collect in the fields adjoining, should only have *one* outlet through the embankment to the river, at the *lowest* point, and that by a pipe or square box of wood, with a valve or lid, fixed to the mouth of it by hinges on the upper side. The valve will shut in floods, to exclude the river, and the pressure of the land water will open it when the flood subsides.

It is improper to sow or plant any tree, hedge, or shrub, that takes deep root, or grows to any height, on the sides or top of the embankment; for by these, the earth would be loosened, the water admitted, and the mound shaken and carried away. If the seeds of rushes, flags, tussilago, or fiorin grass, be sown, these will bind the surface, and prevent the water from making any impression upon it.

Holes made by moles or mice are also dangerous, on account of their admitting the water into the bank, and should therefore be immediately closed up. Lastly, when the smallest breach appears, it should be instantly remedied; for if the water once takes hold of a broken space, it is sometimes difficult to stop its progress. For these purposes, it is necessary to make a frequent inspection, where works of this kind are on an extensive scale.

On the river Spey in Badenoch, the meadows on the estates of Belville and Invershie,* that were formerly overflowed and inundated by every flood, are now embanked in the most complete and secure manner, according to the description that has just been given; whereby above a thousand acres of land are now rendered safe and productive. On the Gordon and Findlater estates, much might be done in the same way. On the rivers Beauly, Carron, Clyde, Dee, Don, Earn, Esk, Forth, Isla, Ken, Nith, Tay, Tiviot, Tweed, &c. a great deal of land has been also embanked in an effectual manner; and on these, as well as many other rivers in Scotland, the extent of land that

* The latter, according to a plan and specification by the author; as also, others of considerable magnitude on the rivers Dee, Don, Eden, Ken, &c.

might be preserved and improved by this means, would amount to many thousand acres.

PART III.

ON THE EMBANKMENT OF LAKES.

All lakes are subject to temporary, and sometimes to extraordinary, swells, occasioned by great falls of rain and snow descending from the mountains that surround them; consequently, they often spread beyond their usual limits, overflowing and injuring the contiguous grounds. The damage they do in these cases is not attended with such devastation as the overflowing of rivers, whose current carries every thing before it, for as the water of lakes subsides gradually, it acts with less violence, and commits less injury. The consequences, however, are always so hurtful, as to make it an object of considerable importance to prevent or lessen them, by confining the water within proper limits.

Lakes that are surrounded with mountains, such as those in the northern parts of Scotland and of England, are known to have increased considerably in height; but in the same time their depth has diminished. This is occasioned by the rapid streams from the hills that run into them, bringing down sand, gravel, and other loose matter, which being deposited in the bottom of the lake, raises its bed, and tends also to choke the outlet, and to retard the discharge. This has also the bad effect of raising the channel, and obstructing the current of such streams as flow *into* them through level ground, and causing these streams likewise to overflow the land adjoining. This is the case with many large lakes, that have stretched beyond their original bounds, particularly that of Loch Lomond, where a small island called Camstradden, which existed in the time of Camden, is now covered with water to the depth of two or three fathoms. At the upper end of the same lake, there is at present a large extent of flooded meadow, that formerly must have been a part of the lake, of no inconsiderable depth.

As lakes subside greatly in the summer season, and swell much in winter, or after heavy falls of rain and snow, it would be desirable to confine them to their lowest limits; and to cut off such creeks and bays where the water is seldom of great depth, and where an acquisition of pasture or meadow ground might be gained. In some lakes, indeed, the extent of surface overflown in winter, so much exceeds what the water covers in summer, that it would be a very desirable object to confine such lakes to their smallest extent. The first thing, then, to be attempted is to enlarge the outlet, that the water may at all times have a free and easy discharge. It would be advisable to deepen this, if the level admits: but in all cases, it will be proper to widen and enlarge it, as much as the expanse of the lake, and the body of water it contains, may require. If rock, this may be difficult and expensive; but may be compensated by the advantages to be acquired, and the certainty of its always remaining open and entire.

The form and construction of the embankment that is to surround the lake, may be similar to that for the sides of rivers, as already described; but as the water, in the former case, presses more directly upon the bank, the slope next it should be greater on that account. The exact degree of slope will depend upon the stillness, or agitation, which the waters of the lake are known to exhibit. In those subject to high waves, from their extent, situation, and exposure to winds, the slope will require to be *twice* as much as that which is necessary for river embankments, where the water presses only in a lateral direction, and where the current glides gently. The embankment should not be confined to the verge of the lake only, but should extend along the sides, both of the stream that flows into it, and that by which it is discharged, as far as the level requires: or must be carried to the higher ground on both sides, above reach of the flood, as shown by the dotted lines marked *bank* in the plan. There must be a back trench or drain to intercept the land-water, and discharge it at the lowest point: and also one, under the high ground, for the same purpose, as represented in the annexed Plate, No. IV.

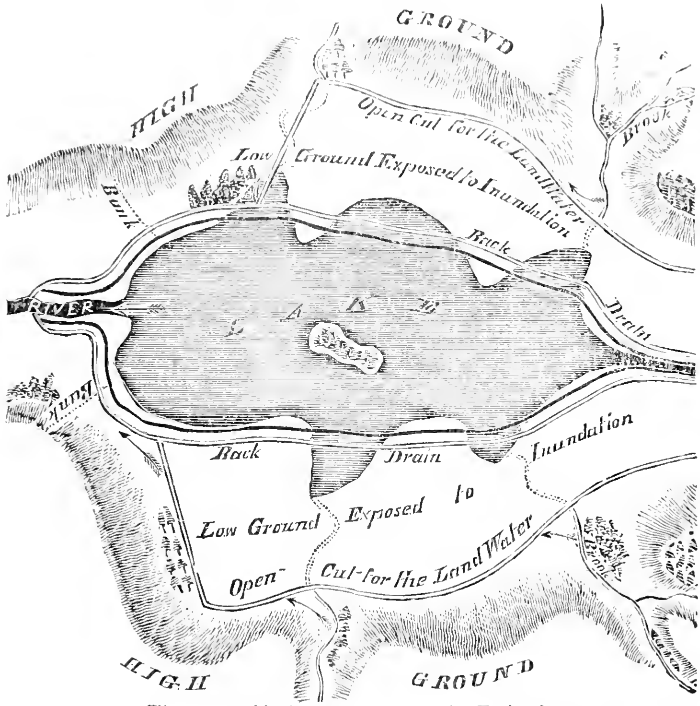
It may be proper to observe, that where a lake is encompassed on all sides by the lands of one proprietor, he may perform such operations upon it as he thinks expedient; but, if the adjacent lands are the property of several individuals, and they have also a mutual share of the lake, every operation on it must be regulated by an attention to their respective interests. Or, if the lake is situated at the head of the river or brook, it may be considered the source of the stream, and no alteration can be made upon it, which may in any degree prove injurious to the proprietors below. It may, however, be remarked, that it is only by such alterations upon the area of the lake, by which an undue portion of water may be taken from, or thrown upon an opposite proprietor, or the general supply of the stream diminished, that a legal cause of complaint can arise: for it is the right of every proprietor to defend and improve his own land, provided it is not done with the evident intention of injuring his neighbors.

PART IV.

ON THE CONSTRUCTION OF WEARS AND DAMS ACROSS RIVERS, FOR THE USE OF MILLS; AND ON THE FORMATION OF BANKS OR HEADS, FOR ARTIFICIAL PONDS AND PIECES OF WATER, &C.

This is a branch of the subject which requires considerable attention; for there is no species of embankment or fence, upon which more money is expended, or where more failures take place. Dams or wears across rivers, for the purpose of raising the water to such a level that it may be conveyed in a lead for the use of mills, &c. are often expensively executed at first; and, for want of being properly constructed, are in constant need of repair, and are sometimes swept away altogether in time of floods. It has hitherto been the custom to erect them in a straight or oblique line across the stream, and to construct the dike in a triangular form, wide at the base, and coming gradually narrower towards the top, where it ends in a point, as represented by Fig. I. in Plate No. V. A dike of this form and structure must be very insufficient, and liable to be disarranged and thrown down by the force of running water pressing upon and falling over it. The upper stones

PLATE IV. *Embankment of a Lake.*



The strong black line represents the Embankment.

PLATE V. *Plan and Sections of Wear and Head for Artificial watea.*

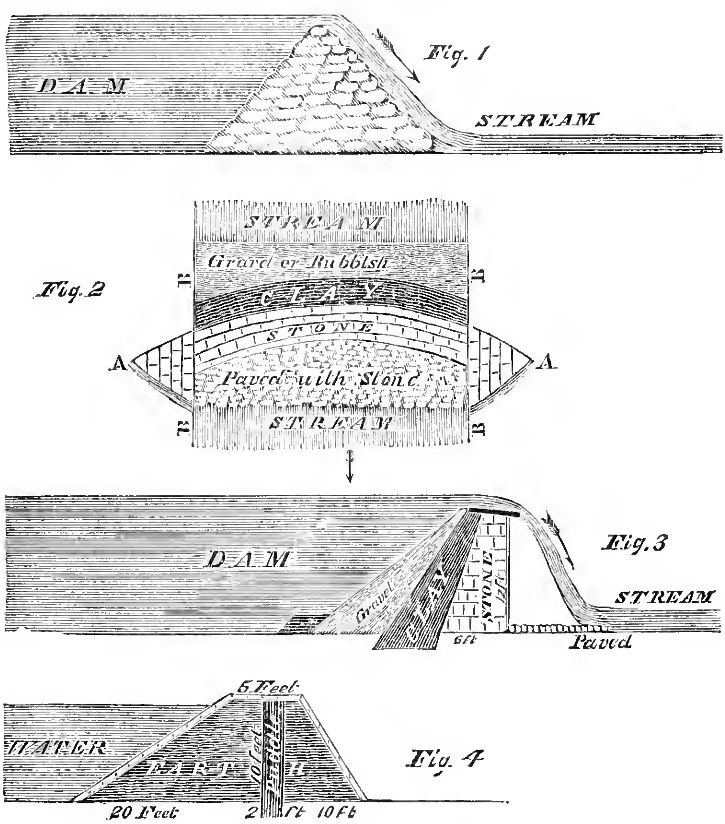


Fig. 2.—A A, Abutment of stone. B B B B, Bank of the river.

are first loosened and carried down, and the water striking with velocity on the whole face of the dike, precipitates itself with violence against those at the bottom, and displacing them, the whole structure is soon demolished.

Dams, that are erected at a still greater expense, of hewn stone, but of a similar construction, are also liable to be destroyed (although in a lesser degree), if the lower side is formed with a slope, or inclined plane. The water, in this case, does not insinuate itself in such a body among the stones that are joined, as it does when they are loosely laid together, as in the first mentioned case; but still, the force of the falling water has such effect upon the undermost layers of stone, that in time it cannot fail to undermine and displace them. The first error in all these kinds of stone-wears, is the carrying them in a *straight line* across the river or stream. They should be constructed so as to form an arch across the bed of the stream, with the convex side upwards, the ends resting on strong abutments placed in the bank on both sides. By this means the force of any body of water, however great, will be effectually resisted, and the structure be perfectly firm and secure. The greater the slope towards the upper side, the better, but the lower side should be nearly perpendicular, that the water may fall over it like a cascade, without coming in contact with the face of the building. Figs. 2 and 3, of Plate V. are a plan and section of this. Dam-dikes, of the construction first mentioned, are sometimes secured by beams of wood, forming a kind of frame-work, in which the stones are placed. But this is liable to accidents, by the wood rotting and giving way; consequently the stones lose their hold, and are soon separated and displaced.

In building the dike or wall, as represented by Fig. 3 in the Plate, it is necessary to dig till a firm foundation be found. The height will be regulated as circumstances direct, and the breadth of the foundation must be according to that height. If the height be twelve feet, the breadth at the foundation may be six, and at top, two feet. The stones should be bedded with as much care as possible, and the joints closely cemented with mortar or *tarras*, that no water may escape, and that the building may be firm and durable. When the wall reaches the requisite height, it should be exactly level across the whole length of the stream, that the water may spread over the whole, of an equal thickness, and so moderate its force in time of a flood; and upon the top, there should be a coping of flat stones, neatly cut and jointed, projecting nearly a foot over the perpendicular wall on the under side, with a rise of a few inches towards the upper side. The length of these stones will require to be three feet; but, if such are difficult to be got, planks of oak, or larch wood, may be used in their stead. That no water may leak through the building, it will be proper to have a bed of clay, three or four feet in thickness, along the upper side of it, well beaten down, and that to the whole height of the wall. The section of clay should be founded lower than the breast-work of stone, to prevent the water escaping under it. The coping stones should be laid on clay or tarras, so that the upper part of the building may be perfectly water-tight, which is a material object in operations of this kind. Gravel, or any loose rubbish, should be tumbled over into the dam, above the clay, shelving gradually from the dike into the water, so as to make the slope as long and easy as possible.

The use of the projection in the coping is to throw the water clear over, so as it may fall at a distance from the bottom of the building. The pavement there will prevent the water making an impression, or opening a cavity in the bed of the river, whereby the wall might be undermined: and it is necessary that this pavement should extend so far as to be beyond reach of the fall when the stream is in flood.

Heads, or banks of earth, for the confinement of water in artificial lakes or ponds, are often constructed at great expense, and not being properly formed, often break out, and occasion considerable damage. The error in their construction is commonly owing to the want of breadth at the base, in proportion to their height; and to their not having a sufficient slope towards the water, nor a proper section of *puddle* in the centre.

Fig. 4, in the Plate No. V. is a representation of what an embankment of this kind should be, according to the supposed depth of water it may have to support. As this bank is acted upon by the water, in a similar manner as that for the confining of lakes, as has been already described, its degrees of slope should be the same, more or less, according to the depth or shallowness of the water. If in a park, or pleasure-ground, the outward slope should also be greater than that of any other embankment, that it may connect more naturally with the adjoining surface, and have as little appearance of art as possible: and shrubs, or clumps of low trees, may be planted on it, to lessen that appearance. Mounds for this purpose are commonly constructed across dens or hollows, where that part of the water immediately above them is of considerable depth. Where this is the case, and the depth exceeds ten feet, the breadth at the base of the embankment will require to be greater in proportion than the section represented in the plate; that is, if the depth is fifteen feet (which it will seldom exceed), the breadth at bottom should be sixty feet; and at top, fifteen. The puddle will require to be equally thick in proportion, and must be sunk several feet deeper than the surface on which the bank is founded, or till a stratum of clay or other safe foundation is got. The mound should be formed of as solid materials as can be got from the space to be occupied by the water; and to render it the more compact, it should be well beaten down, and consolidated in the course of its being formed.

Both sides should be lined with turf, and the water should not be admitted for some months after the bank is completed. For want of attending to this, many heads have given way, by letting in the water, and filling the pond, before the earth was sufficiently consolidated; and it is very difficult to make up a breach in the bank afterwards. Where the artificial mound joins the natural banks, a space should be dug out, to insert, as it were the one into the other, to prevent the constant pressure and agitation of the water at these points from making a breach, and forcing an outlet there. A sluice, strongly secured by mason-work, should be placed in the most convenient part of the bank, to let out the water when necessary; and an overfall, for the waste water, will also be requisite, which ought to be particularly attended to. This should be placed in the solid, or natural bank, at either side, as situation and other circumstances direct, and must be strongly paved with stone, founded on clay; or it may be formed by a sloping tunnel of stone and lime, through the bank, if it rises to a considerable height. This last may, in many cases, be the most advisable, although it is a plan seldom adopted. Sometimes the fall, or outlet for the waste water is constructed of wood; but this is liable to many objections; such as, its alternate exposure to wet and dry, by which means it becomes *warped*, and its joints burst asunder; and its being subject to quick decay, and apt to be undermined and lifted up by a sudden swell of water. If the head is to be erected across a considerable stream, to be widened and formed so as to contain a greater body of water, that it may have the appearance of a river or lake, it may be constructed according to fig 2. in the plate.

In these last embankments of earth (for lakes and artificial ponds), it is particularly necessary to attend to any holes or openings that may be made by moles or mice; for where the water is always pressing against the bank, and ready to ooze out through the smallest aperture, any outlet of that kind should be immediately closed up. A thin coating of hard gravel, immediately below the turf, well beaten down, would tend effectually to prevent the working of vermin of that kind.

CONCLUSION.

In arranging the subject of this 'Treatise on Embankments, &c.' into its proper *heads* and *sections*, that order has been followed which naturally presented itself, according to the degrees of importance which the different branches seem to merit.

Embankments from the sea, are no doubt the first in point of importance, and have a strong claim to the consideration and attention of those active, public-spirited, and wealthy proprietors, whose estates lie continguous to the coast. Where a great stretch of the shore, capable of being recovered from the sea, bounds the property of various individuals, the undertaking should be a joint concern; for, in many cases, it would be easier, and more effectually accomplished in that way, than in separate and detached portions. The expense, too, would be infinitely less, by saving the cross banks that would otherwise be necessary, were only part of a bay of the sea to be embanked at one time.

The ideas of some ingenious and enterprising projectors upon this subject have surmounted the bounds of common understanding so far, as, by their speculations, to have deterred those from entering seriously upon undertakings of this nature, who otherwise might have been willing to execute such plans, on a more moderate and less expensive scale. Persons of this speculative turn of mind, however, are useful in society, so far as they are the means of setting others to think of enterprises that some time or other may be carried into effect. Many great works have, in time, been executed, that were originally suggested by projectors of this description, whose speculations were then looked upon as the mere chimera of a distempered imagination, and absolutely beyond the power of human exertion to accomplish.

England has already shown the practicabilty of these improvements in the art of embanking, in all its various degrees; and it is hoped, that this part of the kingdom will profit by her example.

The second branch of this subject is less open to these objections. That the *improving the channels of rivers, and embanking the land liable to be injured by their overflowing*, is an operation of more practicability, must be generally acknowledged. The benefits to be derived from it are equally certain, and are more easily attainable.

That of lakes, of the nature and description that has been given, has likewise its claim to attention. There are many in Scotland, where a great addition of useful land might be acquired, and that in parts of the country where an acquisition of this kind would be doubly prized. Such would the case in those highland districts, where low-lying ground is of the greatest value, for the purposes of culture and the produce of hay for the winter maintenance of stock.

Lastly, the works that are erected, both for use and for pleasure, in the *construction of dam-dikes and formation of artificial ponds of water*, are often faulty in the design, and expensive in the execution. The rules and directions for these have been suggested from observation in different parts of the kingdom, where the writer has had the opportunity of viewing and examining them, as well as from his own experience in planning and directing works of the same kind. *Of sea-dikes and river embankments*, he has also, in the course of his profession, had the designing and direction. He has, therefore, with some degree of confidence, treated that part of the subject; and can safely recommend to the notice of those who may be desirous of undertaking such works, the various modes of execution that have been explained. At the same time, in submitting these observations to the public, he deems it proper to add, that they are, in a great measure, corroborated by the opinion of others who have written *partly* on the same subject, and whose communications he has consulted. He has avoided entering into a lengthened detail; but has endeavored to explain the whole system of embankment, in as concise and perspicuous a manner as the nature of the subject would admit.

If this short treatise, therefore, shall be the means of promoting the knowledge, and extending the practice of these useful undertakings, he will feel the satisfaction of having, in some degree, contributed to that effect.

APPENDIX.

HINTS AND DIRECTIONS FOR THE CULTURE AND IMPROVEMENT OF BOGS, MOSSES, MOORS, AND OTHER UNPRODUCTIVE GROUND, AFTER BEING DRAINED.

It has been wisely remarked by the late excellent Bishop of Llandaff, in his 'Preliminary remarks to the Agricultural Report of Westmoreland,' that "the *waste* lands of the kingdom are a *public* treasure in the hands of *private* individuals."

It is from waste lands, not hitherto *completely cultivated*, that the greatest profit can be made (when once brought into culture), rather than from land which has been long under the plough; not merely from the rent of such land being comparatively low, but, from all *new land, when improved*, yielding, when properly managed, more *profitable* returns, than can be obtained from those soils that have been long under cultivation. No object in nature can appear more unpropitious, than an *undrained, uninclosed,* waste tract of ground, overrun with heath, rushes, and other useless plants, producing the most stinted herbage, and giving an appearance of sterility, even to the cultivated parts that may adjoin or surround it. Notwithstanding these unfavorable appearances, however, such land is, in a greater or lesser degree, according to situation and climate, capable of improvement; and, *when improved,* rewards the cultivator in a tenfold degree.

The next thing to be considered, after a bog, moss, or other kind of marshy ground, has been *completely* drained, is, the means most easily accomplished, and best adapted for its further improvement.

If such ground is overrun with rushes and other coarse aquatics (which is almost always the case), nothing will tend more to the *first part* of its improvement, than *over-stocking* it with cattle, so soon as it acquires a sufficient degree of solidity to bear them with safety. But care must be taken not to put them on it till it be *sufficiently* firm; otherwise the surface will be poached, and the coarse herbage not closely eaten down. By this means, the strength of the *rank* grasses will be nearly exhausted, and the roots will decay for want of their *accustomed* moisture. The trampling and pressure of the cattle will also help to consolidate the surface. By this first process alone, a wonderful change soon takes place; all the aquatics soon decline, and give way to better grasses, which spring up in abundance.

Lime or marl, spread on the surface, will greatly increase the growth of white clover, and other kinds of fine natural herbage, after the rushes and coarse plants have been closely cut, and eaten down by the cattle.* The first thing, however, to be done, whether the field is to remain in the natural state of pasture, or to be cultivated by tillage, is to level the surface; the natural irregularity of which is, in most cases, an obstruction that ought first to be removed. The earth that composes the highest parts should be removed, and mixed into a compound with lime, to be used either as a manure for a crop, or spread on the surface as a *top-dressing* for grass. Earth of inferior quality may be substituted for filling up the deepest hollows. Where the nature and situation answers, no improvement is so cheap, so sure, or so profitable, as converting a certain class of bogs into water-meadow.†

If it lies along the side of a river or stream, of which, by means of proper dams, trenches and sluices, a command can be obtained; and if the process of irrigation is managed with skill and attention, it never fails to produce luxuriant crops of grass. This crop is in every respect best adapted to the nature of such ground, being less affected by the inclemency of a cold or moist climate, and giving a more sure return, without the labor and expense of annual culture, than any crop of grain that might be produced. As a proof of this, the water-meadows on the estate of Odstone-Hall, in Leicestershire (already alluded to), from being mere bogs, before they were drained by Mr. Elkington, now produce as abundant crops of grass as any of the kind in that part of the kingdom. As a further instance of the good effects produced by watering this kind of land, Mr. Boswell, in his treatise on that subject, says:—"Lands that are very boggy, require more and longer watering than any sandy or gravelly soil. The larger the body of water that can be brought upon them the better: its weight and strength will greatly assist in compressing the soil, and destroying the roots of the weeds that grow upon it; neither can the water be kept too long upon it, particularly in the winter season, immediately after the *after-meat*† is eaten; *and the closer it is fed the better.* This species of soil, after being *well drained* and watered, will equal the wishes of the most sanguine, by its improvement."

No general system of irrigation can be properly laid down, applicable to every particular case, farther than some general directions, that hold good in every situation: but, in other parts of the process, different modes must be adopted, according as the situation and form of surface require. In those where the command of a river or stream can be obtained, the general rule is, to collect a sufficient quantity of water, nearly on a level, in a main carrier, which can, by means of sluices, constructed at proper places in the sides of it, be let out into floating trenches, cut along the surface of the field, or sides of the declivity, one below another. These floating trenches will collect the water from above, after passing over the spaces of ground betwixt each, and distribute it equally over the surface of each space lying between them, alternately. Proper attention must be paid, at the proper seasons, to open and close the sluices, in regular rotation, so as to flood different portions of the land successively; and the floating gutters should frequently be cleaned and scoured out, to prevent their choking up, and to destroy the growth of rushes, or other grass that may grow up in them. From the very absorbent quality of the peat, the water would require to have a more rapid motion on bogs, than on soils less porous or spongy. The saving of manure is another circumstance in favor of water-meadows, as the application of it would appear to be of no material consequence, being very seldom used by some of the best flooders in England.* Still, however,

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* The best time to cut rushes, &c. is when the shoots are weak, and before the seed comes to maturity. If left till the seed is ripe, it is shaken out, and, falling on the ground, multiplies their growth. They should be *frequently* cut before this season, which will soon extirpate them.

† It must be understood, that the surface of the bog has been properly levelled, well rolled, and a good sward of grass on it, before the operation of floating can be attempted. It is a fact well ascertained, that in Merionethshire there is land that was formerly not worth 6*d.* per acre; but being now *drained and flooded,* besides affording excellent pasture till the 1st of June, produces two tons of good hay, cut in the beginning of August.—*Agricultural Report of Merionethshire.*

† Or *latter-math,* as it is commonly called; that is, the pasture or after-grass, when the hay has been cut.

* The late celebrated Bakewell, who was a great advocate for watering, used no manure on his water-meadows. It was a favorite idea of his, that water made to float over the greatest bog or swamp, *without being drained,* would not only have the effect of producing a finer herbage on it, but that the pressure of water artificially brought upon it, would force back that with which it was already overcharged, into the

lime or shell-marl dissolved in the water of the upper carrier, would be attended with the most beneficial effects. Its finer particles would thus be intimately diffused over the surface, would be lodged in closer contact with the roots of the grass and afford them additional nourishment to what they receive from the fertilizing qualities of the water. The operation would be simple, and the expense trifling, from the small quantity of lime sufficient for the purpose. The lime should be laid down along the side of the uppermost trench or carrier, and, after being *slacked*, put, in small quantities, among the water in the cut, and, being stirred about, would be carried down by the stream, and equally diffused over the surface. It is to be observed, that the lime, or shell-marl, is only to be used in this manner, the last days of the watering for that season. The refuse of salt, used in this manner, would be a valuable improvement; its fertilizing qualities being equally beneficial on pasture, as well as on arable land.* These experiments the author has not seen practised, though he here recommends them; but it is obvious to every one who is in the least acquainted with the object of flooding, and with the qualities of these manures, that it must prove beneficial, beyond a doubt.†

As it is only in certain situations where this mode of improvement, by means of water, can be adopted and practised with advantage, it is necessary to take notice of the other means that may be used, and that are best calculated for the improvement of bogs, by converting them into a state of cultivation so soon after draining as they become accessible to the spade or the plough.

If the bog is of considerable extent, the first thing to be done after draining, or which may be done at the same time, is dividing it into proper inclosures, by open ditches.

These will assist in carrying off the surface-water, which the covered drains do not effect; and part of the earth thrown out of them may be mixed in a compound with dung and lime, or made use of in filling up some adjacent hollows. If the ground is to be pared and burnt, part of it may be burned along with the turf; but this is supposing that no thorns or quick-fence is planted along the ditches; in which case, no bank of earth is requisite on either side. In ploughing, regard must be paid to the proper direction and inclination of the ridges and furrows towards the open ditches, in order to discharge the rain-water as it falls. The great object is, to get the ground brought into such a state as to be fit for being laid down with grass-seeds, after which it may be considered in such a state of improvement, that any subsequent crops will require no more than ordinary management to cultivate. Some bogs, when *too much drained*, are apt to become parched in dry seasons. To remedy this, if the ground is very flat, or nearly level, sluices may be placed in the lower end of the division-ditches, which, in very dry seasons, may be kept shut, to *retain* the water received from the top-drains. If the ditches have a descent, so that the water cannot stand level all the way, several sluices of this kind will be necessary; or the water may be stopped, by building in turfs. The water may be allowed to stand within a foot, or a foot and a half, of the surface, and, by its stagnation, will ooze through the peat, or upper soil, and afford such a degree of moisture as will greatly relieve the crop. If in pasture, the cattle should not be allowed to feed on it while the water remains in the ditches, nor for some days after, as they would *poach* the surface too much, and the heat would induce them to go into the ditches, from which they might not easily get out.

In levelling or smoothing the surface, it will be necessary to use the spade, by which the work will be done nearly as expeditiously, and much more effectually, than with the plough at first. There are various opinions, how far paring and burning is conducive to the improvement of land. Some have condemned it, as a practice that ought to be exploded *on every soil;* yet, on a certain class of boggy ground, it may be considered as a very great improvement, not only from the excellent manure that the ashes produce, but also from its destroying the roots of every noxious plant more effectually than could be done by means of fallowing alone. The ashes of the burnt turf;

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channel from which it sprung. That nothing can be more absurd, the following fact will prove:—At Drayton-park, near Tamworth, in Staffordshire, a considerable extent of bog was thus watered, by a cut for that purpose, conducted under the direction of Mr. Bakewell, at a very great expense, and which, after being completed, had the effect of rendering the ground much worse, and more swampy than before. This, to the surprise of Mr. Bakewell (but not entirely to his conviction), not having the effect which he argued it would, Mr. Elkington was applied to, who, by means of a drain which he made, and which did not exceed *one-third* of the expense of Mr. Bakewell's water-works, has rendered the ground worth *ten times* its former value, and it now produces crops of grain equal in value to any that is produced in that country. This is mentioned, as a proof that land of that description, without being previously drained, can never be watered with advantage.

* In a communication to the Board of Agriculture, on the nature and qualities of salt, as a manure, by Mr. Roalfe, of Sandwich, he says—"Salt is also excellent upon rushy and sour pastures, which are subject to occasion the rot in sheep: such is its effect, that it prevents that destructive evil from attacking them."

† A method nearly similar to this, seems to be practised in watering ground in Switzerland, as appears from the following remark in a treatise, entitled, "Le Socrate Rustique," 1764:—"Our cultivator considerably augments the vegetative properties of the water by *rich mould*, procured, as I have already mentioned, from green turf, cut from eminences in pasture, or from fallow land. This he throws into the principal head of water, so that the lesser channels may imbibe and communicate fertility over the meadow." In a note by the translator, alluding to this passage, he says—"This is a good thought; but the benefit on some soils, of casting *slacked lime* into the stream, would be much greater, and acquired at a much less expense."

Another method, practised by Mr. Miller of Dunstall, in Staffordshire, merits attention. On the stream which he applies to the floating of his ground, are two ponds, for the purpose of supplying mills situated below. From these ponds the floating trenches are supplied; and as there is always a quantity of fine mud deposited in the bottom of them, this he stirs about, so as to be carried along with the water, and equally distributed over the surface. The success of this practice warrants its recommendation.

Although the watering of land is now arrived at a very great degree of perfection, yet these hints seem to have escaped the attention of most practical flooders.

when mixed with the soil by a superficial ploughing, so enrich it, as to produce excellent crops, for two years at least, and if a little lime is added, it will help sooner to pulverize and stimulate the soil. If the bog is covered with long heath, or ling, and other coarse *benly grass*, it might be proper to burn it *growing*, without paring off any part of the soil. But this would yield only a small quantity of ashes; neither would it destroy entirely the roots of the plants, and, when ploughed in, would produce very little effect. So soon as the turfs are reduced to ashes,* they should be equally spread over the surface, ploughed in with a light furrow, and turnip or potatoes ought to be the first crop. If the former, they should be sown *broad-cast*, and fed off with sheep. By this the soil will receive great benefit from the dung and urine, and from the refuse of the plants, and by its being consolidated by the trampling of the sheep. It will then be in good state for a crop of oats or barley, which should be sown with grass-seeds, well rolled down. The ploughing, after the turnips are eaten off, should be very slight, not to bury the sheep's dung, &c. too deep; in which case, a crop of oats is preferable to barley, as the preparation of the ground requires less ploughing. If the soil is full of the roots of rushes, and other weeds, a course of summer fallow will be requisite, before any crop is taken; and if the ashes have been made in one corner of the field, they can be spread over the surface, before the seed-furrow is given; and the roots and tough clods may be collected into heaps, burnt, and spread along with them.

If the bog is deep of peat, and very soft, so as not to be fit to bear horses in the act of ploughing it the first year, a crop of *turnip broad-cast* may be got, by sowing the seed among the spread ashes, harrowing it in with a light harrow and roller, drawn by men. The turnip should be eaten off with sheep, and the ground will next year be so much consolidated, as to admit the plough.

If the surface is not pared and burnt at all, a course of fallow, even for two years, will be necessary, to reduce the soil to a proper mould; in the last stage of which, the lime, or other manure, may be applied. In this case, two white crops, with an intervening one of turnip, potatoes &c. may be taken, before the grass-seeds are sown.†

All boggy soil whatever, after being once broken up, and pulverized by tillage and a course of summer fallow, should not be overcropped before being laid down in grass; and when once brought into a good *sward* of grass, should not be too soon broken up, but continue so, brush-harrowing and top-dressing it, when the herbage begins to fog. Frequent rolling is also very necessary on such soft soils.

It is better to feed sheep the first and second years on the grass, than to cut it for hay, as it causes the roots of the plants to strike more horizontally through the soil, and more closely cover the surface. For this purpose, a greater proportion of white and yellow clover, and other short *grass*-seeds, should be sown. In the second breaking up of the ground, after lying some years in pasture, no particular mode of practice, or rotation of cropping, can be laid down. The state of the ground, then, must be the rule for after-management, by which time it will not only have attained a firmer texture, but also a degree of strength to produce any crops, with proper manure and cultivation. In manuring soft boggy soils, one precaution is necessary. The deeper the ploughings are, previous to the dung being laid on, the better; but the subsequent furrows should be very superficial, and the dung intimately mixed; for when it is ploughed in too deep, not equally distributed and incorporated with the soil, it is apt to subside below reach of the plough, or horizontal roots of the grain. The same is the case with lime, which always penetrates deeper into the soil; and marl, when buried too deep, loses all its effect.*

Upon soft boggy land, intended only for pasture, nothing will work a more quick improvement than covering it with a thin stratum of clay, gravel, or any other earth heavier than that of which the bog is composed. Clay-marl, where it can be got, is of all others to be preferred, both on account of its greater weight, and enriching qualities. Sea-sand, being mixed with shells, is peculiarly adapted for this purpose, if the bog is situated near the sea, where such can be easily got. The weight and pressure of these heavier bodies makes the bog soon become more solid, and likewise presses

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* In burning the turfs, after they are properly dried, they should be set up in *large heaps*, adding to them as they burn. This confines the smoke and flame, by which so much of the essence is evaporated and lost, when the turfs are burnt in small heaps.

Paring and burning the turf, is, in some places, begun in the month of March; but it is better to delay the burning till April or May. The paring, however, may be done in March, and the turfs will be dry enough for burning in the month following.

† Rye, being a hardy grain, and thriving on very poor soils, is a very profitable crop on *drained boggy land, pared and burnt*, as appears from the following extract of a communication to the Board of Agriculture, respecting the state of husbandry in the neighborhood of Petersburgh: "Rye-bread, as every body knows, is the chief support of this district, as well as of the other northern parts of Russia; but, in order to save the rye-flour, and to make it last the longer, the inhabitants, when compelled by necessity, mix with it *fine-ground oatmeal*, the meal of buckwheat, and the husks of the field mustard seed *(sinapis arvensis)*. The produce of rye in very few places varies more than here. The poor sandy lands will hardly produce more than three times the quantity sown. The middling sorts of land produce four and six times the seed. The rich and well manured lands, and such where wood has been cleared off, will produce, in a good season, ten or twelve for one sown; but the most extraordinary produce is gathered from *boggy lands, drained*, and sown with rye; as in a favorable season it increases forty times and upwards. The reason of this extraordinary increase must be explained: it is owing to the ashes produced *by burning the bogs*, which assist the vegetation to that degree, that frequently they find one grain produce forty plants, and even more; for this reason, they generally use a much smaller quantity of seed in sowing such land. There is no need to sow clump rye *(secale multicaule)* upon such lands, as any good common seed increases very much upon so rich a soil, to which the burning of the surface has added so much of the vegetative power. The seed is sown in July or August, and is reaped about twelve months after."

* Coal ashes form an excellent manure for sour wet land, either used as a top-dressing for grass, or, if ploughed in, tend greatly to destroy the tenacity of stiff soils, and render them more productive.

out more quickly the moisture contained in the spongy peat; the thicker, therefore, it is laid on, the better. A thin sprinkling of lime over it, will add to its effect, and cause white clover, and other sweet grasses, to spring up in greater abundance. The most barren soil will have a good effect, when used in this manner; but, of all others, limestone gravel is preferable. By means of it, many extensive bogs are improved in Ireland, where it abounds; but very little of it is found either in England or Scotland, which renders that mode of improvement impracticable. After the ground has been thus treated, and lain some years in pasture, it may be broke up by tillage, and crops of grain taken, before being laid down with *grass-seeds*. By ploughing it, part of the natural soil will be turned up, and intimately mixed with the earth, &c. that has been laid upon it; and, if lime or dung is added, will altogether form a very fertile mould.

Such are the methods by which many bogs have been cultivated and improved after draining, in several parts of the kingdom, the success of which is a sufficient recommendation of the practice. But *these hints* are not to be considered as the only means whereby this improvement can be effected. There are others equally beneficial, and, in many situations, equally applicable; by means of which, there is no doubt that much *boggy ground*, however barren in its natural state, may soon be rendered highly productive; but to enumerate these, would be unnecessary; for every one who possesses ground of this description will be able to ascertain what mode of management is best calculated for its situation, what crops he wishes to raise, or what kinds of manure he has in his power to apply.

As no method yet practised for the improvement of moss has equalled, in produce and profit, that so successfully introduced by Mr. Smith, of Swinridge-Muir, in Ayrshire, a short account of the process, and result therefrom, may not be unacceptable to many readers. *

The moss is of two different kinds—the black, and the red or flow-moss. Both are are of a considerable depth, from four to twelve feet; but the first is reckoned more valuable, in several respects, than the other.

The first thing is, to mark out and cut proper drains (taking advantage of the declivity), to draw off the superfluous water, and to divide the moss into separate small enclosures. These drains, or ditches, are commonly eight feet wide at top, two feet at bottom, and four and a half feet deep, when first cut; but as the moss afterwards subsides, they become less; they cost 2*d.* per lineal yard. After these have been cut, and the moss thrown out has been spread from the sides, and the hollows filled up, the ridges are marked off, parallel to the sides of the enclosure, twenty feet in breadth. They are formed by leaving a space of twenty inches untouched in the middle of the ridge, and turning up on each side of this a furrow with the spade, which is laid over the untouched space, so as to raise it to a proper height above the sides. The whole breadth is then dug, by turning over, with the spade, furrows a foot in width, which has the appearance as if done by the plough. The division-furrows are small drains about two feet deep, and as wide, for drawing off the superfluous moisture, and conveying it into the main drains. The ridges must not be formed too high nor too narrow, nor the furrow-drains cut too deep; otherwise the moss will be left too dry, and consequently prevent the action of the lime which requires a certain degree of moisture to have a proper effect. * The next thing is *top-dressing* the ridges with *newly slacked, or powdered lime*, at the rate of 500 Winchester bushels per acre, † *i. e.* 250 bushels of shell-lime. The moss is prepared for the first crop early in the summer preceding; in which time the lime, aided by the effects of the different seasons, has so far meliorated the soil for the reception of the seed.

Potatoes planted in the *lazy-bed* way, ought always to be the first crop, when dung can be got. ‡ The potatoe-beds are formed across the ridges. A thin layer of dung is then spread over the beds, and the cuttings laid about a foot asunder, and covered (to the depth of a few inches) with the mould taken out of the trenches between the beds. When the plants appear above ground, they get another thin covering, by a second scouring of the trenches; and they require no hoeing till they are taken up. The produce is never less than forty or fifty bolls, of eight Winchester bushels, and the quality excellent. When the potatoe crop is removed, the ridges are again formed in the manner as before, and the division furrows cleared out.

In this state the ground remains till next spring, when oats are sown and harrowed in with a small harrow, drawn by men. The early oat is always preferred for seed, the late seed running too much to straw. The produce of the first two crops of oats is seldom less than ten bolls (of six Winchester bushels) per acre, and that of the succeeding crops, six or eight bolls, and often more. Five or six successive crops of oats are often taken, without receiving any additional manure, or exhausting the strength of the moss. By this time its nature has undergone a considerable change, and has now the appearance of a rich black mould, and is sown down with grass-seeds. It is not so favorable to the growth of barley, which is never sown before the first grass. When no dung can be had the first year, and oats taken with lime alone, the crop often misgives; which is a proof that, *without dung, and potatoes for the first crop*, it cannot be productive. The different kinds of marl are well adapted, and many sometimes serve as a substitute for lime; but dung is an inseparable appendage. After the process thus described

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*The author visited Swinridge-Muir, when the moss was preparing for crop 1793; and this account of the process is from his own observation, and partly from what was communicated to him at the time. He takes this opportunity of testifying his regard for Mr. Smith, whose life, he has no doubt, has been *prolonged* by his *draining* and *improving* this large tract of moss, in the *centre* of which he has now attained the patriarchal age of *eighty!*

* In very dry weather, this may be remedied, by stopping the lower end of the drains, and retaining the water; and if there is a command of any spring, or higher water, it may be let into the main ditches; but too much moisture is likewise to be guarded against.

† Scotch; equal to one acre and one-fourth English.

‡ The quantity of dung is about eighteen or twenty single-horse cart-loads to an acre.

has been gone through, and the moss lain a few years in grass, it can be ploughed safely with horses; which lessens the annual expense of labor, without diminishing the produce. The spade is the only implement for the first years; and it is astonishing with what neatness and expedition the accustomed workmen perform the operation. It is sometimes ploughed the fourth year where the moss is not very deep.

When laid down with grass-seeds, the hay crop is often abundant, and the pasture, afterwards, worth £1 5s. per acre; which shows that the preceding oat crops have not exhausted too much of its strength. Rushes are very apt to grow up in the pasture: and the *poaching* of heavy cattle ought carefully to be avoided in *wet seasons*.

Abstract of the annual expense and profit per acre, for five years.

	Crops.	*Expense.*	*Profit.*
1st year	Potatoes,	£15 18 5	£0 11 7
2d "	Oats,	3 2 0	4 3 0
3d "	"	3 11 4	3 13 8
4th "	"	3 5 2	1 0 10
5th "	Hay,	0 12 0	3 4 8
		£26 8 11	£12 13 9

Average profit, £2 10 9 per annum, and will let for £1 5*s*. per acre, in pasture. By this, it does not seem so necessary to lay down with grass, after once manuring it, as in dry land; for the crops fail little in produce; and the great desideratum is to have plenty of straw for producing dung, so invariably requisite for the first crop. An intervening crop of turnips, however, would be an improvement in the rotation.

The different articles of expenditure making up this abstract, are stated at the highest rate, and the articles of produce equally low; so that, on the whole, it may be reckoned a fair average; but the distance from lime, in many places (which is here at hand), must alter the calculation, and increase the expense.

A great deal of moss has now been improved, by cultivating it in the same manner, in the counties of Ayr, Renfrew, and West-Lothian; and, indeed, these examples have been the means of inciting others to follow the same practice in different parts of Scotland, and which is every day becoming more general.

So far, these *hints* and *directions* were given in the editions of 1797 and 1801, and apply more particularly to *spring bogs, marshes*, and *peat-moss*. The following further observations and directions were communicated by the author to the Board of Agriculture in 1801, in a separate form; but were not then published. They are now added, as being connected with the subject. As there was a general scarcity in the country at that time, the Board recommended bringing into tillage all land that was capable of being drained and brought into cultivation, at a remunerating expense; and accordingly the substance of what follows was then communicated.

There is certainly no other means by which a sufficiency of grain for the maintenance of the people, and of improved pasture for that of live stock, can be accomplished, than by that under consideration.

A great portion of the land under this description, is, in its present state, altogether unproductive: but when drained and cultivated in the manner recommended, would become valuable, either under a regular rotation of cropping, or, after being properly laid down, kept in permanent pasture.

There are various circumstances which must guide the possessors of such land in the mode of treating it, which cannot be fully adverted to; but the general hints and directions here given, relative to the different soils, &c. it is presumed will apply to most cases.

I. *Very old pastures, over-run with rushes, fog, or moss, that have been long out of cultivation, but where the soil is strong, and the climate is good.*

In regard to *ploughing* ground of this description for the *first* crop *it* ought to be *deep*, in order more effectually to bury the moss,* and bring up a *fresh* mould, which, besides, will render the crop less luxuriant in straw, and consequently not so apt to *lodge*: and next year's ploughing in the same way (deep) will expose, in a more mature state, the surface that has been turned down the year previous.

In soils of this description and quality, the great object is to obtain *two* valuable crops in the two *first* years, without the aid of manure, or the intervention of a green crop or summer fallow, when such management does not tend to deteriorate, or exhaust the productive powers of the soil. Therefore, in this case, the first and second crops may be oats. If the ground has been in tillage before, though long neglected, and has been limed before being last laid down in grass, or has been top-dressed with lime in the course of its being in pasture, there will be no need for giving it more lime during these two crops. If it has not been limed, or at so early a period that its effects may now be exhausted, it will not be advisable to put on the lime till the *third* year, as will afterwards be noticed. It will be necessary to attend, in the first place to the proper ploughing and harrowing; as by that, a material saving of seed will be gained. When the furrows are laid over unequally, too thick, or too broad, openings are left between, and in these interstices an unnecessary quantity of seed is swallowed up, which either never vegetates, or if it does, is so weak as to be good for nothing. To remedy this, the simple plan is, to give the ground a slight harrowing *up and down* (not across) the ridges, by which the openings between the furrows will be so much filled up as not to endanger the seed. Indeed this will be attended with another advantage, that of encouraging the whole to come up more early and regular, than would otherwise be the case. All the harrowings should be given in the same way, as there is a risk of reverting the furrows when done cross-ways. Rolling, too, is useful in this case, to destroy slugs and worms which infest ground of this kind in the first crop, and which are often very destructive. As to the form of the ridges, none can be prescribed for the first two years, but to plough the land in the same shape

* Moss, here means, what in Scotland is called fog, of so thick and close a texture as to destroy, in a great measure, the growth of any nutritive grasses.

as it may have been before, even though the ridges should be broad, crooked, and unequal. Improving the ridges, by levelling and straightening, will be better performed during the third year.

The whole of this soil, the third year, should be under green crop, with the usual preparation and manure. It would be needless to say what manure is best adapted, or how it should be applied, as these circumstances depend entirely upon the various situations in which such land may be placed. The lime necessary should be spread on and ploughed in with the last furrow only, if the ridges require any levelling or new forming; but if not, this rule need not be adhered to, and the lime may be laid on after the first ploughing, by which means it will be more intimately mixed with the soil. If there is not a command of dung for the whole of the soil that may have been broken up, and it may not be convenient to have the whole under potatoes or turnips, the remainder cannot be better occupied than in tares or vetches, which, cut green in the end of summer, will afford excellent feeding for the working horses. By the consumption of these in the house, a sufficient portion of dung may be made for manuring this part of the ground for next crop.

The application of the turnip to stall-feeding, or eating off with sheep, either on the turnip-ground in hurdles, or by the same kind of shifting inclosure, in an adjoining field, will depend on circumstances. Where the ground has been sufficiently manured, it would be preposterous to feed them off in the field where they grow; and in this case, they should be carted off, either to the house-feeding, if that is wanted; or to be eaten with sheep on some grass inclosure that is to be broken up, and is in need of manure, or perhaps, as a top-dressing to some stinted pasture; or, part of them may be eaten off with sheep on that portion of ground which had got no dung, and had been under tares.

It is found to answer well, and prove very beneficial, to take up part of the turnips early in the season, when they are in the most nutritive state, and by cutting off the *shaws* (leaves), to pile them up in small stacks or heaps, securely covered with straw within a house or shed; and in this state, if the frost be excluded, they will keep sound for several months. * It is of consequence to clear the ground in this way, when the succeeding crop is to be wheat, and when the consumpt cannot be so immediate as to clear it otherwise. When barley or oats is to be the next crop, it is not so material; but at all events, the saving from frost is a great desideratum, and therefore, worth attending to; and having them always at hand when the ground may be covered with snow, and thereby a difficulty in collecting and carting them off. In this class of soils, and where the climate and other circumstances favor it, wheat should be the fourth and last crop sown down with grass-seeds. As the chief object may be, to get this land soon again into pasture, only one cutting for hay should be taken, and the after-grass not too closely eaten down.

By the management and rotation here specified, it is evident, that a very great additional supply of grain will be produced, without deteriorating the soil so much as to render its future produce in grass less valuable; but on the contrary, it will be so much refreshed and renewed, as afterwards to yield an abundance of good pasture, in place of remaining in its former unproductive and unprofitable state.

II. *Old pastures, wet and over-run with rushes and coarse grasses; the soil clay, or clay-loam.*

So soon as the draining is finished, which ought to be in October (or before, if it can be accomplished), the rushes should be closely cut by a strong, short, and broad scythe, made for the purpose; and the ground ploughed with a deep furrow, so as to bury the stools, and expose the roots and seed-bed to the winter's frost. What part of this soil may not be so wet and rushy, should not be ploughed with a deep furrow, but with one of eight inches broad and six inches deep. This ground should be limed on the sward (surface) with newly slacked lime, and immediately ploughed in. The first crop invariably should be oats, and the second may be beans and peas broadcast; or drilled, if the soil be sufficiently pulverized by cross-ploughing and harrowing. No ground, unless it be very foul, and absolutely unfit for green crop, should be put under fallow, as thereby a crop is lost; but neither of these (over-foulness, or too tenacious a soil,) can be the case with the ground here alluded to, after the previous treatment it has undergone. Indeed, the nature of the soil is not adapted to such green crops as turnip and potatoes; but a profitable crop of drilled beans, or of cabbage, may be raised, while the ground is undergoing (by the necessary operations of hoeing and cleaning) a state of preparation nearly equal to that of a fallow.

The fourth and last year, this ground should be sown with barley and grass-seeds. Barley in this case is preferable to oats, because the soil being close and retentive, there is more time to prepare and pulverize it by frequent ploughings, &c. for the reception of the seed. As it should only be cut one year for hay, the quantity of pasture grass seeds should be in a fuller proportion.

III. *Light soil inclining to sand.*

This should be broke up with a crop of oats the first year, and with a very light furrow. Next year's crop should be turnip, manured with a compound of lime and strong earth, such as scourings of ditches, cleanings of ponds, &c., or clay marl where it can be had; and the turnips should be fed off on the same ground, either with sheep or black cattle, in hurdles. The turnip, in this case, may be sown in broad cast, with a less proportion of manure, as that from the sheep or cattle, while eating them off, will add a store of matter to enrich the soil, and the trampling and treading, &c. will help to consolidate the looseness of it. Barley, with grass-seeds, next year (the third), will not fail to be a good crop; and it will be pre-

* There is an excellent method of preserving turnips, by cutting off the *shaws* and *tap-root*, and setting them in regular layers on old pasture. The bottom part immediately sends out fibres through the grass, and preserves the bulb or body of the the turnip *entire* for several months. Straw or grass laid over them, excludes the frost, and so prolongs their nutritive qualities.

ferable to sow only for pasture; in which case, less red clover, and a larger proportion of white and yellow, will be proper.

In this light and loose soil, the grass-seeds should be sown after the barley has got *one* harrowing; and it will be necessary to roll it well when the other course of harrowing has been completed. There may be other rotations for this kind of soil, but none better adapted to it; nor any that will return a profit so easily, and leave it again in an *improved* state of pasture.

IV. *Another class of light soils, wet, the pasture stinted and unproductive.*

Here, the surface being less rugged and uneven, it may be manured on the sward with a compound of lime, earth, and farm-yard dung, at the rate of 100 cart-loads per acre. This should be ploughed down in the months of October and November, and sown with oats early in spring. The second crop should be peas with two furrows; and the third and last crop, oats, with grass-seeds, for pasture only. The compound should be made up some months previous to its being used as manure; and should be once turned over, to accelerate its decomposition, and render it more easily incorporated with the soil.

V. *Another class of similar soil, having the surface over-run with coarse grass, heath, &c.*

If this soil is of sufficient depth, it will be advisable to pare and burn it before the first crop.* When this is done, 150 bushels of well slacked lime to the acre should be spread on it, along with the ashes, which will ensure a good crop of oats. The second year, potatoes or turnip; and for the third and last crop, barley or oats, with grass-seeds, for pasture only.

There are the different classes of soil, with the mode of management, that were proposed to be treated of in this part of the Appendix, as being those which most generally occur. Modifications of culture may be judged of and applied by the occupiers; but the leading object, after draining, is to overcome the barren and unproductive state in which they lie; but not, by *over-cropping*, to exhaust or deteriorate them; and after being managed in the manner described, to let them remain *at rest* for some years, when they will be better able to undergo a more extended course of cropping, and become still more fertile and productive.

GENERAL CONCLUSION.

In the preceding pages, I have endeavored to explain, in as precise and explicit a manner as the subjects admit, the various circumstances, principles, and data on which the 'Art of Draining Land' is founded; as also, the manner of its application in every practicable case; with such directions to guide the execution, as, I hope, will enable every practical farmer to profit by the discovery of the late Mr. Elkington, in the drainage of those more *intricate* cases to which *his system* applies: and also, to apply the more usual modes of hollow and surface draining, which are still very much practised in both parts of the kingdom; and which, in many cases, are the only kind applicable.

Of embankments, I have given a pretty full detail, with practical directions applicable to their various situations, and forms of construction. And lastly, in the preceding Appendix, I have given such hints and directions as may be useful, not to the experienced and more practical farmer, but to those who are not *yet* so fully acquainted with the culture and improvement of *wet* and *unproductive* land, *after* it has been drained.

I have treated these subjects, *in all their various branches*, with that degree of confidence, which the experience of a long and successful practice has enabled me to do; and it will afford me peculiar satisfaction, if this *work* shall contribute, in any degree, to the extension of the knowledge and practical application of these important objects, so likely to promote the interest of the landed proprietor, the farmer and the public in general.

JOHN JOHNSTONE.

Lauriston Lodge, Edinburgh,
December, 1834.

* Though this, in practice, is now almost exploded, it is the best method of subduing such herbage.

From the Cultivator.

EGYPTIAN WHEAT.

This was spoken of, with the other varieties of spring wheat, in our September number, volume iv. Since that time, our attention has been particularly turned to this grain, by the receipt of several parcels kindly sent us, and by repeated inquiries where the seed could be purchased, and at what price. It has also been highly commended in the news journals.

This wheat is known under the various names of *Egyptian, Syrian, Smyrna, many spiked, reed, and wild-goose* wheat. It derives its latter name from a story, which is current in the north, that four or five kernels, from which the American stock has proceeded, was found in the crop of a wild goose, which was shot about four years ago, on the west shore of Lake Champlain. It is called *reed* wheat from the great strength of its straw, which serves to prevent its being prostrated in the field.

The first notice we have of this species of wheat in the United States, is in the 'Memoirs of the Philadelphia Society for Promoting Agriculture.' A parcel of it was received in 1807, by the society, from Gen. Armstrong, then our minister at Paris. This grain was grown five or six years by Judge Peters, and proved to be very productive; a pint of seed, sown in drills and hoed, giving one bushel and a peck of grain. But we find the judge saying, after three or four years' trial, that it had not "thriven so as to encourage extensive culture." In a more *southern* latitude, he expresses a belief that it would do well. It was extensively distributed; but from our not having heard more about it in the last twenty-six years, we believed it had not proven a valuable accession to our husbandry.

We have seen beautiful fields of this wheat. We sowed a sample specimen two years ago, but on being assured by a friend that it was inferior for flour, we gave it up. In the Philadelphia edition of the 'Domestic Encyclopedia,' printed in 1821, we find it stated, that this kind of grain does not yield so much flour or meal as any of the other kinds of wheat, and that "the flour is scarcely superior to that obtained from the finest barley."

Having said thus much, which we felt bound to say in the line of duty, as to the character and introduction of this grain into our country—it remains only for us to add, that the seed may be procured of *our* friend Mr. Thorburn, at *five* dollars a bushel.

REMARKS ON AGRICULTURAL HOBBIES AND HUMBUGS.

We had designed, long ago, to submit, more at length than heretofore, remarks on a class of subjects which may be comprised under the general designation of "agricultural hobbies and humbugs;" to which might be added, "agricultural frauds," if it were not improper and offensive to place in juxta-position the designing deceivers, and the deceived; that is, some of the most knavish of the agricultural profession, with many of the most disinterested, honorable, and public-spirited. But so it is—by the united operations of the cheats and their dupes, (who, being deceived themselves, innocently aid in deceiving others,) there is a perpetual succession, in the agricultural and other papers, of agricultural humbugs and deceptions, by which a few make large profits, and many find disappointment and loss. We have heretofore, though concisely, and as incidental to particular subjects, expressed opinions designed to oppose the progress of this evil; and similar views were more generally expressed by our friend, James M. Garnett, esq. in his last 'Address,' published in this work. Still, there remains an ample field of humbug to treat of, and to expose.

There are various modes of practice, in this branch of business; but the most usual is the following: Some new variety of corn, wheat, or other crop, is announced, and recommended as being superior in production and value, to any thing known before. This statement may be partially true, or altogether mistaken—and in either case, the publication may have been made with honest and praiseworthy intentions. On the other hand, the first motive of the publication, as well as the final effect, may have been to make dupes, and to get hold of their money. According to these, or other circumstances, the early publication either contains, or is afterwards followed by, a notification that Mr. Such-a-one offers to sell seed or plants of this rare and valuable variety, at a price three or four times, or it may be ten times, as high as is usual, or as would be a sufficient remuneration for the raising. The enthusiastic and credulous, among the readers of these highly-wrought panegyrics, are put all agog to obtain seeds which, as represented, alone will add 30 per cent. to their crops. The regular seedsmen hasten to give their orders, that they may profit by the new demand, just as milliners would for bonnets of the latest fashion, and knowing well that the fashion will be as likely to be transient in the one case as the other. The editors and publishers of agricultural journals, who are not themselves seedsmen, find that articles on these wonderful new products are interesting to many of their readers, and very convenient to fill their columns; and therefore, they help on its way every successive humbug, and the more wonderful the account, the more sure it is of being selected for republication. But if the publisher is himself engaged, directly or indirectly, in the selling of seeds, &c. (which is a usual, because a very convenient and profitable combination of trades,) then he can best profit by his readers' appetite for novelties and wonders; for he can not only start and direct the puffs, but such recommendations are, beyond comparison, the most effective of advertisements, because not suspected to be such, nor to be otherwise than the honest and disinterested opinions of the writers. *We*, who have no such connexion with seedsmen or others, and have no such private interest to forward—and who have treated with distrust, scorn and contempt, all efforts to buy of us editorial puffs—yet even *we* can scarcely avoid giving some help to the progress of this widely-spread puffing system; for so many articles in agricultural and other publications partake of this character, without its being apparent, that it is impossible to know all such, and thereby to exclude them from our pages, or to mark them with deserved reprobation, when published. We have always been very scrupulous and cautious on this head; and certainly have never aided, knowingly, any such plan of deception. Still, in selecting for republication the current articles of the day, from other journals, such as notices of particular heavy products, new and valuable seeds, plants, live-stock, and farming implements, we may have been, unconsciously, helping to extend the circulation and effect of a salesman's disguised puff. If we were to discard our scruples, and, instead of neglecting or opposing, were fully to sustain the puffing system, our publication would have many more articles of temporary interest to readers, and in more ways than one, would be productive of much more profit to the publisher.

But this is not all that we suffer from the great and ever-changing demand created and maintained for new seeds, &c. Our remote readers, believing (and very correctly) that we are always pleased to serve them individually, as well as to forward the improvement of agriculture in every department, frequently write to request our aid in procuring for them seed of spring wheat, twin corn, Baden corn, &c. or others of the highly-praised varieties which are successively *elbowing* each other out of notice. We have done our best in such cases, and sometimes at as much gratuitous trouble and expense, as the article in question was worth; even when we had little hope of being successful in the safe transmission; for owing to the difficulties which any one who is not practically engaged in, or acquainted with, commercial business, finds in transmitting articles through circuitous routes, and various conveyances, and by sundry agents, it is probable that not one such venture, in three, reaches its destination safely, after all the trouble and care taken. The regular seedsmen and traders can do better in this respect; and they can not only send any new hobby to any destination, (for price enough,) but moreover, they will generally have a *better* one ready for sale, before the first will have reached its distant buyer.

Since the first commencement of agricultural journals in the United States, there have been many articles announced as new and valuable, puffed into notoriety, thence eagerly sought after by purchasers, tried, and found wanting—and finally abandoned and forgotten. And it is so much more pleasing to mankind to be flattered by vain hopes, and be deceived, than to be warned of the danger of, and guarded against deception, that editors will always advance the popularity of their publications, by floating with the general current, and falling in with every such fashionable error, while it lasts. By thus flattering and ministering to the fancies of the ardent and sanguine, (who are also generally the most zealous and active,) among their readers, *at least to them* they will render the publications most interesting. And though almost every new hobby may, in its turn, be found worthless, yet but few readers will find fault of the favor previously shown. All that the editor has to do, is to dismount, silently and quietly, from the exposed and disgraced hobby, and mount the next one that seems most likely to engage attention and interest.

With such aid, and by such recommendations, the public attention has been at different times solicited to not only various new varieties of the more important grain crops, but also to such minor articles of cultivation, as millet, (of various kinds,) the bene plant, Cobbett's "Russian turnips," (which, as *Swedish turnips*, had been long known, and valued for their real advantages, in England, and treated of in English books, but which it required humbug and false appreciation to bring it into use here—); and as great expectations of profit were thereon built, as are now on spring wheat and the several new kinds of prolific corn; and as probably soon will be, on the Egyptian, or many-headed wheat.

Do not let us be understood as denying all value to these over-rated novelties—nor as wishing to discourage trials of new plants, or new (supposed) improvements of any kind. On the contrary, we would encourage trials, if made carefully and accurately, as being calculated not only to amuse and gratify all cultivators of inquiring minds, but also as sometimes leading to results which, if correctly appreciated, will be of important value to agriculture. But we *do* mean to avow a very general distrust of these many newly discovered values in particular varieties of seeds, &c. and especially when it is manifest that he who makes or sustains the recommendation of the article, has a private and pecuniary interest in raising its reputation, or maintaining for it a high selling price. Let all the attendant and connected circumstances be borne in mind, and the trials be economically, as well as cautiously and accurately made, and we would urge the trial of every new thing that was even plausibly recommended.

In addition to all the supposed more productive kinds of grain, which have been made generally known to the agricultural public, there are hundreds of individual farmers who, silently and privately, cherish their own particular fancies as to the superiority of their own selections. One aims, by selection of seed, to get the *deepest grained* corn, because an ear of such must have much more grain than one of equal size, but shallow-grained; and thence he erroneously infers that the former kind will be much the most productive to the acre. Many, not content with deep grains, seek for the smallest sized cobs—that the larger proportion of each ear may be of grain rather than of cob. On the contrary, John Taylor, our great and distinguished agriculturist, preferred ears with the largest cobs, for seed, because, as is evidently and mathematically true, if the grains are of equal size, there will be more of them encircling a large than a small cob. Some seek for *large* ears; others for *many* ears upon one stalk. Many farmers are as curious and particular in selecting seed-wheat, either for the large size of the grains, the large number of grains in the head, the large number of stalks and quantity of grain from a single seed; and all confide equally in thereby securing more product in general, from the land. Now we have no faith in any of these modes of reasoning, and therefore none in the supposed results. Without denying that particular varieties of plants may be somewhat more productive than others which are equally suitable to the same soil and climate—and admitting that the smallest well ascertained advantage of superiority is worth securing—yet, in general, and in the absence of all positive proofs of exceptions, we maintain that corn, or wheat, or other grains, will produce according to the degree of fertility and mode of cultivation of the soil, and according to the adaptation of the kinds of grain to the soil, climate and season. Perhaps every variety of grain may be the most productive in some particular situation and season; for all varieties are produced by nature, in the never-ceasing effort to accommodate a misplaced plant to its new, and comparatively, inhospitable location or circumstances. It is highly important to adapt the kind of seed to the soil, climate, and usual seasons; and the want of such adaptation may reduce a crop to less than half of what might have been obtained from other seed. But we have not the slightest faith in any of the many prevailing opinions, that larger crops are to be obtained by choosing seed on account of the form, size, or number of grains, or the size or number of ears, &c. Indeed, (as we stated in a former volume, when touching incidentally on this subject,) when ears of corn, wheat, or other grain, are remarkably large, for the particular variety grown, or a single root is remarkably productive, either in number or size of ears, or quantity of grain, it furnishes sufficient evidence of insufficient product from the land; or in other words, that there was too little seed to the acre; and that a greater number of stalks would have yielded a better crop, though by reducing the product of every individual stalk.

These views are not opposed to the fact, that the Maryland twin corn, the Baden corn, or the Dutton corn, (for example) in certain situations, may be more productive than our ordinary kinds. But they are utterly opposed to the belief of either of these varieties, or any other, being more productive in *all*, or in *most* situations—or of being more productive *in a very great degree*, in *any* situation. Mr. Carmichael, who was among the first to recommend the Maryland twin corn, through the pages of the Farmers' Register—and whom we still deem among the best authorities, on account of having full experience and means for observation and comparison—confined his recommendation within the following limits: "My experience" (he says, at p. 605, vol. 2.) "induces me to think that no great advantage is derived if this corn is planted on lands naturally poor, or exhausted by cultivation; but where in a state of fertility, either naturally or by improvements, I think the [increase of] product from this kind of corn will be more than fifteen per cent." Now this amount of increase, if accurately estimated, is sufficiently great to induce the trial of this corn, on the soils recommended as suitable, and in a latitude not very different from that of Queen Ann's county, Md. But this increase is far short of what the sanguine expect, or what would have induced so many to require this kind of grain; and the writer entirely objects to planting it on any but the very small proportion of *rich lands*. This corn is a *forward* kind, even in Maryland; of course it is too forward for our location; and in southern Alabama, and lower South Carolina, it will lose the benefit of near or quite two months of the growing season, which the longer summers there offer to vegetation. This corn will there become, under Nature's correcting training, more and more late in ripening, and the ears larger and fewer; and we believe that Nature knows best how to adapt particular grains to particular soils and climates, and that the more the Maryland twin-corn shall be changed by her efforts, from its present and most highly prized peculiarities, the more productive it will be in southern regions.

Neither do these views contradict others which we have advocated, deduced from the valuable article of Dr. Bronn, in vol. 1, (at page 257) of this journal. Our deductions then made, and still adhered to, were, that northern and moist climates, and clay and cold soils, tended to increase the vegetable (or the stem and leaf) parts of a crop, at the expense of the perfection of the seed; and that southern and dry climates, and hot or sandy soils, made the seed more perfect, but diminished the succulence and size of the plant in general. And, as the first progeny would partake largely of the peculiar qualities of the parent stock, it was therefore proper to bring our grass seeds from the most cold and moist situations, and the seeds of crops, valued mostly for the grain, from the warmest and dryest. We may gain, in this manner, in the particular product most wanting, though at the cost of some general reduction of the product of the entire plant or crop. But, to have a tenth, only, added to the bulk of the stalk and leaf of a clover or other grass crop, wanted for hay, pasture, or green manure, we might well afford that it should be incapable of bringing the half of a usual crop of seed; and we would be very unwilling (by change of seed, or otherwise,) to double our growth of wheat-straw, by lessening the grain only one-tenth. Both these effects, or something like them in degree, we believe might be produced by bringing grass and grain seed, from far northern regions, to be sown in the south; and in a less degree, by changes of seed from cold and moist, to hot and dry soils, on the same farm.

But this is a digression from humbugs and hobbies—or perhaps, as may be charged, from those of other people, to some of our own. We do not claim exemption from the liability of being deceived in such matters, nor, in consequence, of thence aiding to deceive our readers. But we claim *this* at least, that we do not *sell* our humbugs, nor make any pecuniary gain in the humbug market. If we aid in forwarding deception, it is done disinterestedly and honestly. To return then to the subject.

The Baden corn seems now to be the most fashionable and popular variety. The following extracts will show the claims made for it to public favor. The first is a letter from the commissioner of the Patent Office, who exhibits a laudable, though in this respect an ill-directed, zeal for the improvement of agriculture; and the second is the material part of the letter to him from Mr. T. N. Baden, the producer and seller of the corn.

"To the Editor of the Farmer and Gardener.

Patent Office, Dec. 12, 1837.

"Dear Sir—I have received many inquiries respecting the culture of "Baden corn," and addressed a letter to Mr. Baden on the subject. I take the liberty of enclosing his letter for publication in your valuable paper.

"Mr. Baden's experiments this season, show that his own is earlier than many other kinds. I have distributed the last year a great number of parcels of the Baden corn; that which has been planted in latitude not exceeding 40 or 45 north, has succeeded admirably. It will soon be acclimated in the higher latitudes. Over 100 bushels has been raised per acre on the rich lands of the west and south, without any manure.

Yours, respectfully,

H. L. Ellsworth."

"To the Hon. Henry L. Ellsworth,

Washington City.

Prince George's County, Md., Nov. 4th, 1837.

"Dear Sir,—Agreeably to promise, I now write you a few lines to inform you, that within the last two years (and never before) there has been a report in circulation that my corn was a latter kind. However, for the satisfaction of my friends, I have made an experiment this year, which I hope will satisfy every one upon that point. I planted a lot of six acres and a half, as near as I could judge, (by stepping) of this kind of corn, the 20th day of May last—my book is now before me. I cannot be mistaken in the date, which is more than a month later than the common time of many persons planting in this neighborhood. I gave no extra management to hurry its growth, and determined to give it only the common routine of work that I generally give my corn. It is now perfectly ripe and hard, and has been for some time, and no frost could do it any injury in any way; and I believe it will yield as much good sound corn to the acre as any that was planted in the neighborhood any time in April upon land of the same quality. This evidently shows that my corn is a forward kind, and will come to maturity as soon as any other. By the first opportunity, I will send you a few stalks of this corn that was planted the 1st day of May, with the corn on them, as it grew in both the lot and field, and none with less than *four*, and some with *seven and eight good ears on a stalk*—then I will leave you to judge which of them is the better. As soon as it is sufficiently dry to shell and put up, I shall send you twenty or thirty bushels of as good seed corn as you have ever seen. I have not long since discovered something in this corn, which convinces me that I can still make a great improvement on it, by adding much to the quantity and quality of the grain on each stalk. I am now persevering in my efforts, and intend to raise a large crop every year in its purity, to supply all who may apply for it for seed.

* * * * *

"P. S. I can ship any seed that may be ordered each week to Baltimore, if a few days are excepted when navigation is interrupted by the ice."

The grossest, and yet the most profitable fraud that has been practiced, was by an Irishman named Hall, who went through the country (in or about the year 1815,) selling patent rights (as he pretended) for a discovery of his in cultivating corn; by means of which, two laborers only, without horse or plough, and on ordinary land, could make a crop of 2500 bushels of corn, annually. His plan was to lay off a field regularly into squares of nine feet; and one of these squares in each contiguous nine, was to be manured and cultivated, and to bear as many stalks, and (as he promised) was to yield as much product, as the whole space of nine squares, if the whole had been ploughed and planted over equally, as in the usual mode; and each square was to be thus cropped in succession, so as to make a nine-years rotation on the same field. According to his reasoning, the thickly standing corn on each planted chequer, would be benefited by the surrounding vacant eight squares; and yet these eight would be resting and improving, until the turn of each came, in succession, to bear the crop. This impudent impostor did not even exhibit his patent right which he claimed to possess—nor had he any valid testimonials of the worth either of his plan. or his character. His whole means of success consisted in the enormous profits which he promised. It was as if an agricultural Aladdin's lamp had been offered to every farmer. His terms too were very moderate; he asked only $10 in hand, to permit the exercise of his right; and $10 more were to be paid after the first crop had been gathered, and the plan found to be entirely satisfactory. It is true that Hall did not make many converts; but, so far as we heard of his movements, in lower Virginia, he succeeded in making sales to some five to ten farmers in almost every county which he visited during his rapid progress. With these advanced payments he was content; at least he never returned to ask for the much larger balance remaining due. It was still more remarkable, that most of the persons who paid for Hall's plan, were not experimenters, but such as were called "solid, practical farmers." who had been previously eschewers and despisers of all theory and book-farming; and many were old men, who had never before varied from the time-honored usages of their neighborhood. But few of them even tried this dearly bought privilege; for they became heartily ashamed of their bargain before the planting time arrived. Those who *did* try it, made scarcely any crop, and never repeated the experiment.

The merino sheep humbug was of a still earlier date. When the invasion and devastation of Spain by the French served to break up the great merino flocks in that country, and to remove the previous prohibitions to the exportation of sheep of the best breeds, the opportunity was judiciously availed of to supply this country with a truly valuable stock. But the high prices obtained for them generated and nourished a spirit of speculation, such as has been exhibited in sundry other commodities, in various regions and times; as in tulip roots in Holland—lots and lands in and about Richmond, formerly—and lands and sites for future towns in many parts of the western wilderness, recently. The source and the progress of all such bubbles may be stated in a few words. The increased price has no relation to the intrinsic value (or productive use) of the commodity. But whether it be a tulip root or a merino sheep—a vacant and useless lot in a city, or the site of a prospective town in a marsh or a wilderness—the process is the same. The article in question rises in market price (whether by accident, by depreciation of money caused by excessive bank issues, or some other delusion, or by the art of the holders,) say 50 per cent. in a few months. and is sold by A. to B. at that rate of profit. C. buys of B. at a proportional advance, simply because of the rise in price which had taken place, and therefore still expected to advance. Probably he is not disappointed in that expectation; and whether he embarked in the speculation as knave or as dupe, *he* also makes a large profit by selling to D. who is still more eager to buy, that he may not lose his chance for such great profit, the regular advance of which has established confidence in a still continued enhancement of price. Thus the game goes on. The greater and the more rapid the rise in price, the more eager are the buyers; and every one concerned is making large profits—or is made rich, if operating on a scale large enough—until the bubble of speculation can be no more distended, and of course bursts; and the price then is adjusted to *intrinsic*, instead of speculative value. In this way, merino sheep at one time sold in some cases for more than $1000 each. We have before touched slightly on this subject; and expressed the opinion that a like mania was now growing as to race horses, and the improved breeds of cattle.

Another humbug was Mr. Whitmarsh's seed of the Chinese mulberry—which has been fully exposed in the past volume of this journal. The circumstances afford a strong exemplification of the fact, that the public are better pleased to be deceived than to be undeceived; and that if both false promises and means for their correction are presented to readers, that most will grasp at the falsehood, and pass the truth either unnoticed or unbelieved. Before any seed (real or supposed) of the *morus multicaulis* had been offered for sale in this country, we published in this journal, and upon high authority, that these seeds would not produce the parent kind, and therefore were not worth planting. This fact we repeated, and endeavored to enforce, from time to time—but without the notification seeming to have the least effect in preventing error, or staying the frauds of sellers, or the losses of buyers of the seed. The humbug had its course—the sellers made their profit—and now all are content to acknowledge the truth that might have been known as well at first.

The last prevailing humbug is *spring wheat*. Of the value of this newly introduced, or rather re-introduced old variety—for spring wheat is no novelty to well informed agriculturists—we have before intimated our distrust. Nevertheless, hundreds are eagerly seeking seed of spring wheat at $4 and $5 the bushel—and as long as such prices can be obtained, the humbug will live—and no longer. It has already been settled, that *some* kind of this wonderful spring wheat is not worth sowing; but then, it is affirmed that *that kind* was not the "real Simon Pure"—and half a dozen other kinds will be successively offered as the best, paid for at enormous prices, and found alike wanting. Some of the sellers of spring wheat seed are already quarrelling with each other, as to the merits or demerits of their respective kinds, as is shown by the following extracts from late publications.

"*Italian and Siberian Spring Wheat.*—We published in our paper of the 16th instant, a communication from Dr. Goodsell, of Utica, New York, comparing the relative virtues of these grains, and decrying those of the former in no measured terms. Desiring to exercise the strictest impartiality, and at the same time to lay every thing touching agricultural subjects before our readers which in the least interests them, we have published in this day's paper two letters in reply, from Mr. Jay Hathaway, the gentleman who introduced the Italian spring wheat into the culture of this country. Without making ourself at all a party to this controversy, we must express our regret that topics of the kind should be so conducted as to call forth any thing which can be tortured into motives of a sinister character. It is but natural that men should be partial to products of their own; self-love inclines us to the adoption of such opinion; but we can see no reason why one man, who may be satisfied with his own commodity, should step out of his way to attack that belonging to his neighbor."—*Farmer & Gardener.*

The tone of the champion of the Siberian spring wheat, may be inferred from the comments. One of the replies of him who sustains (and is sustained by) the Italian spring wheat, is copied below in full.

"Dr. Goodsell of Utica, has come out in the "Cultivator," (Judge Buel's paper,) strongly recommending his Siberian Wheat, and running down or trying to depreciate the Italian. His letter may possibly hurt the sale of the Italian, where it has not been proven; but in this county, the experience of our whole farming population is against him, and his letter here is quite harmless. Mr. Jos. Wright, a first-rate farmer of this town, has sowed the Siberian three years in succession His first crop was fair—his second was poor—and his third was miserable. I do not certainly know of any other person in this place who has raised it, and it must have very rich land, whereas the Italian does not require it, and will do *well* where the Siberian will not grow at all. The Italian is not liable to rust, let Goodsell say what he will. He is jealous of the fame of the Italian.

Yours, &c. J. HATHAWAY.

The above valuable wheat for seed, may be had (direct from Jay Hathaway, Rome, N. Y.) by applying to John L. Peirce, Bull's Head, North Third-street, Philadelphia, at $4 50 per bushel, by the single barrel. A barrel contains about 3½ bushels.

Philada., Penn., Jan. 23, 1838."

A previous and longer reply in the 'Cultivator,' from Mr. Hathaway, contains the following comparative estimate. The Italian spring wheat is declared to have been raised in "numerous cases, from impoverished lands, that would not yield a crop of oats. *This property alone* should give the Italian spring wheat a name above every other, as no other in this country possesses one so valuable, except such as are in common; none other will grow well, and *produce a good crop upon a poor and worn-out soil,* It has been grown for five seasons in this county, and has not failed in any; it rarely ever rusts, although winter wheat is ruined all around it; it has justly obtained an enviable popularity, as the doctor knows, as a sure crop, a good crop, and a larger;—it is the only article about which there was scarce a difference of opinion, until the letter in question: here it will effect little—abroad it may prevent a million from enjoying a certain good, which unlike the other, has not yet to *establish* a reputation. A "single swallow does not make summer"—nor the yield of a single field fix unqualified by a character. Many folks make wild *guesses:* the doctor says his Quaker friend "*thinks*" that he shall thresh nearly or quite 40 bushels Siberian from one bushel sown. Now this is great, if he has *guessed* truly; yet I can tell him of a man who says he sowed but half a bushel of Italian wheat on an acre of land, and that it yielded him 30 bushels after being threshed, and his account is not *guess* work."

Our inference from this correspondence is, that Mr. Hathaway has already made a pretty penny by *his* spring wheat; and that it is time he should make way for some other public benefactor.

A late occurrence, which will he described as an illustration of some of the foregoing remarks, presented to us, both forcibly and ludicrously, the manner in which humbugs operate.

A highly esteemed and intimate friend, who is a member of one of the learned professions, and no farmer, had lately thrown upon his hands the general direction of a landed estate. Our friend is a regular though cursory reader of the Farmer's Register; and he had been forcibly struck with some of the statements published of the product and great value of spring wheat, which he had seen there, and the far more seducing accounts in other publications; and had not paid so much, if indeed any attention, to our expressed doubts of its value, and warnings against confiding in it as a crop. Under the impressions thus formed, he came to consult us as to a matter of practical farming; and the following was precisely the substance of his statement and inquiry. "There is a piece of ground, of 10 acres on the M——— farm, which was reserved and prepared for oats. It is but of moderate strength, and as I am told, would probably have brought 10 bushels of wheat to the acre, if sown last fall. Now the question is, would it not be the best thing I could do with it, to sow *spring wheat*, instead of oats? I see by advertisements that that grain is selling for seed at $5 the bushel. Now, if I were to buy and sow only 5 bushels on the 10 acres—(so as to make the most of the seed—) and reap only 60 bushels of product—which surely is a *very* moderate calculation—and supposing that my crop would sell for *no more* than $4 the bushel (—for I wish to be sure to be within reasonable bounds—) and still I shall get $22 50 an acre, after paying for the seed."—It did not require much trouble to persuade our friend that his scheme was nought, in regard to his own interest. But perhaps it may not be so, as to the public interest; for the account of it which we take the liberty here to give, may possibly serve to save to some others of our readers fully as much money as he had expected to make by spring wheat. He will be not a little surprised, however, to find himself made use of to oppose the progress of humbugging.

The description, on a previous page, of the Egyptian wheat, however cautiously or correctly stated, is very likely, without any such design, to produce a very general anxiety to possess so curious, and apparently so productive a grain. Indeed, as it is there stated that this seed is already offered for sale, at $5 a bushel, it may be considered that this kind of wheat is already elevated in character to the dignity of a regular humbug; and as such, is launched on its voyage of experiment on the credulity of the agricultural public.

We happened to have known this kind of wheat, having witnessed its growth for two successive years, fully thirty years ago—and its subsequent abandonment, as worthless, by the cultivator. He was not sharp enough to think of such a scheme as offering for sale his last crop at $1 the quart; or perhaps he might have spread the kind through the United States as far as has been done with spring wheat—or as may yet be done with Egyptian wheat itself, notwithstanding this attempt to prevent that result.

The Egyptian wheat (as it was called) which we saw, and observed the after-product of, had several short heads standing out from the bottom of the principal and upright head, which grew as usual with other kinds; the stalk was of strength proportioned to bear so heavy a burthen of grain. According to the usual mode of calculating, in advance, the productiveness of such things, it was supposed that there must be a prodigious increase found in a wheat which bore on each stalk three or four small heads, in addition to one large one. In the earliest sowing, the usual care was taken of the small quantity of seed first obtained; and which care, of itself, serves generally to cause delusion, by showing a very large first product. This seed was drilled, very thin, (so as to make the most of the few seed;) in a garden, on a rich and excellent clay loam. It made two rows, several feet apart, and of some 20 yards in length. The plants were cultivated well, by the hand-hoe, and the growth and product, from so few seed, were considered remarkably fine. The first crop showed *generally* (if our memory is correct,) the valued peculiarities of the kind, in each stalk having several heads. The whole product was sown *broadcast* the next autumn, on a rich part of the field for wheat. The The next crop had none but *single heads*—and exhibited no superiority over the common wheat, so as to induce its being sown again.

The mere novelty of any culture, or, in other words, its being not yet fully tested by experiment, however exciting to curiosity and interest, is but a dubious claim to its being of more worth than other things better known, and already in general use. But even the character of novelty, of many of these humbugs, though forming their principal, if not sole claim to notice, is itself false; for instead of being *new*, they are *old* things which have been tried, and found wanting, long ago, and are again brought forward, because of the general ignorance of any former trial having been made. This applies to both the kinds of wheat spoken of above. Thus, since writing the last paragraph, we found in an old agricultural work, Duhamel's, an account of "Smyrna wheat," which is evidently the "Egyptian;" and making due allowance for the credulity and sanguine expectations of the experimenter, as to its rate of product, it does not differ materially from our own early and almost forgotten experience, as stated above. Having read the whole of this volume some twenty years ago, of course this account did not then escape notice; but it had been entirely forgotten. The volume was printed in 1762; and the experiments made, commenced in 1751. The passage is as follows:

"Smyrna wheat has a very large ear, with several less or collateral ears, growing out of, or round this large one. It requires a great deal more nourishment than the common husbandry will afford; for there its ears grows very little bigger, and produce little, if any, more grain than those of common wheat*. In all probability, it will do much better when cultivated according to the new method [i. e. of being sown in drills, and cultivated]: but the experiments which have hitherto come to our knowledge are very few. The following is the chief, and indeed the only one worth mentioning.

M. Le Vayer, one of the masters of the court of requests, sowed some of this wheat in 1751, in a small part of his estate at Duviere, in the province of Maine, and had a very good crop. He sowed it again in 1752, in the common way; and though it did not answer near so well this time, it yielded him a third more than common wheat would have done."

As to *spring wheat* in general, (which is so entirely new to nearly all who are believers in its superior value,) it is spoken of in numerous European works on agriculture; but by no such authority, that we have met with, is it deemed superior to winter wheat. It is valuable as a substitute, though admitted to be of less value, when the winter wheat has been killed, or could not be sown before winter; and especially in countries, like England, where wheat furnishes most of the bread of the population. Where a so much better spring grain can be raised as Indian corn, we doubt whether any ground remains for using spring wheat, even thus as a substitute. One of the main grounds of the value of ordinary wheat, is, that it can stand the cold of winter, and will produce the more heavily by remaining on the ground through the winter. Oats are not so hardy, and will not generally live through our winters; and therefore we are obliged to sow that grain in the spring. But it is well known, that when autumn-sown oats, *do* withstand the winter's cold, that the crop is far more abundant than any that could be obtained from the same land from spring sowing. It follows, that a kind of oats that could be safely sown in the fall, would be a very valuable acquisition. Winter wheat possesses that hardiness which would cause so much more productiveness in oats; and yet, many are willing to give up that quality, and expect greatly increased products from a wheat which is sown in the spring, because it is too feeble and tender to stand through the winter.

Some wheat of peculiar qualities was introduced from Chili about seventeen years ago, and became a subject of considerable interest to many: but it was found to be a *spring wheat*; and on that account was neglected by all who tried it. *Now*, according to the prevailing views, if again offered, it would be preferred for the very reason for which it was then rejected.

We have referred above generally to English opin-

*Count de la Galissoniere, says M. Duhamel, sowed some of it for several years: it produced a little more grain than common wheat; but the bread that was made of it, was not so good.

sons of spring wheat, and we have just looked for the received opinions of French agriculturists on the same subject. Rozier's '*Cours Complet d'Agriculture*,' &c., it may be presumed, presents a fair exposition of general opinion. In his article on wheat, there are but a few passages on this variety, which, however, show sufficiently that it was valued but little. A version of them will be here given.

"In 1784, I made the trial of sowing spring wheat *(blé de mars)* in autumn; it grew without beard. I have also sown autumn wheat in the month of March, and it became bearded. *May not then this spring wheat be but a degenerate product* (dégénérescence) *of the autumn wheat?* It is known that in 1709, all the wheat in France was entirely killed by freezing; and Louis XIV caused to be purchased in Egypt, wheat which arrived at Marseilles in the beginning of March. It was distributed throughout all the northern provinces of France, to re-sow the land in spring. Much was sown; it grew superbly, and it is from that time known as wheat of March." * * * * *

"Spring wheat has a yellow grain, very short and slender. It also is of two kinds; the one is bearded, the other not; which makes the straw of the latter preferable for food for cattle. This wheat also gives a bread that is too dry; it is necessary to mix rye with it to render it more sweet and palatable." * * *

"As to spring wheat, it is very valuable for lands exposed to the inundations of rivers, during winter, since that kind is not sown but in March."—It is evident that the author would have much preferred autumn wheat, if the peculiar disasters to which the lands were subject, did not render it impossible to sow in autumn with success.

The article of Rozier, quoted from, above, also refers, but in still fewer words, to our other *new-old* acquaintance, Egyptian wheat. This is described as a "yellow wheat, bearing many heads upon the same stalk;" and it is named the "miraculous wheat, or wheat of abundance," which designations are both admirably suited for a humbug; though not its character, as there given; which is, that it is "hard to thrash out, and its flour, very dry and rough, is not good alone, and must be mixed with rye."

We close with the opinions of the excellent practical farmers of Belgium, as to what spring wheat is to be valued for, and the contrary. Radcliffe's 'Report of the Agriculture of Flanders,' furnishes the following passage:

"The heavy rains of the latter season, having made it impossible to sow the wheat till December, and the bad weather which succeeded having injured the clay soil considerably, the growing crop made but a poor appearance.

Upon the defective crops of wheat, the farmer in the month of March was sowing, and covering with the hand-hoe, the *triticum æstivum*, or spring wheat, by which means, notwithstanding the unfavorable weather, he expected to reap a full crop in August.

It seems an important advantage in this species of grain, that, though sown even so late as April, it will ripen at the same time with the winter wheat sown the preceding October. For which purpose, or as a crop in itself, when from bad weather, or any other interruption, the winter sowing has not been accomplished, the spring wheat is esteemed of great value, but is not considered to produce as much, or of as good quality, as the winter grain."

PLAN AND DESCRIPTION OF AN EXCELLENT GATE, AND A COULTER.

To the Editor of the Farmers' Register.

Essex, February 10th, 1838.

Dear Sir—Being always desirous of contributing something (even if it be no more in amount, than "the poor widow's mite,") towards the promotion of our good cause, and of your paper, which is constantly rendering such essential services to it, I now send you two drawings, which I confidently hope, will prove highly useful to our agricultural brethren, in every part of our country. The first drawing represents *a gate*, in the structure of which, I have endeavored to combine all the peculiar advantages that I have noticed in a great variety of gates, which I have carefully examined to ascertain which was best. The second drawing represents a single coulter; for the use of which the season is now rapidly advancing. I hasten, therefore, to send it to you, as I deem it far superior to any, out of five or six kinds of which I have made trial; and indeed, to all of which I have ever seen any description; for it unites strength, durability, cheapness, and simplicity in a greater degree than any of those; while its efficiency is equal to that of the best. All this I may safely say; for it is not my own invention.

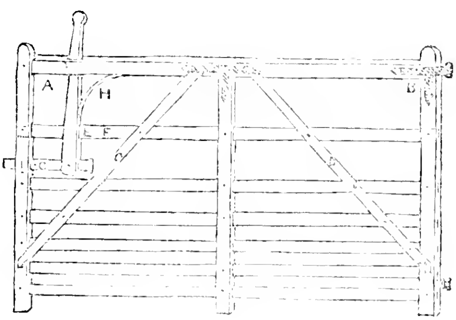
But, before I proceed to my description, permit me to indulge my constitutional infirmity of *digressing*, by inditing you a brief homily, upon what I will take the liberty to call—*The Morals of Gates;* in humble imitation of the illustrous Franklin's "*Morals of Chess;*" a theme, by the way, not comparable, in importance, to mine; for *his* was nothing but a mere game contrived to kill time, whereas *mine* is an invention which has been of the greatest use in rural affairs from time immemorial.

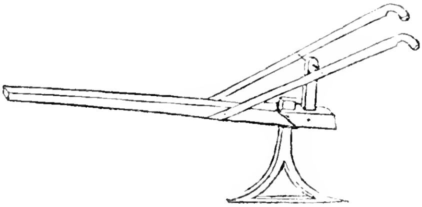
First then, considering the antiquity and universal utility of gates, the rarity of *good* and the frequency of *bad ones*, would hardly be credible, were it not for our daily experience of the fact; although all persons are aware of the numerous evils, that may arise from the latter cause. Among these, it is not one of the least, that even *our characters* often suffer from it, with strangers; for whenever they pass a bad gate, no remark is more frequently made by them than—"*this must be a bad, careless farmer—a lazy, slovenly fellow.*" On the contrary, the sight of a good gate inspires them, at once, with a belief that the owner is a good manager, although, possibly *that* may be the only good thing about his whole establishment. Here the gain is obvious; the means of attaining it so cheap, and the advantage to the proprietor so great, in other respects, that he is inexcusable to neglect them. Again, good gates contribute much to preserve good understanding among neighbors, by preventing the depredations of each other's stock; than which, nothing, in the long catalogue of neighborhood grievances, is more apt to produce bitter and lasting quarrels between those who are bound, both by duty and interest, to live in peace and good will towards each other. Those quarrels are almost inevitable; for the *injurers* and the *injured* rarely ever measure their losses by the same standard, or take the same views of their provocation. Hence, the wrathful indignation becomes mutual—virulent abuse is often reciprocated; until, at last, by such alternate aggravations, this most ridiculous neighbor warfare—originating in no better cause, than a bad gate! is waged with quite as much animosity, as ever inspired two nations to attempt each others' destruction. Let a short recital of one such quarrel, of which I have known several, not materially different, suffice for the rest; and let us suppose, that, on a certain occasion, A's hogs, both seniors and juniors, finding B's gate most invitingly out of order, did, incontinently make a forcible entry through the same, into B's corn-field; and not having the fear, either of God or man, before their eyes, did there most feloniously break down, and wantonly destroy sundry ears of corn, to the great detriment of the proprietor; whereupon, the said B, forthwith issues his mandate to his overseer and negroes, (nothing loth,) to dog, shoot, or otherwise destroy the said marauding porkers. A report of the killed and wounded is speedily made to A, by his people also; made too, with a thousand embellishments and aggravating circumstances, to screen themselves from blame. Then comes A's mandate, as a retaliatory measure, to murder B's dogs; or should *they* not be "come-at-able," to wreak the vengeance, at the first opportunity, upon B's famous high-bred bull, with some great appropriate name, such as Bonaparte, or Jackson. This order being executed, imparts such additional dignity to the quarrel, that it not unfrequently descends to the children, as a valuable part of the family inheritance; and thus may whole families, to the second generation, be kept at variance, for many years—all owing, in the first instance, to a *bad gate!!*

The foregoing arguments and suggestions in favor of good gates, ought, alone to cause every body to make them, who use them at all. But they are susceptible of more important application. They may teach *even politicians*, (high as they generally hold their wise heads above all agricultural matters,) a most useful lesson, thus. When they notice, *as they might*, their perfect adaptation to all the purposes for which they were designed, and plainly perceive that these purposes could not properly be accomplished, unless all their bars and bolts, and braces—their tenons, mortices, dovetails, and hinges—were carefully maintained in their original and relative combinations and positions; might not the said wise-headed politicians apply these manifest facts to our state and federal constitutions? Compared to *a gate*—they are machines of vastly greater importance and complication; although the arguments to prove the necessity of maintaining the relative position of all the different parts of *the gate*, are precisely the same, as serve to demonstrate a like necessity to maintain, unimpaired, the relation of all the parts of our political constitutions; if, indeed, we sincerely desire to preserve them. *Good gates, carefully kept up*, according to the plan of the contrivers, greatly contribute to the neighborly amity, and all its delightful accompaniments of good offices. But *their* sphere of influence is limited to the walks of private life: whereas, *good political constitutions, carefully maintained*, secure peace, prosperity, and happiness, to millions upon millions of human beings, who, *without such restraint*, would have a chance, not much better than that of so many tygers and hyænas, of living together in peace and harmony. If, therefore, any considerations or arguments can possibly be drawn from the former, in favor of the latter, I hope to be excused for making the attempt; especially, when the worst that can happen, will be to condemn *me* as somewhat too fanciful in forcing my premises and conclusions to suit each other.

There is a little story related by Mr. Say, in his excellent work on political economy, so applicable to this subject of *bad gates*, that I cannot forbear to repeat it, in his own words.

"I remember" (says Mr. Say,) "being once in the country, a witness of the numberless minute losses, that neglectful housekeeping entails. For want of a trumpery latch, the gate of the poultry yard was forever open; there being no means of closing it externally, it was on the swing every time a person went out; and many of the poultry were lost in consequence. One day a fine young porker made his escape into the woods, and the whole family, gardener, cook, milk-maid, &c., presently turned out in quest of the fugitive. The gardener was the first to discover the object of pursuit, and, in leaping a ditch to cut off his further escape, got a sprain that confined him to his bed, for the next fortnight; the cook found the linen burnt, that she had left hung up before the fire to dry; and the milk-maid, having forgotten, in her haste to tie up the cattle properly in the cow-house, one of the loose cows had broken the leg of a colt that happened to be kept in the same shed. The linen burnt, and the gardener's work lost, were worth full twenty crowns; and the colt about as much more—so that here was a loss, in a few minutes of forty crowns—purely for the want of a *latch*, that might have cost a few *sous*, at the utmost; and *this* in a household where the strictest





economy was necessary--to say nothing of the suffering of the poor man, or the anxiety and other troublesome incidents. The misfortune was, to be sure, not very serious, nor the loss very heavy; yet, when it is considered, that similar neglect was the occasion of repeated disasters of the same kind, and ultimately of the ruin of a worthy family, it was deserving of *some little* attention." Thus endeth my homily, and now for my descriptions.

The first drawing represents a gate nine feet wide from out to out, by five feet high. The hinder upright or stem is four inches by three. The centre and front stem, are three by two and a half inches. All the bars are three inches wide; but the upper one is square behind, tapered to two and a half inches before. The other bars are one inch thick, at the hinder ends, tapered to five-eighths at the front ends. Each tenon has a shoulder three-fourths of an inch deep; but the shoulders behind should be cut in the *lower* edge of the bars, and those before, in the *upper* edge, as indicated by the dotted lines across the front and hinder stems, where the tenons of the bar, next the top, enter them. These shoulders, thus cut, aid, both before and behind, in counteracting the tendency to *swag*; which is common to *all* gates. This tendency, if not checked, always makes the angle A *greater*, and the angle B *less* than a right angle. The brace C, therefore, acts as a *tie*, while the brace D, acts as a *stretcher*, and both co-operate with the shoulders of the tenons, at the ends of the bars, still farther to counteract the swagging. But the most effectual counteraction of the whole is the upper hinge, which is alike on both sides the gate, and which will suffice of itself, unless the half inch iron bolts, that fasten together by screws and nuts the opposite sides of this hinge, or the hinge itself, should break, which it cannot easily do, if made two inches wide and a quarter of an inch thick. A gate thus guarded cannot possibly swag, while the various guards, eighteen in number, maintain their relative positions. The shank of the lower hinge, should be made an inch or two longer than that of the upper hinge, and the hook on which it hangs should be driven in the post at the same distance beyond the perpendicular line from the upper hook. This fixture, when the gate is opened, throws the lower end of the hinder stem farther from the face of the post, than the upper, and consequently, the gate will shut of itself, if no obstacle interposes. By this simple contrivance the posts may be fixed perpendicularly; otherwise they must incline considerably *inward*, according to the common very unsightly practice. This lower hinge should be about one inch square next the shank, tapered to five-eighths at the inner end, which should have a screw and nut to fasten it. The iron in the form of a T, which fastens the centre stem, the upper bar, and the upper ends of the braces together, by half an inch iron bolts, has a corresponding iron on the opposite side of the gate, and aid in making "assurance doubly sure" against swagging.

The handle of of the latch is two inches wide by five-eigths thick, where it passes through the upper bar; and three by two and a half inches, at the lower end, through which the hinder end of the latch passes, and is fastened in a mortice, somewhat longer and wider than itself, by a wooden pin, smaller than the hole in that end of the latch through which the said pin passes. This is necessary to give it play, and the same difference, for the same purpose, must be made between the size of the hole through the upper end of the handle, and wooden pin which fastens it in the upper bar of the gate. Another mortice is cut through the handle of the latch, at E; also, somewhat longer and wider than the bar on which it plays, and a pin must be fixed in this bar at F, to prevent the latch from being drawn out of its mortice in the front stem, unless the mortice through the upper bar be cut exactly in the oblique direction indicated by the dotted lines across that bar. If this mortice be not thus cut, another wooden pin, in the latch itself will be necessary at G, to prevent it from being forced too far forward, by the spring *H*. This may be made of the thinnest hoop iron, if not bent beyond its point of elasticity; but steel is best. To relieve the latch from friction against the bottom of the mortice through the front stem, a round wooden pin marked I, is driven in, so that half of its thickness shows above the bottom of the mortice, and supports the lower edge of the latch, which should be rounded for three inches, at this part, and then the two surfaces would touch only at a single point.

The foregoing description, may perhaps appear, to some, unnecessarily minute; but, I myself, have so often been puzzled by two much brevity in such matters, that I was determined to err, if at all, on the safe side. In the gate here described I claim nothing as my own invention, but the latch and the upper hinge, which last I have not used, although previous use is not necessary to establish its value.

A very brief description will suffice for the coulter, the original contriver of which, I do not know; for I met with it about two years ago, on board the Rappahannock steam boat, in possession of a gentleman who could give me no other account of it, than that he procured it from the late Mr. George Banks of Stafford county. I was so struck with its manifest superiority to any coulter I had seen before, that I immediately made a sketch of it; had one made as soon as I could; and have been using them ever since, with a decided preference to all others. None, of which I have any knowledge, are superior to it, in any one respect, while this is superior to them all in two important particulars; you may wear out both points, by reversing them, before you send it to the blacksmith; and the point which works behind, causes the coulter to run much more steadily. A single horse will draw it easily in most of our lands, after they have been well broken up with the plough; while four, even of our miserable half-starved Virginia oxen, will break or tear up roots by it, as thick as a man's wrist, with no more "geeing" and "hawing" than they require to drag a load of wood to their master's door, or to any other coulter, that I have ever seen tried.

The lower part of the coulter is made out of inch-square iron, flattened and well steeled at the points, and is twenty-two inches long. The upright part is of bar-iron two and a half or three inches wide, by a half inch or five-eighhts thick, and should be seventeen or eighteen inches high from top to bottom, and left square both on the front and hinder edge. A half inch bolt will suffice to fasten it in the mortice through the beam, which should be at least four by three inches at that part. A band of round, half-inch iron, should also be fixed on that part of the beam, so as to rest against the front edge of the coulter above and its back edge below, which will keep it firmly fixed in the mortice.

If these two drawing, with my description of them, should contribute only half as much as I hope they will, to the benefit of our agricultural brethren, it will be deemed an ample reward, to the end of life by their friend and yours,

JAMES M. GARNETT.

To the Editor of the Farmers' Register.

BUCK-WHEAT CAKES.

By the way of contributing a little to the usefulness of the 'Register,' I will venture to send you a receipt for making buck-wheat cakes. In the room of water, mix up your batter with buttermilk; instead of leaven, yeast, or yeast powder, use a little saleratus, and one, two, or three eggs. If you do not pronounce it the best buck-wheat cake you ever eat, you and I do not agree in taste.

The same receipt is likewise as good for other batter cakes and biscuit. The theory of this is plain, which you will at once see. R.

MARLING AND LIMING IN NEW JERSEY.

To the Editor of the Farmers' Register.

Cumberland, N. J., March 8th, 1838.

Sir—I became acquainted with your 'Essay on Calcareous Manures,' between two and three years ago, by the way of an article in the 'New Jersey State Gazette', copied from the 'New York Journal of Commerce.' I was so well pleased with your theory, as there laid down, that I procured a copy of the essay of Messrs. Carey & Hart of Philadelphia, the first opportunity I had; and I can truly say I perused it with much pleasure, and I trust with some profit. I consider it a valuable work, especially for those making use of marl and lime. I put your 'Essay' into the 'Union Library,' thinking to procure one for myself. I have sent to Philadelphia several times, but could not obtain one at any price. It is perhaps not more than two years since people in these parts generally became in favor of marling and liming. Having got clear of their prejudices, many are perhaps acting in the other extreme. Many people in this county cart marl that contains only thirty or forty per cent of calcareous earth, 6, 7 and 8 miles, and pay for it at the pits from 50 to 65 cents for a load of 20 bushels.

Our practice in this part of the country, generally, is to raise from one to three crops of buckwheat, first, before we sow clover, or try to raise some other grain.

I sowed gypsum last summer on buckwheat, from one to two bushels to the acre. The season was quite wet, and I could perceive but little difference, and none between that which had but one, and that which had two bushels to the acre.

I would like to be informed in the 'Register' or some other way, of your success in using plaster; and whether you still continue to hold to your theory respecting its want of action, as laid down in your essay. I think your theory very ingenious, and far more reasonable and scientific than the old theory respecting the influence of salt water, heretofore maintained by many, without foundation.

Respectfully

CHARLES F. RANDOLPH.

[In answer to the inquiry above, we have to say that there has been nothing found, either in later experience or information, to contradict or oppose the views presented in the 'Essay on Calcareous Manures,' as to the action of gypsum on marled lands; and as to the fact, and the cause, of its not acting on all soils which most need the application of marl or lime.—ED. FAR. REG.]

From the Norfolk Herald.

DISASTERS ON RAILWAYS.

A correspondent calls our attention to a communication in the March number of the Farmers' Register, purporting to be from a correspondent on the Eastern Shore of Maryland, but suspected to have originated nearer home, in which the writer, while arguing against the construction of the Eastern Shore rail road, does injustice, we think, to Major Kearney. But what we regard as more particularly deserving our attention, and the expression of our regret at such remarks from such a quarter, are the notes by the editor of the Register, whose position towards the great body of the public, if we understand it rightly, is one of strict neutrality in regard to all questions of a local bearing. Whatever interest he may feel individually in the line of rail road from the Roanoke to Fredericksburg (and it is natural that he should feel a deep interest in it) it does not become him to make his excellent Register, which owns the whole state for the sphere of its usefulness, a vehicle for advancing one section of it at the expense of another. For instance: he says, "but if experience may be relied on to furnish evidence, it may be safely assumed, that a well managed railway is the safest mode of travelling next to well managed river (*not Atlantic or Chesapeake*) steam vessels." Now this is an assumption notoriously contradicted by fact. Without instituting a comparison between the safety of rail road and steam boat travelling, or between that of *river* steam boats (including those on the western waters) and the steam boats navigating the Chesapeake between Norfolk and Baltimore for the last 21 years, we will only state the remarkable fact, that while the public sensibility has been almost incessantly pained by recitals of "dreadful steam boat disasters" on our rivers, and "accidents and loss of life on rail roads," from all parts of the country, no accident has ever occurred on board of one of the boats running on the Chesapeake, which involved the loss of a single life, or any bodily injury whatever, from their commencement in 1817 up to the present time. Now we defy the editor of the Register, and the whole world to back him, to produce a corresponding instance of exemption from casualty and human suffering on any other line of travel, in so long a period of time. The fact here stated is too well known to travellers, for the inuendo of the Register to cause the least apprehension for their safety in committing themselves to the Chesapeake steam boats.

The editor of the Register also takes occasion in his remarks, to notice the disasters on the Ports mouth and Roanoke rail road, during the last year, in contrast with the great security which has attended the operations of the Petersburg road, which he dwells upon *con amore;* but he says not a word about the recent one on the Richmond and Fredericksburg road. We can state for his information, and that of the public, that the directors of the Portsmouth road have profited by the disasters to which he alludes, so far at least, as to place it in a condition for safety and expedition, not inferior to that which he vaunts of the Petersburg road, and certainly equal to that of the Richmond and Fredericksburg.

The growing popularity of the Chesapeake route, however, cannot be checked by any device, while travellers prefer, as they always do, steam boats to steam cars; for when they have to choose between two routes, the one entirely by rail way, and the other for two thirds of the distance by steam boat, they will assuredly incline to the latter.—[Ed. Herald.]

When it is proposed to reply to, and still more so when to condemn any publication, it is proper, both for fair dealing to the writer, and for the better understanding by the readers of the strictures, that the piece censured, itself, should be presented at the same time. This course we have always desired to pursue, as is done in the present case; and we have never availed ourselves of the customary privilege assumed by editors, of answering an offensive or disagreeable article, before, or without, copying the article itself; and thus, in advance, raising prejudice against it in the minds of readers. We regret that our highly respected brother editor should have adopted a different course; and have done us injury in both these respects, by the foregoing editorial remarks, of his paper of March 30th; and which course is the less excusable, as the entire note, which he considered so reprehensible, is but little, if any, more than half the length of his remarks copied above. Of course, the length did not forbid its insertion. As a matter of sheer justice, we request that he will supply the omission to his many readers who do not see the Farmers' Register, by copying the foot-note in question, from page 752 of the March No., and also, that he will accompany it by these remarks, which his have rendered necessary. They will be made as concise as possible.

First—in correction of mistaken impressions. The *suspicion* that the correspondent who opposed the Eastern Shore Rail Road is not what his communication purports, is as much unfounded, as the expression was uncalled for, in argument, or in courtesy. The writer is a resident landholder and cultivator of the Eastern Shore of Maryland, and one whose private interest in the prosperity of that region, as well as his standing and general intelligence, give him a right to express opinions on that subject, even though they should be mistaken. That his views do not agree exactly with ours, is sufficiently evident to the readers of the notes to his piece, and of several other articles of greater length, which have before appeared in this journal. In reasoning on general and public facts, the name of the writer is not required as authority; and there is no reason why such pieces should not be anonymous. But we assure our brother editor, that we would not knowingly permit a correspondent, were one to attempt such a deception, to *assume false colors*, to sustain private interests either opposed to those which would be inferred from his assumed locality or position, or with which he was desirous to conceal his connexion.

In the next place—we claim for this journal, and its editorial conduct, to the fullest extent, the ground which, it is justly said above, ought to be occupied; but which, it is charged, has been abandoned in the note referred to. In the five volumes of the Farmers' Register, there have been many articles relating to the rail roads from Petersburg, and from Portsmouth, to the Roanoke; and while these two great improvements stood as rival claimants, contending before the legislature, we confess it was difficult, in a journal like ours, open to both sides, and designed to favor the general cause of internal improvement, to appear so perfectly neutral as to satisfy all persons of both the rival interests. But until now, no complaint has ever reached us of having shown less than equal favor and justice to the Norfolk and Portsmouth road and interest; though we have heard of charges of the opposite character, being made by some of our nearer neighbors. These charges had no just foundation; but there is no question, but that more selections, communications, and editorial notices, have appeared in this journal, favorable to the Portsmouth route, and its designed continuations, southern and northern, than to the Petersburg route. The pages and indexes of our volumes offer ready proofs of what is here stated in general.

The views of our correspondent from Maryland, if received as correct, would have operated to lower the true estimation of the safety and convenience of rail road travelling in general, and of the value of the Eastern Shore Rail Road in particular, which route has been planned solely as a most important extension of the Portsmouth and Roanoke Road, and is expected, by the friends of the latter, to give it double value. Now, the manifest object and purport of our note was to defend what was impugned, the safety of rail road travelling; and in that defence, we conceive that Norfolk has at least as deep an interest as Petersburg, and that we were thereby upholding the general interests of the one, fully as much as those of the other.

But we limited our assertion of almost entire security to passengers, to "well-managed rail-roads." Would our brother editor, or our Norfolk friends, have desired that the claim should have been extended to, and made to include the *ill-managed* also? Such a claim would have been as impolitic in argument, as it would have been manifestly false in point of fact. The editor of the Herald does not even dissent, in the slightest degree, from our assertion that the accidents on the Portsmouth road, so fatal in their effects on passengers, were caused by gross mismanagement, and were *not* such as are "necessarily and unavoidably attendant on railway travelling." By maintaining that the causes of these disasters were *not* permanent and continuing, but temporary, avoidable, and that in fact, they *had already ceased to operate on that road*, and that the proper and safe course of management had been there adopted, surely we were *sustaining* instead of *detracting from* the present and future value of the Portsmouth and Roanoke railway.

But the odious part of this branch of our remarks was presenting the case of the Petersburg railway, as proving incontestibly, by long experience, the entire safety of travelling on railways, under proper regulation. This road was not selected for illustration because it is (or is considered as) a rival work to that of Portsmouth, but because we happened to know the facts. Any other road, presenting as strong, or stronger, and as well established facts, would have been as readily noticed. And should any highly improper and dangerous measure be hereafter be adopted on this road, we shall be as ready to denounce it, in advance of the occurrence of its expected ill effects, as to commend what has been heretofore, and is, worthy of commendation. If such reprehension should be necessary, and be ever so sharply given, we shall deem it as *friendly*, instead of *hostile*, to the interest of rail-roads in general, and even of the very road whose conduct is then condemned.

Our little note is not only censured for its sins of commission, but also of omission, in not speaking of a recent accident on the Richmond and Fredericksburg railway. It was not seen then, nor is it now, what bearing that accident, or any other circumstances of that road, had on our designed defence of the safety of railway travelling in general. We know nothing of that road, except from the newspapers, and are not prepared to say whether it furnishes most examples of good, or of bad management. But since we are thus twitted with the omission of instances of the latter, we will add, that if its conduct had been ten times worse than any charged, and the accidents to the trains ten times more numerous than they have actually been, it would only serve to strengthen our previous argument against placing the burden cars *behind* instead of *before* the passengers. For we understand, that by simply avoiding that very faulty arrangement, that all the accidents on that road have been entirely harmless to the lives and limbs of the numerous passengers.

The only remaining charge against our note, is its admitting "well-managed *river* steam vessels" to be possibly safer than even well-managed railway passenger cars; and the denying that greater degree of safety to Atlantic or Chesapeake steam navigation. The former part of the admission, whether correct or not, certainly is not obnoxious to the suspicion of local or private interest. We had especially in view the James River steamers, in which Norfolk is very deeply interested, and Petersburg, scarcely at all. But without claiming the benefit of the limitation to James River, we think that truth demands the admission, and all experience proves, that "*well-managed*" river steamboats are as safe a mode of conveyance as any in this country; and that the numerous and fatal disasters of the *badly-managed*, on the western rivers and elsewhere, afford no ground of contradiction. As to the denial of equal safety to sea steamers, it is enough to refer to the horrible fate of the steamer Home. For the Chesapeake steamers, we readily admit that no loss of life has yet occurred, and have no ground to deny that they are as well constructed, and as well navigated, as any could be. But every bay as well as sea vessel is liable (however small the chance, and remote the danger,) to destructien by water or fire, and steamers particularly to the latter most awful calamity; and if the vessel were about to sink, at only ten miles from shore, having on board, as is usual, twice or thrice, and it might be five times as many passengers as could be crowded into the few boats, the almost certain result would be the swamping of the boats, and the death of almost every passenger. Such a disaster may not occur in a century; perhaps never; but the possibility of its occurring, and the almost certainly fatal results of such an occurrence, must always put Chesapeake, as well as Atlantic steamers, on a very different footing of security from that of the James River steamers.

In concluding, we beg leave to assure the editor of the Herald, that we are not only free from every wish and feeling inimical to Norfolk and Portsmouth, and their interests, but that we should rejoice to see their noble seaport rapidly rising to the elevated station in commerce, population and wealth, for which, by its highly favorable location, and great natural advantages, it seems to have been designed.—ED. FAR. REG.

THE PERSIMMON TREE AND THE BEER DANCE.

(Continued from page 596, vol. 5.)

To the Editor of the Farmers' Register.

When I found my "Persimmon Tree," grouped with the "Persimmon Tree" of James M. Garnett, Esq. in your January No. of the Farmers' Register, I drank his health in a glass of persimmon beer. I am not only pleased with his remarks, but highly gratified that the gentleman has employed his able pen on the subject of this valuable tree. I find very little difference between his opinions and mine, and it rarely happens that two communications on the same subject, accidentally falling together, should correspond in so many particulars. We agree perfectly, as it regards the use and value of the persimmon tree. It will be seen, however, by the reader, that he has discovered an astringent acid quality, in the leaves and unripe fruit, which, when combined with iron, gives a black color for ink. To make amends for this, I have given the medicinal properties of the bark. He has discovered vinegar for table use; to meet this, I have given a good receipt for making beer. He has also informed us, that the wood of this tree makes shoe-lasts; and I have told you, the wood of the persimmon tree makes bed-posts. His molasses and sugar stand ready to sweeten my coffee and tea, and the two communications are so nicely poised and equally balanced, that it is impossible to tell which will kick the beam. I regret, however, that the learned gentleman has obtained brandy by the distillation of persimmon beer; for it may have a very demoralizing effect in eastern Virginia; the brandy drinkers will require such a demand on the product of this tree next fall and winter, that we may lose our sugar, molasses, pies and puddings. Should this be the case, there will, I suspect, be a tumultuous scuffle, and all make a simultaneous movement in order to obtain the great prize. Then, as Jim Black would say, "*the longest pole takes the simmons.*" I am of the opinion, that persimmon beer contains no alcohol, and although it is found in most fermented fluids, I have never witnessed any intoxicating effects from the use of this beverage. Our slaves make it in great perfection, and use it freely without any appearance of inebriation. An old servant in my family was remarkable for making good persimmon beer, and whenever I would pass the door of his house, he never failed to invite me in to taste his beer. "Come, master, drink some beer; simmon beer and ash-cake is equal to *cash*; but it don't make *glad* come like whiskey." Although the old man was a moveable swill-tub as long as his beer lasted, yet I never knew him to be intoxicated. I differ with Mr. Garnett, as it regards the presence of alcohol in ripe fruit. Speaking of the persimmon, he says, "it contains so much of the alcoholic principle as never to freeze." I have been educated to believe, that alcohol is never present in ripe fruit; its components, oxygen, hydrogen and carbon, are not developed or properly evolved, previous to fermentation. Alcohol forms the true characteristic of vinous liquors, and is obtained from wine and other fermented fluids by distillation.

I will call your attention again to the persimmon seed, as a substitute for coffee. It has not the genuine coffee taste, and some individuals may not like it at first; but if they will continue its use, with one-third or one-fourth West-India coffee, they must be pleased with it, and but few can distinguish the taste from genuine coffee. Much depends on parching the seed; they should be carefully stirred with a stick while parching, in order to prevent them from burning, which never fails to give the coffee a bitter taste. Twelve gallons of water, to eight gallons of persimmons, makes the beer luscious, rich and very fine; it may be too brisk and sharp for delicate palates; the beer we generally meet with, has double the quantity of water. Although I am of the opinion that persimmon beer is not intoxicating, yet I have witnessed great glee, and highly pleasurable sensation, produced in our slaves, over a jug-gourd of beer; but I ascribe this reverie or pleasurable hilarity, to the wild notes of the "banjor," which give zest to the beer. There is an indescribable something in the tones of this rude instrument, that strikes the most delicate and refined ear with pleasing emotion; the uninterrupted twang or vibration of its strings, produces a sound as it dies away, that borders on the sublime. I never could account for its wonderful effect on a well-organized ear, capable of distinguishing and appreciating agreeable sounds; unless it be admitted, that concord and discord are so completely blended as to produce perfect harmony. This opinion, however absurd it may seem at first view, is not without its supporters. Pope says, "all discord is harmony not understood."

The honorable gentleman, Mr. Garnett, has indulged in a little innocent merriment in giving us a "Munchausen story"—a "mutton machine," which would really be invaluable if reduced to practice. With all due respect for your valuable columns, I must ask the privilege of being indulged in a similar strain, in giving an account of a "beer dance" that came under my observation.

Some years ago, I rode in the night to visit a patient, and as I passed the house of Mr. Samuel Poe, in the lower end of Prince Edward, I heard the tones of a banjor, and was told by the old gentleman, (Mr. Poe,) that his servants had brewed a barrel of persimmon beer, and he gave them the privilege of having what they called a "beer dance." Curiosity induced me to ride to the door, accompanied by Mr. Poe, and the other gentlemen. And here we saw rare sport! "an unco sight!" Not, however, such a sight as Tam O'Shanter saw when he peeped into "Kirk-Alloway," for the dancers there were "*warlocks* and witches;" here they were Virginia slaves, dancing jigs and clapping "juber," over a barrel of persimmon beer. It occurred to me, that if Tam could have made his appearance about this time on his gray mare *Meg*, the scene would have frightened *Maggie* more than the "*bleeze*" of "Kirk-Alloway;" and Tam might have roared out, "weel done Catty Sark!" a thousand times, and the torch-lights would not have been extinguished.

The ball was opened with great ceremony by singing a song known to our Virginia slaves by the name of "who-zen-John, who-za."

"Old black bull come down de hollow,
He shake hi' tail, you hear him bellow;
When he bellow he jar de river,
He paw de yearth, he make it quiver.
Who-zen-John, who-za."

This was a sky rocket thrown out, as a prelude to the grand exhibition, and will give the reader some idea of what is to follow. Those who could not get seats in the house, took their stand outside, peeping in the door and through the logs, making remarks on the dancers; and here I will observe, that there was a complete Babel jargon, a confusion of tongues!

"Down the road, come show me de motion." "Set to your partner, Dolly."—"Cut him out, Gabe."—"Sal. *does* put her foot good."—"Yonder come de coal-black horse."—"The yellow roan's up! hear how he lumbers! he's a *reel* stormer, ring-clipper, snow-belcher and *drag out*."—"Congo is a *scrouger*; he's up a gum, and no bug-eater I tell you; he carries a broad row, weeds out every thing—hoes de corn, and digs de taters."—"Molly look like kildee; she move like handsaw—see how she shake herself!"—"Hello! in there, I wish you all sen' us out some simmon beer." "Lor! see how Aggy shake her foot! she *ken* pull the whip-saw down."—"Nick? come here and see Ben cross hi' bow-legs! look at hi' mouf! when he grin, hi' mouf' and teeth like hen-ness full o' eggs."—"Nick? I reckon if Tamar's cat stay in there much longer, they will mash her guts out; her skin '*ont* hold peas."—"Come here, Gabe; come, if you please; Jackson's Dick is dancing with Ellington's Nance! see how she quivers! *Now*, Nance!—*Try*, Nance!—She *does* but look pretty.—When she sets and turns, she is like a *picter* —and she is fine form, back. Dick shan't have Nance; I'll kick him high as the meat house first." [Sings.] "She *bin* to the north, she *bin* to the south, she *bin* to the east, she *bin* to the west, she *bin* so far *beyond* the sun, and she is the *gal* for me."—"Dick hadn't no business dancing with Nance; he ain't a man of *gumption*. I tried him, and he can't be made to understand the *duramatical* part of the function, the function of the fundamental, and the *imperality* of ditrimental things. Gabe? Dick's a fool, and you may tell him Sambo says so: he is knock-knee'd, and ugly enough to eat *Gumbo*." "Well, I know that; sing on Sambo."

"I went from the great-house, down to the kitchen,
To get a knot of light-wood to see to go fishing,
To treat granny Di: a;

I went to the stable, I cotch master gray horse,
I clap the saddle *pon* him and he trot like *do'nk* care.
He *do'nk* care, he *do'nk* care.

Having become tired of this out of door conversation, we concluded to view the group in the house. Here the banjor-man, was seated on the beer barrel, in an old chair. A long white cow-tail, queued with red ribbon, ornamented his head, and hung gracefully down his back; over this he wore a three-cocked hat, decorated with peacock feathers, a rose cockade, a bunch of ripe persimmons, and to cap the climax, three pods of red pepper as a top-knot. *Tumming* his banjor, grinning with ludicrous gesticulations and playing off his wild notes to the company. Before him stood two athletic blacks, with open mouth and pearl white teeth, clapping *Juber* to the notes of the banjor; the fourth black man held in his right hand a jug gourd of persimmon beer, and in his left, a dipper or water-gourd, to serve the company; while two black women were employed in filling the fire-place, six feet square, with larded persimmon dough. The rest of the company, male and female, were dancers, except a little squat wench, who held the torch light. I had never seen Juber clapped to the banjor before, and you may suppose I looked upon such a novel scene, with some degree of surprise. Indeed I contemplated the dancing group, with sensations of wonder and astonishment! The clappers rested the right foot on the heel, and its clap on the floor was in perfect unison with the notes of the banjor, and palms of the hands on the corresponding extremities; while the dancers were all jigging it away in the merriest possible gaiety of heart, having the most ludricuous twists, wry jerks, and flexile contortions of the body and limbs, that human imagination can divine.

"The whole world is a ball we find,
The water dances to the wind;
The sea itself, at night and noon,
Rises and dances to the moon.

The earth and planets round the sun,
Still dance; nor will their dance be done,
Till nature in one blast is blended:
Then may we say the ball is ended."

The rude ballad set to Juber, corresponds admirably with the music and actors in this wild fantastic dance. While the clappers were laboring in the performance of their office, they responded at the same to the notes of the banjor.

"Juber up and Juber down,
Juber all around de town,
Juber dis, and Juber dat,
And Juber roun' the simmon vat.
Hoe corn, hill tobacco,
Get over double trouble, Juber boys, Juber.

Uncle Phil, he went to mill,
He suck de sow, he starve de pig,
Eat the *simmon*, gi' me de seed,
I told him, I was not in need.
Hoe corn! hill tobacco!
Get over double trouble, Juber boys, Juber.

Aunt Kate? look on the high shelf,
Take down the husky dumplin,
I'll eat it wi' my *simmon* cake,
To cure the rotten belly-ach.
Hoe corn! hill tobacco!
Get over double trouble, Juber boy Juber.

Raccoon went to *simmon* town,
To choose the rotten from de soun,
Dare he *sot* upon a sill,
Eating of a whip-poor-will.
Hoe corn! hill tobacco!
Get over double trouble, Juber boys Juber."

When supper was announced, the banjor-man, was first served; then the clappers and beer bearer, and lastly, the beaux and their partners. Each had a huge loaf of larded persimmon bread with a gourd of beer.

Thus ended the beer dance, and as I left the house, I thought to myself, that Virginia slaves, were the happiest of the human race—and I still think so.

"The learn'd is happy, nature to explore,
The fool is happy that he knows no more."

Solomon the wisest man, says—"in much wisdom, there is much grief: and he that increaseth knowledge, increaseth sorrow."

The beer dance, I have attempted to describe, is a faint representation of what actually occurred. It requires an abler pen to it justice; I feel mortified that I cannot give a more vivid and glowing description of these black beaux, who acted so conspicuous a part with their partners in the persimmon junket. The broad grin, the smile of the little squat wench, seen through her torch-light, the humid lip, the twist of the tongue, the white teeth, the oblique look, the glance of the eye, the toss of the head, the quaint bow, the curved shin, the bandy leg, the nimble jig, the affected air of the wenches, the profuse perspiration, the cloud of dust, the lurid room, the phiz of the banjor man, the banjor's *tum, tum, tum*, and Juber's song and clap, would call forth the combined talents and lively imagination of a Wirt, an Irving, a Burns, an Addison, and Dryden. And if a northern abolitionist, with his pocket filled with inflammatory documents and resolutions, could have witnessed such a scene in Virginia, he would, in my opinion, have consigned them to the flames; his great love for the blacks, to the contrary notwithstanding.

In conclusion, I offer no apology for introducing in your columns, and bringing before your intelligent readers, such a novel, rude production, as the *beer dance*. We are to derive from such scenes in this life, much useful instruction; the poet, divine, statesman, philosopher, and all mankind, may be benefited by looking *down* in life, in order to explore the dark corners of nature.

There is this consolation to be derived from the scene I have described; the pleasing recollection that God has placed us high in the scale of human beings; and we should all appreciate its worth.

I drink you the following sentiment, in a glass of persimmon ale: May the product of the persimmon tree, substitute foreign wines, molasses, sugar, tea, and coffee, and save the "old dominion" thousands annually.

With sentiments of regard, and esteem, I am,
Your obedient servant.
WILLIAM B. SMITH.

REMARKS ON THE PUBLICATION OF 'JOHNSTONE'S TREATISE ON DRAINING, EMBANKMENTS, &c.'

In this number is completed the general 'Treatise on Draining, Embanking, &c.' It was contrary to our intention and desire that this republication should be divided between two of our volumes. Nevertheless, the subject treated in each volume is entirely distinct and independent of the other; the one being on draining in all its branches, and the portion here presented embracing all that relates to embanking low lands straightening water-courses, and constructing dams, &c. This latter portion is valuable not only in a very important degree for agricultural improvement and profit, but even more, at least in this country, and in these times, to civil engineers, and to all other persons who, without the knowledge possessed by engineers, undertake the construction of dams, making canals, straightening of rivers, and other such works. In the *improvements* (so often miscalled,) of rivers for navigation, in this country, millions of dollars might have been saved, if merely the theoretical principles, and practice, presented in this number had been known, and properly regarded, by the constructors.

The republication of this work, in the Farmers' Register, besides causing a very heavy pecuniary cost for engravings, &c. has produced delay and disorder in the heretofore very regular times of publication, and also other important difficulties in our mechanical operations. But a small part of these disadvantages (the irregularity of publication,) has fallen upon our readers; and we hope and believe, that there is not one of them, whather he be farmer, civil engineer, mill-owner or mill-constructor, or merely a general reader, who will not find ten-fold remuneration in the information and instruction afforded by some portion of the contents of this treatise, which is now, for the first time, offered to the view of American readers.

The English copy of this work, which this first American edition gives in full, cost $6 in purchase money, as imported by our special order; and which is lower than it could be sold for, even if there were any other English copies in America, which is believed not to be the case. The subscribers to the Farmers' Register get this reprint, which gives every word, and every illustration, of the original work, (though, of course, in inferior style,) for 57 cents; that being the proportion of $5, equal to that which this treatise occupies of the bulk of one volume of the Farmers' Register.

For the Farmer's Register.

COMMERCIAL REPORT.

There is less demand for every description of imported goods this spring, than there has been in any previous one for many years. Small as the importations were, they are sacrificed at less than cost in the northern markets. Merchants from the south and west cannot make collections, and consequently have no means of purchasing. But even if collections could be made, the difference of exchange is so great, even where northern funds can be procured, as to deter men of business from carrying on their accustomed transactions.

In Virginia, 5 to 6 per cent. premium is paid on New York; and in New York, western paper is 20 to 30 per cent. below par. Sterling bills on New York are at 4 to 5½ per cent. premium; or, taking specie as the standard, 4 to 5 per cent. below par. Such a state of exchanges never before existed.

The south-western banks have become the principal purchasers or shippers of cotton, so that the merchants are almost completely thrown out of the business. The price of cotton is higher in the towns on the Mississippi and Alabama, than in New York. In the latter it is 7 to 10 cents; in the former, 8 to 11. The rate of freights is higher than at any time since the termination of the last war.

In our own markets, cotton is in fair demand at 8½ to 9½ cents. Not a vessel for Europe was in port during the month of March.

Tobacco is in demand at prices nearly or quite double those of last year, for the lower qualities, and 50 per cent. higher for the better sorts. The range of quotations is $3.50 to $12. This advance is owing to the diminished stocks in every market; the crops of Virginia having been small for the last two years.

Flour commands $7.25. Indian corn 70 cents. Of wheat, there is none brought to market.

The New York and Boston banks propose to resume specie payments next month. A convention of the banks generally, is to be held in New

York a few days hence, when the time for general resumption will be proposed; but that it will be at an early date is not expected. X.

April 7.

From Loudon's (London) Gardener's Magazine.

JOYCE'S NEW MODE OF HEATING.

Mr. Joyce, a commercial gardener at Camberwell, has recently made one of the most extraordinary inventions for producing heat, which have ever been given to the public. We question if any thing so remarkable has occurred, in a practical point of view, since the *invention* of gunpowder. Whether Mr. Joyce's stove will be so economical as to be adapted for general use, is a question that can only be satisfactorily determined by experience; but in the mean time it promises to be so; and, while it may be employed to heat churches, and all kinds of public and private buildings, ships, and the inside of carriages, Mr. Joyce thinks that the poorest cottager will find more comfort and economy in its use than in the common open fire-place. The invention not being, at the time we write, fully secured by patent, the details cannot be here given; but the result is, that heat is produced by an apparatus of very limited magnitude, and that it may be raised to any temperature that can be required, short of red heat, by combustion without the production of smoke. To most of our readers this will seem impossible; but the fact was placed beyond a doubt yesterday (Dec. 5), when one of Mr. Joyce's stoves, in action, was exhibited at a meeting of the Horticultural Society, in Regent Street, and examined by a great number of persons. The form of the stove in which the heat is generated, is that of an upright cylinder, from the conical apex of which a heated current of air escapes, and which current can be regulated at pleasure, or altogether stopped: but the chief source of heat is the radiation from the sides. Of course, the heat so generated may either be allowed to escape directly into the surrounding atmosphere, or be conveyed away in air-tubes, or by means of hot-water pipes, to a distance, or to any other apartment. If this invention answer the expectations which have been formed of it, it will effect a complete revolution in the mode of heating dwelling-houses throughout the world; because it is the only mode hitherto discovered by which heat can be produced by combustion, without any heat being lost. At present, whether a room is heated by an open fire-place, a close stove, steam pipes, or hot-water pipes, or by the introduction of a current of heated air from a cockle-stove, still a large proportion of heat necessarily escapes along with the smoke produced by the consumption of the fuel; but here not one particle of heat escapes, and the only care requisite in regard to the air of a room will be, to have a quantity of fresh air admitted proportionate to what is deteriorated by the combustion of the material employed in this new mode of heating, and by the persons breathing in the room. One advantage attending this invention is, that it is perfectly free from dust, and that the stove, when once charged and lighted, requires no attention whatever for from 20 to 30 hours, according to the charge. The convenience of such a mode of applying heat to rooms, without fire-places, closets of every description, whether of books, curiosities, or plants, &c., and, in short, to all enclosed places without chimneys, must be obvious. It is also adapted beyond all other inventions, for heating, with security from fire, ships, and for warming the inside of close carriages; and it might be taken under water in a diving bell, or into the atmosphere in a balloon. It is also admirably adapted for the purposes of French cookery. We shall not, however, enlarge farther on this invention, till we can explain to our readers what it is; and this Mr. Joyce has kindly promised to enable us to do at the very earliest moment after his patent is sealed. It is no small honor to the profession of gardener, that an invention of so much importance has been made by one of their number.—*Conductor.*

From the same.

Joyce's new stove and economical fuel.—Since we noticed this stove in our former number, p. 57, Mr. Joyce has taken out a patent, and has formed a partnership with Mr. Harper, of Cornhill. The stove has been exhibiting to the private friends of Messrs. Harper and Joyce, and to some literary and scientific men, three times a week; and it has been noticed in the 'Mechanic's Magazine' and the 'Literary Gazette,' for January 13, the only public journals, as far as we have observed, that have noticed it at all, except this Magazine. The following are extracts from the notices referred to:

Joyce's new stove "is in the form of a tall urn, having a pipe running entirely through the centre, with a cap or valve at the top, to regulate the draft. The urn is of thin bronze, and about two feet high, and eight inches in diameter. By the combustion of the fuel inside, the metal continues at a dull red heat, and so gives off the caloric to the surrounding air. The fuel is stated to be a vegetable substance; and one charge, in a stove of the above described dimensions, will burn for thirty hours, and will cost 6*d*. No smoke or effluvia are produced.—*Mechanic's Magazine*, January 13, 1838.

"*New mode of heating rooms.*—The puzzle which has been shown at the Jerusalem Coffee House, has set the wits of conjecturers at work upon the nature of the particular fuel, which, at so cheap a cost as a farthing an hour, is to warm a room. Of these conjectures we have heard two. The first is, that the gardener who discoved the fuel, which enabled him to keep up the fire whilst he slept, must have used old tanner's bark, as it was the only fuel accessible in a hot-house. The other is, that charcoal is the base, and lime employed to absorb the carbonic acid gas. Gipsies are in the habit of using the ashes of their fires, raked together in a heap, and sprinkled with lime. This will burn throughout the night, and no deteriorating gas is evolved to distress the sleepers in the gipsy tent."—*Literary Gazette*, January 13, 1838.

Mr. Joyce's patent is dated December 16, 1837; and the time for giving in the specification to the patent office, is limited to six months from that date. It will not be before our July number, therefore, that we can make our readers acquainted with the secret of the kind of fuel and the mode of burning; but, in the mean time, we may state that the conjecture as to the fuel consisting of charcoal and lime, which was made by Mr. Sylvester, the engineer, in the Horticultural Society's meeting-room, when the stove was first exhibited there, is by far the most plausible.

NEW CONDITIONS OF THE FARMERS' REGISTER.

The price reduced for the current and back volumes, and a further reduction proposed for the next.

I. The Farmers' Register is published in monthly numbers, of 64 large octavo pages each, and neatly covered, at $5 a year—payable in advance. Or three NEW subscribers, by sending their names and $10 at one time to the editor, free of postage, and of every other deduction from the amount, shall receive their copies *for one year*, for that sum, or at $3.34 for each. Purchasers of any three volumes (except Vol. I.) at one time, in like manner, shall have them for $10. [This reduction of price will be made on all suitable orders dated after April 20th.]

II. The risk of loss of payments for subscriptions, which have been properly committed to the mail, or to the hands of a postmaster, is assumed by the editor. ALL MAIL PAYMENTS MUST BE MADE IN NOTES, OR CHECKS, OF PAR VALUE IN VIRGINIA; and these, and all other letters, (except such as contain articles for publication,) must be POST PAID.

III. For all copies not received by mail, at the proper post offices, duplicates will be furnished to those subscribers who have complied with their own obligations; provided that the failure shall be notified through the postmaster, and within two months after the date of the miscarried copy.

IV. If a subscription is not directed to be discontinued before the first number of the next volume has been published, it will be taken as a continuance for another year. Subscriptions must commence with the beginning of some one volume, and will not be taken for less than a year's publication.

V. The mutual obligations of the publisher and subscriber, for the year, are fully incurred as soon as the first number of the volume is issued; and after that time, no discontinuance of a subscription will be permitted. Nor will a subscription be discontinued for any earlier notice, while any thing thereon remains due, unless at the option of the editor—(or in obedience to the regulations of the Editorial Convention, copied below.)

VI. Any five *old* subscribers, by paying for any current volume $20 *directly to the editor, at any one time before the issue of its second number, and without causing any charge for postage or agency*, shall be credited for their five copies for the year so paid for—thus reducing the price to $4 for each. This privilege, of course, ceases, for each volume, as soon as its 2nd number is issued—and no subscriber can use it, *who is indebted for a previous year*, unless his arrears are paid at the same time.

New Condition, offered for the 7th volume only.

Each subscriber to the Farmers' Register, for the present (6th) volume, (or any person who may hereafter subscribe for it,) who has paid for the same when the proposed arrangement shall take place, may, *by sending the names of three new subscribers*, for volume 7, at any one time previous to January 1, 1839, accompanied by a POST-PAID *current bank note, or check for ten dollars*, shall have credit for his own payment for volume 7, in addition to that for the three new subscribers; the *four copies, of that volume only*, being thus supplied for ten dollars.*

General Regulations adopted by the Editorial Convention.

The following resolutions of the Editorial Convention of Virginia, will hereafter form part of the conditions of the Farmers' Register, and will be strictly observed.

1. "All subscriptions shall hereafter be considered as incurred and due in advance, and for a year's publication, unless specially ordered for a shorter time, and paid for in advance for that shorter time, when so ordered.

2. "No publication shall be sent to the order of any new and unknown subscriber, unless paid for in advance, or satisfactory reference be made to some known and accessible person in regard to the subscriber or his payment. But, in case of an order for a publication, without payment, from a new subscriber who is unacquainted with the conditions, a single number may be sent, containing, or accompanied by, a copy of this regulation.

3. "The names of all subscribers, whose ability to pay may be unknown to the publisher, and who may remain indebted on open account at the end of two years, from the time when the advanced payment was due, shall be erased from the list of subscribers." [*Resolutions of the Editorial Convention of Va.*

Address— EDMUND RUFFIN,

April 12th, 1838. *Editor of Farmers' Register, Petersburg, Va.*

* For reasons which will be hereafter stated, it is designed to conclude the present volume on December 31, 1838—by issuing two numbers in advance of the regular times of publication. Therefore, the next and succeeding volumes will begin with the year. This change of time will be convenient in many respects, and is especially required for an agricultural journal.

TO THE FRIENDS AND SUPPORTERS OF THE FARMERS' REGISTER.

The attention of every subscriber and friend to the Farmers' Register, is requested to the new alterations, and temporary additional article, in the general conditions of publication; and as many as can, with convenience, avail of the advantages offered by the latter, are requested to do so, not only for the benefit of the individuals concerned, but for the purpose of extending the circulation and the influence of the work, and thereby greatly increasing its useful operation. It is believed that almost every subscriber now on the list, might, with the inducements thus offered, obtain at least three new subscribers among his neighbors; and those who deem and declare the present and previous operation of the Farmer's Register to be highly beneficial to the improvement of agriculture, have still stronger motives to urge to the effort; and they can well estimate the increased benefit to the public, thus to be obtained by a quadrupled publication and distribution of the work. We should rejoice at reaching such a general result, even though the nett profits were not to be increased in the least thereby.

The expenses of printing, however, decrease still more rapidly than the amount of sales of a publication increases by a greater demand; and therefore, we shall not lose any thing by any extent of the use of the privilege now offered. And if this abatement of price should finally serve to give a list of subscribers increased four-fold, then that which is now offered as an experiment of a temporary measure, of special and limited application, may safely be made permanent and general, by reducing the price of the Farmers' Register to a lower rate than any publication, of worth or character, has ever yet been offered in the southern states.

If by the legislative action of any state, or of any public spirited association of individuals, a sufficiently large sale of this work was guarantied to the publisher, the price might be reduced, for that state, to but a little more than double that of as much blank paper; and when the sales were once made equal to so large a supply, of this or any really useful agricultural journal, the demand would doubtless continue, at so low a price; and the sustaining aid of public patronage, as security against loss, would no longer be required. It is doubtful whether any other mode of extending the knowledge, and the improvement, of agriculture, would be so effectual and so cheap. But this, or any other legislative aid to agricultural instruction and improvement, is out of the question, at least in Virginia; and therefore the experiment now proposed, appeals to individual interests, and has regard to the action and patriotism of individuals only.

It is indispensable for those who mean to benefit the publication and themselves, as well as the agricultural interest in general, by making use of this offered privilege, that they should do so before the close of volume 6; as the increase of number of the copies of volume 7 must be then determined on, and cannot afterwards be altered. It is to allow full time for the usual slow movements of subscribers that this early notification is made.

Should this offer prove acceptable to a large number of our present subscribers, it will have other very beneficial results, in causing payments to be made prompt and certain, and relieving the publication of the present heavy expenses of commissions paid to collectors, postage on remittances, and most of the many and total losses of debts for subscriptions. These several items, in distant places, and where the subscribers are few and widely dispersed, consume nearly the whole profit of those subscribers, similarly located, who are both punctual and generous patrons.

It is hoped that no person who may choose to avail himself of the proposed reduction of price, will forget that the very foundation on which it rests, and by which alone it can be afforded, is that, in relation to all such subscriptions, the publication is to be entirely relieved of all expenses and losses of postage, exchange of uncurrent money, and every other charge, save the furnishing the work according to the 'General Conditions' of the publication. According to those conditions, the loss of money remitted by mail, in these as in other cases, is still at the risk of the publisher, and all numbers of the work, lost by mail, are to be re-supplied—both losses being duly authenticated, as required in the general conditions annexed.

Any subscriber who may have paid in advance for volume 7, may still have the benefit offered above, of four subscriptions for $10, except that his second payment, so included, will be placed to his credit either for another copy of volume 7, for some other named new subscriber, or for any other back volume (except vol. 1,) for himself, as he may choose and direct, at the time of sending the order.

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THE FARMERS' REGISTER.

Vol. VI. MAY 1, 1838. No. 2.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

NEW DISCOVERY IN MAKING MANURE.

To the Editor of Bell's (London) Weekly Messenger.

Corner of Half-Moon Street, Picadilly, London, December 30, 1837.

Sir—I beg to hand you a copy of a prospectus relative to a new manure, which I drew up in the course of last spring, by the request of the Earls of Leven and Melville, from the Report of the Committee of the Academy of Agriculture at Paris, and from the certificates given to the inventor by thirty-eight large landed proprietors in France, testifying the value of his invention.

Lord Leven considered, and in which opinion I had the honor to concur, that the best mode of giving the benefit of the discovery to the British farmer would be, for a committee to be formed for the purpose of collecting a subscription sufficient to defray M. Jauffret's expenses to this country, for the purpose of his making experiments before some person appointed for the occasion.

That an agreement should be entered into with M. Jauffret, that should his invention answer the description given of it, that he should communicate the secret by which he effected the operation, for a sum of money previously agreed upon, and that experiments should be made with the manure under different circumstances, as to soil, &c. to ascertain its relative value with regard to other manures, taking all things into consideration. I have the honor to be, sir, your very obedient servant,

HUMPHREY GIBBS,
Honorary Secretary of the Smithfield Club.

Prospectus of a process for obtaining cheap and valuable Manure, without the aid of Cattle, invented by M. Jauffret, of Aix.

A method has been discovered in France, of making manure as it may be wanted, without cattle, in twelve days, and with great economy, as appears from a report made to the committee of the Academy of Agriculture at Paris, by M. Chatelain, its secretary, who, with M. Cailleau, president of that committee, M. de la Gerandiere, president of the Academy of Agriculture of Blois, and the Marquis de Saint Croix, were appointed to examine into the merits of M. Jauffret's invention.

These gentlemen report "that by a cheap wash or lye, the ingredients of which are to be found in all places, and which every cultivator can make on his own land, all sorts of herbaceous and ligneous substances, such as heather, furze, brambles, and even the living dogstooth, can be put into a state of rapid fermentation, and not only these substances, but even earth itself, be its nature what it may, can be converted into a valuable manure.

"That the manure produced by this new system, is quite as valuable as the best horse-litter; its effects are visible upon several successive crops, and it can be obtained with perfect facility, at pleasure.

"That M. Jauffret supplied the committee with numerous and undeniable proofs of experiments, ranging over a period of nine years, in five communes of the department of the Bouches-du-Rhone, in which trials were made upon an extensive scale, on different kinds of soils, and on various seeds, plants, and trees. The success of those trials surpassed the most sanguine expectations, as has been attested, 1st, by the Academy of Aix, (annual public session 1835, at 38 and following pages of the 'Report'); 2d, by the circular of the prefect of the Bouches-du-Rhone; 3d, by 38 certificates* from most respectable inhabitants and farmers of that department, founded upon repeated experiments made by themselves; and 4th, by the declaration of well-informed proprietors of the department of Vaucluse, who for years have attentively watched the trials of the Jauffret manure.

"That in order to convince themselves more thoroughly on the subject, the committee wrote, unknown to M. Jauffret, to some individuals who were most distinguished by their agricultural science, and who had given certificates to the inventor, and that their replies, which are annexed to the report, are of so satisfactory a nature, as to leave no doubt on the minds of the committee of the importance of the discovery.†

* A printed copy of these certificates may be seen at Messrs. Thomas Gibbs & Co., seedsmen and nurserymen to the Hon. Board of Agriculture of England, and to the Board of Agriculture of Sweden, corner of Half-Moon street, Picadilly, London.

† Mons. Gauthier de Vancluse, who is about to publish a new Atlas of Agriculture, says, (in print at Marseilles, 1832) "M. Jauffret, an intelligent farmer and acquaintance of mine, possesses exclusively the valuable power of converting, in less than a week, all vegetable substances, whether dry or not, into dung of good quality, without spreading them as litter, or even submitting them to the tread of cattle. The change is effected, as if by enchantment, by means of a lye, with which he sprinkles the straw, herbs, leaves, plants of all kinds, even woody stalks of a finger's thickness, previously dividing them to a certain extent by a very ingenious operation. Such is the action of the lye, that forty-eight hours after the matters are heaped, their fermentation becomes, as it were volcanic; volumes of smoke announce the decomposition at a considerable distance; and a poor and spent soil may, without delay, receive, in the form of an excellent manure, that which a week before could have done nothing towards rescuing it from a state of exhaustion."

Like all other interesting discoveries, this has been the subject of fierce attack; but experience has vindicated the inventor. Following the example of many landed proprietors, I determined upon making trial of this important manure, and I declare it equal to that of well-fed horses. M. Jauffret asserts that he can at pleasure increase the dose, and even confer all properties required by the nature of the soil on which he uses it.

One single horse-cart load of straw, or other dry material, produces more than two of good dung. The inventor charges 5 francs (2s. 6d.) for each cart load; probably, to those who should effect the operation themselves, the expense would be diminished by one-half.

The advantages of such a process are incalculable.

"The committee enter into the following details of the process:

"By means of a cutting machine, the cost of which is about 600 francs (£15), and which, after a careful examination, appeared well adapted for the purpose, three men and a horse can prepare 180 quintals, or 7,200 kilograms (about seven tons English) of manure per day, and the machine is easily erected. Ten quintals of straw produced 40 quintals of manure; this is effected either by the addition of the lye, or by the fermentation dilating the material operated on.

"The Jauffret process admits of greater economy as to labor; for the wooden cistern, and the ingredients of which the lye is made, may be carried to the field which is to be manured, and the compost prepared on the spot; and thus the carriage of the vegetable matter from the field to the yard, and back again from the yard to the field, is saved; the escape also of carbonic acid gas, one of the most valuable component parts of manure, which takes place during removal, is thus prevented. The inventor asserts, moreover, that he can vary the degree of fermentation, to suit the defects or qualities of different soils; and as he can raise the heat caused by the fermentation as high as 60 Reaumer (167 deg. Farenheit) his process has the additional advantage of destroying the germ of all noxious herbs, which might foul the land.

"That in considering this process, the committee were struck with the advantage that might arise from establishing manufactories, not only on large farms, but near towns and villages, to which every cultivator might bring his refuse vegetable matter to be converted into manure. The cutting machine might be worked either by horse, water, or steam power.

"The Jauffret process will be advantageous not only to large proprietors, (by whom an expense of 600 francs (£15) will scarcely be felt,) but it will be more important and useful to small farmers, who can cut their weeds by hand, and prepare a quantity as perfect as any made by the machine.* As to the conversion of earth into manure, any one can make it without the help of the machine invented by M. Jauffret, and the manure made from earth by this new process, is not less valuable than the compost. Thus, those who have no cattle to feed may employ all their fodder for manure; others can render available weeds, briers, dogstooth, thistles, &c.; and those who have neither straw, fodder, nor weeds, can convert earth into manure; so that no discovery was ever more capable of easy or general application. The Jauffret process tends to supply agriculturists with new and powerful means of increasing their wealth, especially in the case of poor-land farmers, who usually find it difficult to obtain a sufficiency of manure."

* Mons. Jauffret states, the machine necessary for a small farmer is only a barrel and a pail, and which can be carried with ease from one part of the farm to the other. It is set to work in the open air, wherever materials happen to be; thus the fields that are so distant as to be seldom manured, may by this manure be rendered highly productive. The mixture is made without fire, and every thing concurs to render it economical.

From the British Farmer's Magazine.

MODE AND EFFECT OF EMPLOYING BONE MANURE.

By C. W. Johnson. Esq.

I proceed to notice the effects and modes of applying bones as a fertilizer, either whole, broken, or in the state of powder.

The Doncaster Agricultural Association long since paid considerable attention to the use of bones as a manure, and they have made a very valuable report, to which I have before alluded, of the result of their enquiries, in which they say :—

"The returns received by the association, satisfactorily establish the great value of bones as a manure; our correspondents, with only two exceptions, all concur in stating them to be a highly valuable manure, and on light soils, superior to farm-yard dung, and other manures.

"In copying the language of one of them, in reference to dry sandy soils, we express the opinions repeated in a far greater number.

"I consider bone tillage one of the most useful manures, which has ever been discovered for the farmer's benefit. The lightness of carriage—its suitableness for the drill, and its general fertilizing properties, render it peculialy valuable in those parts where distance from towns renders it impossible to procure manures of a heavier and more bulky description." For, as stated by another farmer, "the carting of six, eight, or ten loads per acre, is no trifling expense. The use of bones diminishes labor at a season of the year when time is of the first importance; for one wagon load, or one hundred and twenty bushels of small drill bone dust, is equal to forty or fifty loads of fold manure. Upon very thin sandy land, its value is not to be estimated; it not only is found to benefit the particular crop to which it is applied, but extends through the whole course of crops."

The report adds, that bones have been found highly beneficial on the limestone soils near Doncaster; on peaty soils, and on light loams; but on heavy soils, and on clay, they produce no benefit.

The mode of applying them is, either sowing by broad-cast, or by the drill, either by themselves, or previously mixed with earth and fermented. Bones which have been thus fermented, are decidedly superior to those which have not done so.

The quantity applied per acre is about twenty-five bushels of bone dust, and forty bushels of large broken bones. The dust is best for immediate profit; the broken half-inch bones for more continued improvement. Mr. Birk, says, "if I were to till for early profit, I would use bones powdered as small as saw-dust. If I wished to keep my land in good heart, I would use principally half-inch bones; and in breaking these I should prefer some remaining considerably larger."

The reason for this is very obvious; the larger the pieces of bone, the more gradually will a given bulk dissolve in the soil.

Such is the result of the application of bones in Yorkshire. In Middlesex, the practice is scarcely different, as will be seen by the answers to some questions I received from a very intelligent correspondent, Mr. John Rayner, of Uxbridge, in November, 1833.

I. On what description of soil is bone-dust employed with the greatest advantage? On light dry soils.

II. The quantity per acre? From twenty to twenty-five bushels.

III. How long has its effects been observed to last? This question requires a more lengthened reply. The good effects of bones as a manure, have been acknowledged by many agriculturists for a number of years: but as farmers, generally speaking, are men who are not fond of trouble, and as there was great difficulty in breaking bones in sufficiently small pieces, to prevent dogs, &c. from running away with them, we can only in a few instance trace out their good effect. There is a farmer in the neighborhood of Watford, who dressed his land with *whole bones*, some twenty years since, (at a period when you could obtain them from London for fetching) and he declares that to this day, to use his own expression, "the land has never forgotten them." Although the first season or so he found but little benefit; this I attribute to the bones being so large, the ground could not so soon act upon them. The *bone dust* is supposed to last but one season; the larger sizes of half-inch and inch, are supposed two or three years, and are always seen to most advantage after the first season.

IV. What is the expense? The dust is 2*s*. 3*d*. per bushel—the half-inch 2*s*.—the inch 1*s*. 9*d*.

V. What is the season, and on what crops is it generally applied? The turnip season. Bone manure shows itself to more advantage on this crop than on any other. It is drilled with a drill made on purpose, with the turnip seed: the period is from May to July. Bone dust is also used with great advantage on grass lands sown broad-cast.

In the valuable and long-continued experiments of Mr. Robert Turner, of Tring, in Hertfordshire, the use of bone manure has been most decidedly successful.

The soil on which these experiments were made, hitherto a common, producing only furze, is sandy, with a substratum of clay, and then chalk. He began the use of bone manure in 1831, *on this land*, and has continued its employment for the last four years on a very bold scale, and with unvaried success. The quantity generally applied was from twenty-four to thirty bushels per acre, of the description of half-inch and dust, and the bones were invariably applied to the turnip crop.

The bones are drilled with the seed at the distance of eighteen inches, and the turnips are always horse-hoed.

The year 1831 was a very good season for this crop generally. The turnips manured with bone dust, like most others in the district, were very luxuriant. About 2,000 bushels of bone manure being this year employed by Mr. Turner.

In 1832, the turnips were in general a very bad plant, the fly committing general devastation. Many cultivators in the neighborhood of Tring, unsuccessfully sowed four or five times.

On the turnip land of Mr. Turner, seventy-four acres were manured with bones. The effect, with the exception of the very last sown four acres, was again most excellent; the crop being very heavy, and that two on land now first cultivated: and there was in no case any necessity to repeat the sowing. The turnips were a much better crop than in 1831.

In 1833, the turnip crops in the neighborhood of Tring, were a very partial crop.

On the farm of Mr. Turner, about fifty acres were manured with bones. The effect, with the exception of some of the last sown turnips, was very satisfactory; the crop very heavy.

These experiments the cultivator will deem of the very first importance; the soil was not manured with any other fertilizer, except bones; and in drilling every now and then, for the drill's breadth, the bones were omitted.

On these breadths of land not boned, the failure of the turnips was general and complete; they vegetated it is true, and came up; but they were wretchedly small, and of no use whatever.

The turnips being fed off, and the sheep folded on the soil, without any distinction being made between boned and unboned land, the comparative experiments upon the succeeding crop were rendered uncertain.

In 1834, Mr. Turner boned about eighty acres of turnips with the best success, and with the exception of some destroyed by the wire worm, had a very excellent crop.

In 1835, on nearly an equal extent of land, notwithstanding the extreme dryness of the season, Mr. Turner had again on his turnips manured with bones, a very excellent plant, and never did this crop promise better than this season, on the lands of Tring.

The caterpillars which devastated the chalk districts of England, did not, however, omit this parish; their ravages were dreadful and complete.

And had not Mr. Turner made a most successful attack upon them by a detachment of six hundred and fifty ducks, procured especially for this purpose, who devoured the black caterpillars with great voracity, his turnip crop would have been utterly destroyed. By their industry, however, twenty-five acres of turnips were cleared of the vermin, and saved from destruction.

At another farm held by the same gentleman, at Ellesborough, by the assistance of the same ducks, who were transported there in carts for that express purpose, saved about eight or nine acres of turnips from the caterpillars; so that there is no doubt of the importance of the services rendered by these birds. He informs me that he found it necessary to give them a quantity of corn while they were thus employed in cleaning the turnips.

The soil of the Ellesborough farm, on which the bones were tried for the first time in 1835, with complete success, is called white land, and was in a very poor state of cultivation. The experiment was entirely successful, and the turnips promised to be very good indeed: those that were saved from the caterpillars, being for the season very excellent.

This soil, called white by the farmars, is probably a mixture of clay and sand; it becomes very dry and loose in dry weather, but is described as "sticky" in wet periods.

Mr. Turner possesses a capital bone mill, worked by four horses, in which he crushes all the bones employed in his farm. He pays for the coarse 2*l*. 15*s*. per ton, and fetches them fifteen miles; a ton of bones producing of half-inch and dust about thirty to thirty-four bushels of bone manure.

The cost of the mill, with the substantial shed which covers the machinery, horse-path, &c. was about £300, and it has been rendered available by Mr. Turner for several other purposes, such as chaff-cutting, thrashing, &c., by which the aggregate expense is materially lessened, and a very considerable annual saving effected.

For the last two years Mr. Turner has drilled with his crushed bones, an equal quantity per acre, of sheep-dung, collected for the express purpose, at an expense of $2\frac{1}{2}d.$ per bushel, paid to the collectors; this he prepares in the winter, by laying the bone dust in alternate layers with the sheep dung, and suffering them to remain fermenting some months until the turnip sowing. By this plan, by the fermentation of the mass, the two manures are thoroughly incorporated, and he considers that thirty-five bushels of the mxture, are fully equal in effect to twenty-five bushels of the bones. So that, allowing 3*s.* 6*d.* per acre for the expense of collecting the sheep dung, there will be a clear saving of 12*s.* 6*d.* per acre in bones, valuing these at 2*s.* per bushel.

The mixed bones and sheep dung is invariably drilled in with the turnip seed.

The practical farmer will hardly need any better testimony of the important value of crushed bones, than these extensive and long continued experiments of Mr. Turner.

They are not open to the common objection to experimental attempts, that they are carried on in far too limited a manner, and for much too short a period, to enable the cultivator to form from them a satisfactory conclusion; for he has annually manured with them scores of acres of turnip land, and that too in seasons which have afforded him, from the adverse price of agricultural produce; but little encouragement to lay out money on any fertilizer of a doubtful value.

I earnestly, therefore, commend these important experiments to the attention of the practical farmer, as being fraught with information of the most interesting nature, especially to those who have to contend with the poor, light, upland soils; lands which are now with difficulty retained in cultivation.

In the year 1831, on a thin chalky soil, in the neighborhood of Amesbury, in Wiltshire, Mr. Devenish employed bone manure of the quality called "fine," drilled at the rate of twenty-four bushels per acre, with the turnip seed, on a portion of a field of about ten acres.

Part of the same field was manured with spit dung, at the rate of about twenty tons per acre, and another portion of the same field remained without any manure.

The Swedish turnips produced on the boned soil, were of four times the value of those grown upon the land manured with spit manure. Those grown on the soil without any manure, were deemed scarcely worth hoeing.

Bone manure presents to the cottager or cultivator of small plots of poor ground, as under the allotment system, a ready and cheap mode of permanently improving his land.

It would be well perhaps, in some instances, if the managers under such an excellent system, were to apply the manure for the holder, and that too, if they even thought it necessary in consequence, to add to the amount of the rent.

As a manure for plantations of trees, I am not aware of any experiments with bones; I should however, strongly recommend their use for ornamental plots; but in a roughly broken state. A considerable quantity of phosphate of lime is contained in all timber trees. There is no manure of a mixed animal and vegetable nature, which remains so long in the soil as bones.

As a manure for flower roots, the turning and clippings of bones, the refuse of the Birmingham cutlers, have long been employed with the best results by my friend Maund of Bromsgrove, the talented author of 'The Botanic Garden.'

Not only does he find their use increase the luxuriance of the plant, and the beauty of its colors, but there is in the application of this powder an elegance and cleanliness which cannot fail of recommending its introduction into the flower garden, and the conservatory.

Such have been some of the successful uses to which bones have been employed. The turnip crop has been the more generally experimented upon from the general difficulty of finding for this invaluable crop a sufficient supply of manure.

And with regard to other crops, the care and labor required for trying with sufficient accuracy a *comparative* agricultural experiment, must account for many discordant statements. Upon grass land, however, it has been employed with very general success; but for the turnip, on poor light soils, it seems of the greatest and most undoubted value. It not only promotes the luxuriance of the plant; but there is a very great probability that the gaseous matters evolved by the crushed and putrifying bone, and the vigor it imparts to the crop, afford the young turnip plants very considerable protection from the ravages of the fly; at least many farmers consider this as one of its valuable properties.

The complete manner in which the roots of the young turnips envelope the pieces of crushed bone with which they are drilled, shows the attractive nature of this manure, and how nourishing it is to the turnip.

I cannot conclude these observations without professing my readiness to assist in any experiments, and answer any questions which may promote a cause now proceeding so successfully. The consumption of bones has already rendered it necessary to import them from foreign countries; and it yet remains to be proved, whether the fossil phosphate of lime will not be nearly as powerful a fertilizer as the crushed or powdered bones usually employed.

General directions.—The crushed bones have been invariably found more immediately beneficial as a fertilizer, when suffered to remain previously for some weeks, mixed with earth in heaps, exposed to the action of the atmosphere. By being thus fermented and dissolved, they are necessarily more speedily serviceable as food to the plants to which they are applied; and this observation more especially relates to the oat, barley, and other spring corn, since these do not remain on the ground for so long a period as other agricultural crops. The proportion is fifty bushels of bones, with five loads of earth or clay; or forty bushels to five loads of common dung.

For wheat and pasture lands, the previous fermentation of the bones is, for this season, not so essential to the production of immediate benefit.

It is impossible to give any general directions for the quantity of bones to be applied per acre, since soil, situation, and climate, must all be taken into the farmer's consideration.

The following facts, however, have been ascertained by numerous experiments, at some of which I have personally assisted.

I. That crushed bones remain in the soil, for a length of time proportionate to the size of the pieces; the dust producing the most immediate effect, the larger pieces continuing to show the longest advantage. On arable land their good effects continue for four years; on pasture land for eight.

II. On turnips, oats, barley, and wheat, the quantity has been from twenty-five to thirty bushels, per acre; on pasture land, from twenty-five to forty bushels of bone *dust*, early in the spring.

III. The best mode of application is by the drill, with the seed corn.

IV. The bones should, when first used, be always applied, for the sake of correct information, in varying quantities per acre; and on no account, should the farmer omit to leave, by comparison, a fair portion of the field, without any manure.

AGRICULTURE, &C. IN FRANCE.

[The following extracts are from a letter received by Dr. Joseph Johnson of this city, from our late fellow-citizen, J. H. Mey, esq., and furnished for publication in the 'Southern Agriculturist.'—*Ed. So. Agr.*]

"*Paris, (France) 15th Sept.* 1837.

My Dear Sir—The "*Academie de Sciences*" amuses me much in their sittings. A subject which may interest you I will state: Dr. Arago asserts, they have dug an Artesian well 1050 feet here without finding water; a thick clay (coat of) prevented them from perforating deeper, but he hopes to overcome the difficulty, and to come to water hot enough to heat apartments, baths, &c.; that heat increases as we descend, and at a certain depth, every thing is in fusion.

Silk worms.—This is a subject of deep concern to our country. Prince and others have propagated and recommended the "morus multicaulis" as the best subject for that purpose—do all you can to destroy this opinion. Noisette, who has studied the "morus" more than others, tells me there is none equal to the common white (morus alba) that the morus multicaulis, after four or five years, dies or vegetates badly. This is experience—profit by it.

In Paris, the culture of the mulberry is progressing rapidly. France consumes and exports 81 millions of silk. 36 to 40 thousand millions are imported from Italy, and they are pretty certain it will succeed here.

M. Beauvais, who has studied the silk worm for ten years, asserts that he is certain of his method being the best, which is to keep them at a higher temperature than 18° (Reaumur), multiply by $2\frac{1}{4}$ and add 32, to make Fahrenheit's=$72\frac{1}{2}$°. His process is reduced to this:—1st, to the employment of a pure and fresh air constantly; 2nd, to a constant dampness of 90° of Desaussure's Hygrometer; 3d, to slight repasts, as many as 48 the 1st, 36 the 2nd, 24 the 3d, and 12 repasts the rest of their education, that is 18 days, making in all 324 repasts; in this way they consume less leaves than at 18 to 20° with 180.* At the last temperature, the worms have less vitality than those kept 4 or 5° higher, they have a different sensibility from the others. B. says he has drawn the source of his information from "Du Halde," and recommends translating all Chinese works on the silkworm.

In England, I observe they have invented a machine to work by steam for making silk, whereby a girl can do as much work as two men formerly, and the space occupied by the machine not as great as before.

A medicinal spring has been discovered near Vicenza, the use of which alone dissolves the stone in the bladder. A man of 70 years old has been cured by drinking it, the stone passing off in small particles. As you keep leeches (I believe) for your information, it is found out that two or three ounces of "animal charcoal," powdered, in water, kept a dozen leaches a year. The powder must be washed two or three times in boiling water previously to being added to the water, in order to disengage it of the sulphuric acid the coal contains. By disgorging them in a little marine salt, and put again into water, in two or three days they are equal to those never used before.

M. Vilmoren has made trial of a species of wheat from New Trinity, which is said to ripen in 70 days, and to give several crops. V—thinks unfavorably of it. I will obtain some seed for our friend Benjamin, if he is in the land of the living.

The *beet root* occupies France very much. I shall myself engage in its culture. A hectare (2,632 toises square of 6 feet) yields from 2100 to 6000 lbs. more than the same lands in the West Indies, and as much as the lands in the East Indies. The cost at present is 50 francs to work it, and it may be made for 30 francs the 100 lbs. In retail, at present, we pay 20 cts. a pound for the best. The government wishes to encourage the West India sugars by laying a duty on their industry at home (taxing it two cents the pound.) I hope this will not succeed, for since the introduction of the cultivation of *beet root*, lands have risen 40, 60, 80 and 100 francs the hectare*—200,-000 men employed in its culture, &c., 18,000 hectares planted, and a capital of 100 millions of francs engaged in it!! This speaks volumes. I recollect in 1815, when Napoleon introduced its culture, a caricature was shown of the young king of Rome, with a beet root in his mouth, crying out, "*Papa dit que c'est du sucre!*" (Papa says 'tis sugar!)

It is worthy of remark, that provisions and property generally on the continent have risen 50 per cent.!! My friend Steinmetz at Mannheim, says, money cannot command more than 3 per cent., and with difficulty 4 per cent. on mortgages.

I recollect seeing at the bank a sample of "*Phormium Tenax*," manufactured. Michaux persists in saying we ought to encourage the planting of this plant. At "Pont St.' Remy" a manufactory is established. Its virtues are, the quality is better than flax, and it may be immersed in water 5 to 7 months without injury; for cables, nets, &c.; of course it is valuable. The "*Laurus Camphora*" will no doubt succeed with us.

"* This idea is no doubt good. Like children—often and little at a time is better for them than heavy meals. The same as in drinking—drink slowly and little at a time, and often, satisfies the thirst, as you know, better than swallowing tumblers-full at a draught!"

* About 2 3-6ths acres, our measure.

M. Bonnet, of "Boulogne sarmer," produced two crops of potatoes in the year; the middle of July he dug up the roots, and planted them six inches deep, trimming the tops to 8 inches. In the day they were covered, and watered in the evening. In three days they became strong and looked fresh; by hilling them afterwards, he had by the middle of October a second crop of 10 to 15 potatoes to each plant, better in quality than the first crop.

The crop of wines generally this year, will not be better than 1835, according to present appearances. The weather has set in rainy, and already speculations are made, fearing injury may be sustained by the present crop. The "Raisin," which gives the Champagne brandy, looks well, and indicates an excellent one, and the quality also excellent.

The nut grass is a *pest* with you. May it not contain a tanning principle? It is astringent; draw the attention of some able chemist to the subject.

From the British Farmers' Magazine.

HOLKHAM ANNUAL CATTLE SALE.

Exhibitions of fat stock, be they of bullocks, sheep or swine, merely considered as so many vehicles for the manufacture of suet, tallow, or bacon, have never been greatly to our taste; and for choice, we would at any time prefer a vein of one inch of fat upon the ribs, to more. We shall doubtless be regarded as mere Goths for holding these our heretical opinions; but "such is our fate," and we must even put up with the obloquy attached to our unpopular notions of meat, meet for home consumption, rather than bolt the *bons bouches* of our worthy friends, the patrons of the new Leicester pigs, that have made beasts of themselves, or any other *precieuses morceaux* of the oleaginous, porpoise-like breeds of our acquaintance. So far do we carry this our feeling, that, fond as we are of music, we never could wholly divest ourselves of prejudice even against the first and finest of our modern vocalists, solely because she is *Grisi;* nor would any consideration tempt us to select a *rib* of the unctuous name of *Fatima.*

However, joking apart, we are not insensible to the value of specimens of early maturity in *quadrupeds*, mind; and we hold that a disposition to fatten, by cattle or sheep when young, is, and ought to be, one of the first qualifications in the eye of a farmer; nor are we by any means inconsistent in asserting, that without attention to this particular, the toil and trouble of the breeder are thrown away. It is the abuse, not the judicious use of this quality, at which we have been pointing; for though there are some animals which it is next to impossible to fatten; yet there are others, which, by dint of stuffing and cramming, may, even in the hands of an unskilful feeder, be made to *appear* better than they really are: for fat, like charity, covereth a multitude of faults. I would instance the common breed of pigs in this county. They will get as fat as most others of their species; but it is *all* fat. The bacon is very fair, to outward appearance, but what is the substratum? It is deficient in *flesh;* without a due proportion of which, the main ingredient of a perfect animal is wanting. A layer of bacon, more or less thick, is laid on to bare bones, or little better; whereas a Berkshire pig, to all appearance not half so well made up, is infinitely superior in point of quality, because it combines a full and fair quantum of meat, on which to apply any reasonable share of fat. There is a good and solid foundation to begin upon. A friend of ours once took the pains to illustrate, by experiment, the deceptive nature of this *spurious* coating of fat, for so it may not improperly be termed. We admit that this illustration of his is somewhat overstrained; still, it furnishes an useful hint as to the propriety of due attention to lean as well as fat; and, at all events, proves the truth of the old adage, "all is not gold that glitters." He fatted a pig on oil-cake alone. The animal, to all appearance, did well—in my friend's own words, "got fat in no time;" and very fat, too—but what sort of fat was it? You shall hear. On being exposed to the fire, it melted away, leaving nothing but sheer grease! And yet, when living, he was thought "a very pretty pig" by all the neighbors!

The North Devons sold on Wednesday, the 13th, at Holkham, (the particulars of which we shall now proceed briefly to detail,) were beautiful specimens of quality of meat, and symmetry of form; and exhibit a striking proof of what may be done with good blood in skilful and intelligent hands. Four bullocks of this very handsome breed, three years' old off, were justly extolled as perfect pictures, and fetched £36 each. Several others averaged £34 each.

The two-shear Down wethers (splendid specimens of that truly valuable breed of sheep) fetched as high as £4 8s.; and the shearlings of the same breed £3. 6s. Twenty pigs attracted great attention, and sold for £5 6s. 8*d.* each. On the whole, it must have been highly satisfactory to the noble and venerable Earl of Leicester,* to see his labors so well appreciated by the many excel-

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* It may not be superfluous information to most American readers, to say that this is the title, or *nick-name* under which the illustrious name of Coke is now disguised and hidden. The Norfolk farmer. Thomas William Coke—whose great agricultural improvements, and labors, were as valuable to his country as profitable to himself, and whose well-earned fame had extended as far as agriculture was prized, and whose name belonged to the whole world—refused, when it was offered at a former time, to permit his name to be exchanged for an ea,l's title. But recently, whether from uxoriousness, or the commencing imbecility of old age, he has yielded his consent, and henceforth will be comparatively scarcely recognized as the Earl of Leicester. As he has consented to be thus degraded, and to forfeit the proud name for which he had acquired more true honor and respect, than can be justly claimed for any other now borne by living man, it would have been better than an unmeaning, though ancient title, if he had assumed one having reference to the labors of his long and useful life, and the grounds of his great public services and fame. Thus, it would have been somewhat less degrading to Mr. Coke, if, instead of the earldom of Leicester, he had received the title of "Earl of Turnips," or "Duke (Dux) of South-Down Sheep," or even the lesser dignity of "Baron of Red Clover."—ED. FAR. REG.

lent judges, some from a considerable distance, who attended the sale, as purchasers: nor could it be otherwise than gratifying in the highest degree to Mr. Bulling, the steward, that *his* exertions on the occasion were crowned with so successful a result. It was generally remarked, that seldom did the noble Earl appear in better health, or more bouyant spirits, than during the sale. He was attended by his amiable Countess, Lord Waterpark, and a numerous party of distinguished guests, who seemed thoroughly to enter into, and enjoy the novelty and bustle of the scene." * * *

From the Annual Register, of 1763

THE VELOCITY OF HORSES IN THE RACE PHILOSOPHICALLY CONSIDERED, BY MONSIEUR CONDAMINE. FROM HIS TOUR IN ITALY, IN THE YEARS 1755 AND 1756.

The spectacle which at present forms the amusement of the people of Rome, retains nothing of the barbarity of the ancient combats of gladiators. Some of the princes and Roman noblemen amuse themselves by keeping horses purely for the course; not as in England, backed by a rider; but alone, at full liberty, and entirely delivered up to their natural ardor, and that kind of emulation which the concourse of people assembled seem to inspire. Eight or ten horses, commonly barbs, of a small size, and mean figure, retained on the same line by a rope extended, about the height of their breast, set off at the instant when they let this rope fall. In the races at carnival time, which are the most solemn, the course is usually in the long street at Rome, to which this exercise has given the name of El Corso, or race street. They take care, at such times, to gravel it over. The length is 865 toises. I observed twice, by means of a watch for seconds, and the help of a signal, that this distance was run over in 141 seconds, which makes near 37 feet a second. A little reflection will make this speed appear much more considerable than at first we may imagine it to be.

It is evident that we cannot suppose more than two leaps or progressions on gallop, to one second, seeing that each of these leaps requires at least three very distinct points of time, viz: that in which the horse lifts himself from the ground; that in which we see him cleaving the air, and that in which he descends again; and that these two bounds, thus supposed to be made in every second, require six definate movements, a period scarce perceptible in so short a space of time. These horses, which are but of an inconsiderable size, and whose swiftness, every second, is equal to 37 feet, pass then, at each bound, over a space of more than 18 feet, which is very near equal to four times the length of their body, taken from the breast to the tail. It is true, indeed, that this length is more than doubled by the extension which their outstretched gallop gives their limbs before and behind. All this considered, how can the fleetness of the English horses be by a great deal, greater, as it is known to be in reality? But there are certain cases wherein the truth surpasses all the bounds of probability, and of this kind is that at present under consideration.

The late Monsieur Dufay writ in 1737, from Newmarket, that the course there, of four English miles, had been completed in less than 8 minutes, by 4 or 5 seconds. These miles are 826 of our toises, which makes more than 41⅔ feet in a second, or near 5 feet more than the barbs at Rome, and we must also remark here, that the latter run at full liberty, whereas the English horses are burthened with the weight of a rider. This fleetness, however, of 41⅔ feet, is still but an ordinary degree, of swiftness there, inasmuch as of ten horses which ran together, the very hindmost of them was no more than 12 to 15 paces from the end of the course. Besides, it is asserted that the same course had been frequently run over in 6 minutes and 6 seconds. I have this as a fact from a gentleman who has been concerned in the races at Newmarket.* And this swiftness, which would amount to more than 54 feet in a second, is to that of the barbs nearly as 3 to 2. We must also observe, that instead of one English mile, or a little more, to which the course of Rome is limited, that of Newmarket is 4 miles—a space too long for the swiftness of any horse to preserve itself through, on a sensible equality. It is evident that this swiftness cannot extend through the whole course, and consequently at the moment of the race, when it is at its maximum, the impulsion must be upwards of 54 feet in a second. We are likewise assured that a famous horse called Starling, has sometimes performed the first mile in a minute, which would make 82½ feet in a second—a degree of swiftness, which, if there be no exaggeration in the statement, is almost inconceivable. But this is a point on which I expect some further elucidations.

[The following are the elucidations I have received, since the reading of this memoir, from Dr. Maty, keeper of the library of the British Museum:—]

There are, says Dr. Maty, two courses at Newmarket—the long, and the round. The first is exactly 4 miles and 380 yards; the second is 4 miles, less 400 yards. Childers, the swiftest horse ever remembered, has run the first course in 7 minutes and 30 seconds; and the second in 6 minutes and 40 seconds, which amounts to 46 feet 9 inches French, in the second. Whereas, all other horses except the foregoing, take at least 7 minutes and 50 seconds in completing the first and longest course, and 7 minutes only in the shortest—which is 44 feet 5 or 6 inches the second. These are facts, adds Dr. Maty, which I believe to be true. I must also add, that it is commonly supposed these coursers cover, at every bound, a space of ground 24 English feet in length.

This is a little inside of my conjecture of two bounds in the second. Every bound in this case would be about 18 royal feet and a half for the fleetest barb in Rome, and 22 or 23 feet and a half for English running horses. So that the swiftest of the latter to that of the barbs, is very nearly as 4 to 3.

From the New York Farmer.

EXTRAORDINARY PRODUCTIONS ON A SMALL FARM.

[We are indebted to a distinguished member of the legal profession for the following communica-

*Mr. Faafe, then at Paris, since dead.

tion written by a friend of his, who, in addition to an extensive and profitable business carried on in this city, finds time to cultivate a miniature farm —and it may also be considered *a model* farm—in New Jersey.

This statement, which may be relied on, of the products of 3552 *square feet*, which is a fraction less than *one and a half* city lots, or a *farm* 100 feet long by 35 feet 6¼ inches broad, shows what *may* be accomplished by those who believe *in*, and have the industry to practice *upon*, "*book* farming." It teaches a lesson worthy of being studied and practised upon by thousands in, and in the vicinity of, this city and elsewhere. We shall endeavor to obtain further details in relation to these extraordinary productions, for the purpose, and with the hope, of inducing others to profit by becoming "farmers" on a similar scale, or larger if they choose. If they will manage as well in proportion as J. L. L., the writer of this communication has, and furnish us for publication their annual report, we will place the result on record without fee or reward.—Ed. N. Y. Far.]

Hoboken, Dec. 11th, 1837.

To J. Anthon, Esq.

Sir—Agreeable to promise, I enclose you the result of my last season's cultivation, ending at date; also a statement of the cost and keep of domestic animals, &c.

I uniformly look well to the result of all my undertakings; but the gain from one cow exceeds my most sanguine expectations; and it is a confirmation that whole families of the peasantry in Europe are supported chiefly on *one* cow. I will say nothing of the luxury of *pure* fresh milk and butter, as I know you have them in abundandance; but hereafter, I shall never be without one of those most useful animals. I shall take another opportunity of showing you that pure milk is not "feverish;" but that from neglect and starvation the poor cow may become fevered, and thus affect her milk.

You will perceive that the *vulgar* pig is the most profitable; this accounts for the poor man's habitation being surrounded with them. However, my pigs were penned and fed on pumpkins and corn.

The fowls, owing to the high price of corn and grain for two seasons past, are not so profitable; but they are of the Sicillian breed, as big as turkeys. Not having bought vegetables (except potatoes) for two seasons past, I do not know what price to attach to my produce. Will you put the market price to each, and strike a balance? This will enable us to estimate the value of a well cultivated farm of 20 to 50 acres.

My outlay for seeds and plants is just \$3 50. The labor is my morning and evening's exercise, with the assitance of my cow-boy in weeding and digging.

It would be an idle boast to rise with the sun, to plant cabbages and raise turnips, but if I can produce choice wholesome fruit and vegetables *out* of season, in our climate, then I may flatter myself that I have made my "blade of grass grow where none grew before."

I fattened pigs to obtain three results.

1st, Furnish to my household good wholesome food.

2nd, Save money in my expenditure.

3rd, Obtain manure, which is not to be got where I am, unless at a heavy cost.

I will here state that my vines are quite young. I did not think it prudent to allow all the fruit formed to remain, another season: I estimate my crop of grapes at three fold. As you have seen, during the past season, samples of the principal of my fruit and vegetables, I will add a few more that you have not seen. I should also send you some choice cauliflowers; but I understand that you had an abundance.

In regard to my butter-making experiment, thus far I am successful; but I will lay no claims to the "medal," until I get through the three next months; they will be the most trying.

In making comparisons with the result from my *miniature farm*, you must make due allowance, that I am a farmer of only two seasons.

The sample of butter I now send you, I think is as fine as any made during the summer.

I also send you a taste of sausages made on my *farm* from my pig: if you eat sausages, you must compare, by purchasing some in the market.

I shall try the experiment of making Westphalia hams from my pork.

Also, bacon that shall look like a cherry when you cook it.

Yours respecfully,

J. L. L.

Statement.

3552 square feet of ground under cultivation produced in one season the following in four crops:

First Crop.

Lettuce, cart loads,	2
Radishes, bushels,	1
Pepper-grass, chives, etc.	

Second Crop.

Green peas, bushels	3
French beans, do.	2
Early cabbages, heads	210
Cucumbers, bushels,	1
Cherries, do.	2¼
Pot-herbs of every kind.	

Third Crop.

Sweet corn, bushels,	2
Yellow and white flint, bushels,	1
Lima and Cranberry beans, do.	3½
Squashes,	70
Okra, bushel,	½
Onions, do.	1
Leeks, do.	½
Tomato, do.	3
Pumpkins, average 17 lbs. each,	53
Beets, bushels,	2
Carrots,	½
Nasturtium (for pickles) gallon,	1
Pears, (bad season,) bushels,	1½
Grapes, golden Chasselas, average ½ lb. each bunch, bunches,	33
Grapes, Isabella, average half pound each bunch,	80
Gooseberries, currants, etc.	

Fourth Crop. *

Cauliflowers, heads,	- - - - -	50
Celery, do.	- - - - - -	75
Scotch kale, do.	- - - - - -	50

Ruta-baga, 3500 plants expressly for the leaves.

Statement of the cost and keep of a cow, with an account of her produce:

Dr.

April 1836,	Cash paid for cow,	$20,00
to	Do. for hay,	42,00
Dec. 1837,	Do. corn-meal,	20,00
	Do. pasture,	12,00
		$94,00

Cr.

April 1836, to Dec. 1837.	By 225, lbs. butter 2s. per pound, - - - -	$56,25
	Calf sold for - -	12,00
	Milk for house estimated at two quarts per day,	45,50
	Cash received for milk sold chiefly butter milk,	147,25
		$261,00
	Deduct,	94,00
	Gain on cow,	$167,00

Statement of the cost and keep of two pigs:

Dr.

Oct. 1837.	Cash paid for two pigs,	$10,00
	Do. for corn meal,	2,00
		$12,00

Cr.

Dec. 1837.	By 160 lbs. pork, 8 cents per pound	$12,00
	By seven pigs fit for table in three weeks	14,00
	By one sow, value	12,00
		$38,80
	Deduct	12,00
	Gain on two pigs,	$26,80

Statement of the cost, keep and produce of 3 pair chickens.

Dr.

Sept. 1835, to	Cash paid for three pair chickens,	$ 2,50
Dec. 1837.	Do. for oats, corn etc.	57,25
		$58,75
Sept. 1835, to	By 2500 eggs 12d. per dozen	$26,62
Dec. 1837.	By 143 fowls,	71,50
	Carried forward	98,12

* The whole of the fourth crop is at this time growing in the open air, except the cauliflowers, which have been taken up, from time to time.

Brought over	98,12
On hand 16 do.	8,00
	$106,12
Deduct	59,72
Gain on chickens,	$46,37

From Johnson on Liquid Manure.

ON THE USE AND VALUE OF LIQUID MANURE.

The absolutely fluid portion of the London sewers consists, generally speaking, of a mixture of urine, soap-suds, street, and other washings, blood from the slaughter houses, &c. &c., an immense mass of liquid which is naturally of the most fertilizing description. Thus it has been found by those who are most deeply conversant with the admirable system of irrigation, or watering meadows, that the water taken from a river *below* even a small town, is infinitely more fertilizing, from its waters being mixed with the town drainage, than when taken from the river *above* the town, and consequently unmixed with the sewer waters. These matters can almost always be made available near large cities, and there are one or two cases with which I am acquainted, as in the fields near Musselburgh, which are traversed by the Edinburgh town drain waters, in which the use of the mass is productive of a growth of grass of the most luxuriant description, ensuring to the farmer four or five crops in each year. And it must be remembered in the cases which I have quoted from the practical observations of the talented irrigators of the south of England, that the drainage, which they have found so useful, is not employed by them as it issues from the town sewers, but is, in fact, mixed and diluted with all the waters of the river. Liquid manure has ever been gladly and zealously employed by the most able cultivators of the earth from very early periods, and is daily coming more and more into use, even with the most sluggish and indolent farmers. The knowledge of its value too is not confined to one country, nor has it been one of the many valuable modern products of vegetable chemistry. Thus we learn from Sir George Staunton, ('Embassy to China,') that the Chinese farmers ever prefer night soil mixed with water; and irrigation, which is, as usually practised, the most diluted method of applying liquid manure, was known to the Roman farmers in Virgil's days. *Georgics*, l. iv. 106—9.

It is hardly necessary to show that the urine, the blood, the soap-suds, and other fluids of the London drains, are well known fertilizers, since every farmer is aware of the fact. He gladly saves all descriptions of urine for his dunghill—carefully collects and carries, even for miles, the semi-fluid refuse of the slaughter-houses, and readily gives a considerable price for even the soap-maker's waste, since he is fully aware of the value of the small quantity of alkaline matters yet remaining even in that; and while I am writing this sentence, a paragraph has been pointed out to me in an excellently conducted paper, the 'Sussex Agricultural Express,' which details the admirable fertilizing results of using, as a watering for vegetables, a very weak solution of soda (one pound in fourteen gallons) and states, as an instance, that the vegetable marrow-plant, when growing in common mould, has been found to surpass other plants growing in a bed of dung. The London drainage waters always contain the soda in its fluid portion, the soda of some thousand tons of soap, consumed annually in London, all finding their way into the sewers.

Nature is here again our instructor. The fertile fields of Syria, and some of the most profusely luxuriant lands of the orientalists, abound in carbonate of soda. This alkali not only enters into the composition of many vegetables, but it promotes the growth of all, by preserving the moisture of the soil, and by accelerating the decomposition of the numerous organic substances found in all cultivated lands.

To the immense quantity of urine which is mixed with the drainage waters of large cities, one source of their fertilizing powers must be mainly attributed, a fact well known equally to the farmer and to the chemist. "All urine," said the late talented Davy, "contains the essential elements of vegetables in a state of solution. During the putrefaction of urine the greatest part of the soluble animal matter that it contains is destroyed; it should consequently *be used as fresh as possible;* but if not mixed with solid matter, it should be diluted with water; as when pure it contains too large a quatity of animal matter to form a proper fluid nourishment, for absorption by the roots of plants. *

Urine has been subjected to the most careful analysis by M. Berzelius, the great Swedish chemist, and its constitutents are determined by him to be as follows.

Water - - - - - - -	933 00
Nephrin (peculiar to animal matter,)	30 10
Sulphate of potash, - - -	3 71
Sulphate of soda, - - -	3 16
Muriate of soda (common salt,) -	4 45
Phosphate of ammonia, - -	1 65
Muriate of ammonia, - - -	1 50
Lactic acid, - - - - -	} 17 14
Lactate of ammonia, - - - -	
Animal matter, mixed with nephrin,	
Earthy phosphates, (earth of bones,) and fluate of lime, - - -	1 00
Uric acid, - - - - - -	1 00
Mucus, - - - - - -	0 32
Silica *(flint,)* - - - -	0 03
	10 00†

Well might Davy exclaim after such an analysis, that "all urine contains the essential ingredients of vegetables;" its magic fertilizing effects when spread upon the earth, need no longer puzzle the agriculturist, since there is hardly a single ingredient detected by the analysis of M. Berzelius, which is not either direct food for vegetation, or furnishes, by its decomposition, a supply in another form. It contains all the ammoniacal salts of the dunghill, the phosphate of lime of bones, and abundance of easily decomposable animal matters.

On the use of the liquid portion of the Edinburgh town drainage, a very able report has been made to the Thames Improvement Company, by Mr. Thomas Oliver, an excellent Scotch farmer, in which he says, "from the elevated position of Edinburgh, there is a considerable extent of ground which can be overflowed by the water from the city drains, in its progress to the sea, and of late years it has become an object of attention to the proprietors and occupiers of ground, so situated as to admit of its application; there are, I should think, not less than three hundred imperial acres to which it is regularly applied, and with great advantage."

"Such ground is annually kept in grass and yields from *three* to *six* cuttings in the season, which is let to dairy-men and others, at rents varying, according to circumstances, from twelve to twenty-four pounds per acre. You will perceive from this statement, that the chief benefit derived from the drainage of Edinburgh, arises from the fluid part; and if we reckon the increased yearly value of the land, above-mentioned, at ten pounds per acre (which I think is under the mark) it yields a clear revenue of three thousand pounds per annum to the proprietors of those grounds through which the drains pass." *

The history of the adoption of this system of town drainage irrigation at Edinburgh is very interesting, and will, therefore, abridge and insert the description given of it by Mr. Stephens. † "Edinburgh," says this intelligent land drainer, "has many advantages over the most of her sister cities; the large supply of excellent spring water is one of the greatest blessings to her numerous inhabitants, both in respect to household purposes and keeping her streets clean, as well as irrigating the extensive meadows situated below the town, where the art of man, with the common sewer-water, has made even sand hillocks produce riches far superior to any thing of the kind in the kingdom, or in any other country.

"By this sewer-water about two hundred acres of grass land, (1834) for the most part laid into catchwork meadow, are irrigated; whereof one hundred and thirty belong to W. H. Miller, Esq., of Craigintinny, and the remainder to the Earls of Haddington and Moray, and other proprietors. The meadows belonging to these noblemen, and part of the Craigintinny meadows, or what are called the old meadows, contain about fifty acres, and have been irrigated for nearly a century. They are by far the most valuable, on account of the long and continual accumulation of the rich sediment left by the water; indeed the water is so very rich, that the tenants of the meadows lying nearest the town have found it advisable to carry the common sewer water through *deep ponds*, into which the water deposites part of the superfluous manure before it runs over the ground. Although the formation of these meadows is irregular, and the management very imperfect, the effects of the water are astonishing; they produce crops o grass not to be equalled, being cut from four to six times a year, and the grass given green to milch cows.

"The grass is let every year by public sale, in small patches of a quarter of an acre and upwards, and generally brings yearly from twenty-four to thirty pounds per acre. In 1826 part of

* Agricultural Chemistry, p. 295.

‡ Annals of Philosophy, vol. ii. p. 422.

* Paper of Dr. Granville. Rep. of Committee, p. 75.

†Practical Irrigator—copied at length in the Farmers' Register, begining p. 347, vol. iii.

the Earl of Moray's meadow fetched fifty-seven pounds per acre.

"About forty acres of the Craigintinny lands were formed into catch-work water-meadow before the year 1800, which comprises, what is call Filfieside Bank old meadows, and is generally let at a rent of from twenty to thirty pounds per acre. In the spring of 1821, thirty acres of waste land called the Freegate Whins, and ten acres of poor sandy soil, were levelled and formed into irrigated meadow, at an expense of one thousand pounds. They now bring from fifteen to twenty pounds an acre per annum, and may be much improved.

"This," continues Mr. Stephens, "is one of the most beneficial agricultural improvements ever undertaken; for the whole of the Freegate Whins is composed of nothing but sand deposited from time to time by the action of the waves of the sea. Never was one thousand pounds more happily spent in agriculture; it not only required a common sewer to bring about this great change; but a resolution in the proprietor to launch out his capital on an experiment of a soil of such a nature. One hundred and ten acres of Mr. Miller's meadows in 1827 gave a clear profit of two thousand and ten pounds; the yearly expense of keeping these meadows in repair is from ten to fifteen shillings per acre, which is more than double the expense of keeping water meadows in repair in general; for the watering of them is not only through the winter season, but the water is put on them for one or two days together, immediately after every cutting of the grass, throughout the whole of the season."

It must not be forgotten in the consideration of these very important facts, the northern situation of the good city of Edinburgh; for it is in the same latitude as St. Petersburgh, and therefore the warmth of the meadows around it, and the consequent rapid growth of the grass, as compared with those of the valley of the Thames, must be under the same circumstance greatly inferior.

The forcing quality of liquid manure, as shown by the constant result of irrigating with common water, and as still more strrikingly confirmed by the use of the Edinburgh town drainage waters, is entirely confirmed by the practice of Mr. Knight in the employment of liquid manure for fruit trees, which I cannot give better than in his own words.

'I have shown in a former communication," says this able vegetable physiologist, "that a seedling plum-stock, growing in a small pot, attained the height of nine feet seven inches in a single season; which is, I believe, a much greater height than any seedling tree of that species was ever seen to attain in the open soil. But the quantity of the earth, which a small pot contains, soon becomes exhausted relatively to one kind of plant, though it may be still fertile relatively to others; and the size of the pot cannot be changed sufficiently often to remedy this loss of fertility; and if it were ever so frequently changed, the mass of mould, which each successive emission of roots would enclose, must remain the same. Manure, therefore, can probably be most beneficially given in a purely liquid state; and the quantity which trees growing in pots have thus taken, under my care, without any injury, and with the greatest good effect, has much exceded every expectation I had formed.

"I have for some years appropriated a forcing-house, at Downton to the purposes of experiment solely upon fruit trees; which as I have frequent occasion to change the subjects on which I have to operate, are confined in pots. These at first were supplied with water, in which about one-tenth by measure of the dung of pigeons, or domestic poultry, had been infused; and the quantity of these substances (generally the latter) was increased from one-tenth to one-fourth. The water, after standing forty-eight hours, acquired a color considerably deeper than that of porter, and in this state it was drawn off clear, and employed to feed trees of the vine, the mulberry, the peach, and other plants; a second quantity of water was then applied, and afterwards used in the same manner; when the manure was changed, and the same process repeated.

"The vine and mulberry tree being very gross feeders, were not likely to be soon injured by this treatment; but I expected the peach tree, which is often greatly injured by an excess of manure in a solid state, to give early indications of being over fed. Contrary, however, to my expectations, the peach tree maintained at the end of two years the most healthy and luxuriant appearance imaginable, and produced fruit in the last season in greater perfection than I had ever previously been able to obtain from it. Some seedling plants had then acquired, at eighteen months old, (though the whole of their roots had been confined to half a square foot of mould,) more than eleven feet in height, with numerous branches, and have afforded a most abundant and vigorous blossom in the present spring, which has set remarkably well; and those trees which had been most abundantly supplied with manure, have displayed the greatest degree of health and luxuriance. A single orange tree was subjected to the same mode of treatment, and grew with equal comparative vigor, and appeared to be as much benefited by abundant food, as even the vine and the mulberry tree.'

As it is, therefore, evident from the concurring practice of not only the talented agriculturists of our own country, but of those of all parts of the world, from China to Egypt, from the low lands of northern Italy to those of Holland, that the value of any liquid manure is as great as that of the more solid; is it not more desirable, even in a national point of view, that every facility should be given to its collection and disposal? And if the drainage, from a small country-town is distinctly found to render even the passing waters of a river more fertilizing to the meadows on its banks, how strongly does this fact show the immense values of the fluid matters hourly wasted in the huge drainage of London, none of which has hitherto been employed for the purposes of irrigation? and should not some plan be speedily devised by which this rich liquid portion may be made available, if only on the great marshes of Essex and Kent? Let it not be concluded that the earthy, animal, and vegetable matters brought down by flood waters of large rivers, are of a small aggregate amount, for such is not the case; all the extensive marshy country at the mouth of the Mississippi, has been formed by the deposites of that mighty river, and the same remark applies to the Ganges, and the Delta of Egypt. It has been calculated that the Mississippi carries into the sea 8.000,000 cubic feet of solid matter every hour, and it has been clearly established that at least 700.000 tons of animal and vegetable manure finds its way yearly into the Thames, through the sewers of London.

From the London Mechanics' Magazine.

CAOUTCHOUC ROOFS.

Sir—As yours is a repository for many crude (as well as perfected) inventions, which may afterwards be the groundwork for others of the greatest value and importance to the public, I beg to request you will lay before your readers the following suggestions for a new application of caoutchouc or India-rubber.

I have thought, that if the tops of house could be flat, and have reservoirs of water upon them, that water might be made available as a supply for domestic purposes to every room in the house, and also that screw-hose might be fixed thereto for the purposes of extinguishing any fire in the room where it originates on its first discovery. Hitherto, lead has appeared the most suitable material for roofs; but weight, price, and contraction by the heat of the sun, have been great objections. May not India-rubber be advantageously substituted? If prepared in large sheets, one-eighth or three-sixteenths of an inch in thickness, they might be laid on, and afterwards the joinings made perfectly secure by the solution of caoutchouc; and in case of damage from any cause, it might easily be repaired by the same means. Some of your more scientific readers can give the necessary strength of wall and timber for bearing the various depths of water which might be required. I apprehend that in large buildings, such as the new houses of parliament, it would not only be advantageous as a preventive of fire, but also more economical. Yours,

A Constant Reader.

NOVEL AND GRAND SCHEMES. BRIDGE OR TUNNEL FROM DOVER TO CALAIS.

Mr. Coppett, an English engineer, is now on his road to Paris to lay before the French government a project for constructing a passage to cross dryshod from Calais to Dover. He at Havre explained his plan to the public. Mr. Coppett asks of France only one milliard, and as much from England. With this trifling sum, he will make cones like those employed at Cherbourg, between fifty and sixty years ago. If the government does not approve of this system, he has in his pocket three or four others. For instance, he will make a tunnel under the sea from Dover to Calais introducing from one end to the other cast-iron pipes eighteen feet in diameter. This last mode of communication, according to Mr. Coppett, would cost only one milliard, to be paid in equal portions by both countries.—*English Paper.*

From the Quarterly Journal of Agriculture.

EMBANKMENTS FROM THE SEA.

There seems to be no operation connected with agriculture which promises more immediate and important results than the reclaiming of submerged lands in the estuaries of our large rivers. Till within these thirty years, the sole object contemplated in embanking submerged grounds, seems to have been the exclusion of water from the surface of soil which required only to be protected from its occasional invasions, and kept dry merely to make it eminently fit for most productive cultivation. Within the last twenty years, a system has been entered on, and is now, in the Forth and Tay in particular, being carried out to the most astonishing extent, not only of bringing into a cultivable state lands already, but for the periodical submergence, fit for cultivation, but of causing rivers to precipitate their mud in convenient localities, and so of creating fields where nothing before existed but a gravelly river bed, covered by from eight to twelve feet of water every tide, of the most unprecedented and unlooked-for productiveness.

In the Forth, 350 acres of this sort of land have been, in the last twelve years, reclaimed by Lady Keith, at a cost of about £21,000, and affording an annual return of about £1400, or nearly seven per cent. In the Tay, seventy acres have been recovered, opposite to the shores of Pitfour, 150 on those of Errol, and twenty around Mugdrum Island, making in all 240 acres, at about an outlay of £7200, yielding an annual rent of about £1680, or upwards of twenty-three per cent! On the Errol estate alone, 400 acres are just about to be embanked, in addition to the above 150, all of which may probably be in cultivation before 1847. Off the shores of Seaside, a wall just now being built, 800 yards in length, will effect the recovery of not less than 150 acres; and on Murie property, 50 acres might be taken in by seed-time 1838. The operations of the embanker, which began off Pitfour in 1826, will thus probably have brought into cultivation before 1846, on a shore of not more than seven miles in length, no less than 810 acres of land, renting at from £6 to £7 per acre, or of a gross annual value of £5670, and a gross total value, at twenty-five years' purchase, of £141,750. This is a clear creation of £117,450 of new agricultural capital, taking the reclaiming cost at £30 an acre. The junction of Mugdrum Island to the north shore, would probably afford 1000 acres at a single operation, while thrice that surface might be obtained betwixt Errol and Invergowrie.

The capabilities of the Forth, over and above what has already been effected above and below Kincardine, are not much, if at all, behind those of the Tay, though no sufficient inquiry has been made to permit details to be gone into.

The basin of Montrose affords a surface of nearly 3000 acres, all capable of embankment, and which, by being relieved of the salt water of the ocean, with which every tide at present overflows them, and keeps them submerged for twelve hours out of every twenty-four, and irrigated by the fertilizing current of the Esk, which, for at least forty days every season, bears along with it not less than $\frac{1}{300}$th part of its weight of the richest mud, might speedily be made not less productive than those of the Forth or Tay.

It is probable that between North Berwick and Montrose are to be found the most favorable localities for embanking on the east coast of Scotland, if not indeed the only ones which could be made available with a sure prospect of profit. It would be at the same time well that the debouchures of all our great rivers were examined, lest at the mouths of the Spey, the Dee, the Don, the Esk, and the Tweed, might lurk localities equally accessible to the embanker, and equally unlooked-for, or more, than in the Tay or Forth thirty years since.

If the harbors on both sides of the Forth be examined, as low down as Dunbar on the one side, and Crail on the other; and those on the Tay down to Broughty Ferry; those on the Esk to Montrose and Ferryden, large quantities of silt will be found accumulating in each of them, quite as impalpable and fine, and probably, if freed of salt, as fertile as those deposited and taken in higher up the rivers. It is probable, then, that lands might be embanked much farther out in these estuaries than seems at present to be suspected, by much the greater part of the argillaceous flocculi which the river bears along with it being actually carried out to sea.

The various embankments hitherto completed have been constructed by those manifestly little acquainted with hydraulic engineering, with little concert amongst the proprietors, and without almost any recognition of general principles, or systematic plan of procedure. Many anomalies are consequently apparent in the now finished works, and many cases of useless expense and annoying inconvenience have arisen, which it would have been most desirable and not difficult to have avoided.

On these and on many other grounds, which must be apparent, but to enter into a detail of which would be much too tedious for the present memoranda, it seems most important that something should be done in the way of a historical account of all the embanking operations of any importance in Scotland, whether for the purpose of merely defending lands previously existing, but liable to periodical inundations, from tides or river freshes, or for the purpose of obtaining and inclosing accumulations of silt, which, but for the skill and industry of man, would have been wholly swept away.

From the Quarterly Journal of Agriculture.

ON THE PROPAGATION OF THE APPLE-TREE.

In the number of this Journal for September 1837, I observe the following statement, among the Miscellaneous Notices:—

"*Propagation of apple-trees.*—A new plan for increasing plantations of apple-trees has lately been carried into extensive practice by the horticulturists of Bohemia. Neither seed nor grafting is required. The process is to take shoots from the choicest sorts, insert them into potatoes, and plunge both into the ground, leaving but an inch or two of the shoot above the surface. The potato nourishes the shoot, while it pushes out roots, and the shoot gradually grows up and becomes a beautiful tree bearing the best fruit, without requiring to be grafted. Whatever may be the success of the undertaking, its novelty at least is an inducement to give it a fair trial."

I beg leave to remark that six or eight years ago a similar statement was published. It was not then represented as a general practice, but merely as the successful operation of an individual in Bohemia. In consequence of the publication, I immediately made the experiment. I took cuttings of various apple-trees, and inserted each cutting in a potato, and planted the potato and cutting, leaving only an inch or two of the shoot above the surface. The consequence was that *the potatoes did grow*, but the *apple-tree cuttings did not grow.* It then occurred to my gardener, James Smith, who had long been employed as a nurseryman, that we should have sliced off the eyes of the potatoes. Next year this was done and the experiments repeated, but the potatoes still grew, but not the apple cuttings. The experiments were tried, not only in the country, but also in the back ground of a house in the New Town of Edinburgh, but in no instance with success.

It has since occurred to me that to complete the experiment we ought to have *boiled* the potatoes, but this was not done and had not been suggested by the publication which mentioned the practice. In the meanwhile, so far as *raw* potatoes are concerned, my opinion necessarily is, that the plan of rearing orchards by cuttings inserted in potatoes may, for aught I know, succeed in Bohemia, but it wont do for Scotland. I do not recollect whether we made a trial with turnips instead of potatoes, although I remember we at one time talked of trying turnips. Most people are no doubt aware that there is a species of apple-tree which can be reared from cuttings, like a willow or a poplar, and produces sweet apples without engrafting. I have two of these trees in bearing. I got the cuttings from Mr. John Geddes of the Verreville Works, Glasgow. They were taken from a tree that had been removed from the college garden, and that tree was said to have been propagated from a tree belonging to the Monastery of Aberbrothock.* The apples are rather small, round, and may be eaten from the tree, being quite sweet.

NOTICE OF AN EXPERIMENTAL FARM IN FRANCE.

By Col. Le Couteur.

It is situated, in a beautiful and fertile country, well wooded and watered, but cultivated by the Breton farmers just as their fathers tilled it 200 years since. The college or experimental farm appears like a garden in a smiling wilderness, so far as culture goes. I rose at four in the morning, in order to witness the whole course of labor in this interesting institution.

There were from 80 to 90 students under the superintendence and tuition of a director, a professor of agriculture and agricultural chemistry, a veterinary surgeon, and an agricultural implement maker. At half past four they took a slight repast, and as the clock struck five, all were employed; some in harnessing the horses and oxen, others in carting out and properly disposing the implements in the field, others set to hoeing, others weeding, some ploughing, some hay making, in a word to all the various labors of the season.

* The Arbroath Oslin or Original Apple, here alluded to, is a well known variety. It may be added, that all the burr-knot and codlin tribes of apple-trees grow freely from cuttings.—EDIT.

The school is divided into working parties of ten; at the head of each is a steady young man of experience, called the 'decurion,' who directs the work of his party. In all difficult operations, a regular farming laborer is at hand to perform them; but such is the ardor and perseverance of the youths, that they rarely allow any difficulty to arrest their progress. The duty of one 'decury' or ten, is to dress, litter and feed the cattle, with as much regularity as a cavalry corps dress their horses; also to keep the farm-yard in order. Thus all, in turn, are made acquainted with every thing connected with a farm, whether in regard to horses, oxen, cows, pigs, or manures. These last are made and husbanded with the greatest care, the mixons being formed of sweepings, leaves, and weeds that had not seeded, in alternate layers with stable manure.

The drainings of the stables and straw-yard, run into a tank, to be pumped out when required as liquid manure, which is in the best, most portable, but least known in this country.

The learned professor M. Donku, who is an admirable practical farmer, as polite and communicative as he is learned, complained that he had not a sufficient quantity of manure. I urged him to burn the underwood and decaying timber of the large adjacent forests, through which wide roads were cut, which would enable him to obtain an inexhaustable supply of ashes the best of all manures either for turnips or wheat; the cartage of ashes being easy, and the quantity required to dress the land not being great; in which he entirely coincided.

At nine all come into their studies, when they write remarks on the various operations of the morning. From eleven to twelve is the breakfast hour. From twelve to three is the time for recreation and study, which embraces for the first class questions of the following nature:—"His farm of 600 acres, one eighth of which is always to be in beet-root, is to be divided into the most eligible rotation of crops; show the most profitable course, and describe the nature and chemical properties of the soil in each field, the proper manures to be applied to them, the quantity of seed required for the crop, its culture by previous ploughings, by after-hoeing or weeding, the cost and labor, and the probable return?"

The plans of farming given by some of the youths, would have done credit to an experienced farmer, and demonstrated clearly that though theory alone in farming is an absurdity, the combination of the practice with scientific acquirements, will soon operate great melioration in the agricultural world. From three till seven they prosecute their labor in the fields, being eight hours work in the day. They then come in for dinner. At eight the director receives the report, from every decurion, of the day's work of his party of ten. He then orders the work for the ensuing day, giving a concise lecture on the subject when necessary to the culture of any unusual crop. A library of agricultural works is open to the students till bed time, a quarter past nine. * * * The crop that appeared to me to be most carefully cultivated, was beet-root in drills, which produced per acre about 750 pounds of sugar, selling at ten pence per lb. as fast as it could be manufactured.

REMARKS ON THE EXCEPTIONS TO DR. MUSE'S ADDRESS.

To the Editor of the Farmers' Register.

March 25, 1838.

You will allow, if you please, an earnest patron of the "Farmers' Register," to make a few remarks upon your "Exceptions to some positions in Dr. Muse's Address," including, also, others of a similar import, under the signature of 'N. L.' in your late 10th and 11th Nos.

First, as to his belief of the transmutation of wheat—besides the numerous evidences referred to by him, he has lately received from a farmer of intelligence and high standing, other conclusive testimony.

What I chiefly design in this brief communication, is to call your attention to the fact, that your 'Exceptions' to Dr. Muse's views of the deterioration of our climate, and its approaching unfitness for the profitable growth of wheat, are founded, exclusively, upon *one, only*, of the grounds which he has taken to arrive at his conclusion, to wit: the *general* lowering of the temperature of the globe; and you consequently "differ widely as to the *rate* of the progress of the change." Were he to confine himself to this *single cause*, as you have done, he might probably agree with you, that the rate of the progress should be shown.

In his address, Dr. Muse has called in the aid of co-operative causes, which, he maintains, where they exist, will greatly accelerate the *ordinary* rate of this progress. Among these auxiliaries, he names the *extensive clearing of the country, and the felling of the forests of the United States*, which, from the geographical position of this section of the globe, in relation to the northern regions of the same hemisphere, and their mode of connexion, will, he thinks, in all human probability, upon well-known philosophical principles which he explains, produce such effects as he enumerates; and which, he thinks, have already operated to the injury of the wheat plant; and, as this cause is progressive in a kind of geometric ratio with the increase of the population, and the spreading of new settlements, so he thinks, that in a short lapse of time, not to be measured by a *single rule*, the meteorological character of the United States will be so considerably altered, not only in the *degree* of cold, but in the *suddenness* and *frequency* of the *transitions*, at all seasons of the year, and in the frequent and critical *droughts*, as to compel a resort to other crops, which may be found more suitable to the *partially present* and *reasonably anticipated condition*. And the motive of Dr. Muse appears to have been, not to excite alarm, or despondency, but to warn his fellow-citizens, of the necessity of gradually introducing new crops, in place of that, which experience and reason both declare to be on the decline.

You say, "if this (the general lowering of the temperature of the globe,) were the cause of the frequent failures of our wheat crops, the effect would be more striking, as we advanced to the *colder stations;*" which, you add, "is not the case." Dr. Muse adduces authentic proof, in the records of the "Northern Farmer" of New England that fifty years ago the New England states made fine crops of *winter wheat;* and that now, they cannot produce enough of this grain to pay costs." They are, at present, trying the *spring* wheat, to avoid the effects of their modern winters; and much to the honor and sagacity of that section of country, under the encouragement of *legislative patronage.* Many of the northern and eastern states, from the same necessity, have, with legislative assistance, also introduced new crops, in place of the wheat; and, with acknowledged advantages to the public and private wealth and convenience. A similar policy has been adopted in Europe, in regard to both *new crops and spring wheat,* with good effect; and this is a point which Dr. Muse was obviously desirous to demonstrate the necessity of attaining, for the safety of Maryland agriculture, whose legislature have uniformly refused any participation or regard for the interests of this branch of industry.

Moreover, Dr. Muse in his address, admits that *other causes,* as well as *climate,* may conduce to the extensive failure of the wheat crop in the south, as well as the north; such as the migration of parasitic insects to their choice plants :and this cause should show its effects as strikingly, if not more so, in the *warmer,* than in the "*colder stations;*" because, in the former, this class of animal evils is generally the most abundant; and this may be one great cause of the frequent failure of southern wheat.

The general scope of my remarks will apply equally to some of the 'Exceptions' taken by your correspondent 'N. L.' to the same address.

He ascribes the failures of the wheat crop, to the want of a "*fit soil*" and "*good culture,*" "rather than to the want of a *suitable climate.*" The general *fitness* of the *soil,* cannot materially have differed in its constitutional character, and the "*culture,*" under the advantages of science and experience, and increased devotion to this branch of industry, for the late and long term, in which the failure has been occurring, must be obviously better than formerly. These two propositions being, it would seem, undeniable, the climate must be held largely answerable for the defect.

Indeed, it does not seem reasonable to entertain the idea, that a whole class of men, possessing *now* more knowledge of principles and practice than *formerly,* which must be conceded, as having grown out of time and experience; and, having equal, if not larger interests at stake, as well as improved implements, should execute their work with less skill, judgment, and attention, than their ancestors, who did not possess them.

Your correspondent 'N. L.,' adduces the successful growth of the Cuba tobacco by Dr. Muse, as evidence of the power of acclimation, and against his position, that plants should be brought from higher latitudes.

This very article affords good proof of the correctness of Dr. Muse's position, "that plants from the north will be more likely to continue longer with us." Gen. Hernandez and others, entitled to full confidence, assert the fact, *upon trial,* "that the Cuba tobacco, though very fine, from the imported seed, grown in the southern and middle states, will very shortly degenerate *by reproduction,* and not be recognized as the same article, differing so widely in its structure and qualities, &c. &c. it would seem to furnish an instance of transmutation, almost as considerable as that of wheat into cheat.

AGRICULTOR.

From the British Farmers' Magazine.

ON GREEN CROPS—THEIR USES AND CULTIVATION.

Most of the arts and sciences during their progress from infancy to their present state, have been greatly advanced by some single discovery which has accelerated their progress much beyond what might have been expected during a long period of years, and has introduced a new era in the history and application of the art. The invention of printing greatly facilitated the progress of all improvements; and has spread knowledge and civilization to the remotest corners of the world; the discovery of the magnetic needle, altered entirely the system of maritime intercourse; and the invention of gunpowder completely changed the whole art of war, and introduced an entirely new system of tactics, more simple and direct, bringing the strength of nations more nearly to a level, and has rendered war less bloody, and success to be more nearly a matter of calculation. In our present time, the invention and application of steam power to arts and manufactures, and the substitution of it for animate labor, will mark an epoch in the history of machinery, not less interesting or less useful than any of the great discoveries which have so much benefited the human race; and the prospects we may reasonably entertain of its future developement, lead us to indulge in the pleasing hope, that the uses of this wonderful power, in simplifying the production of the necessaries of life, are many of them still unknown, and will lead to useful and valuable applications. The introduction and cultivation of green crops, for rearing and feeding the different animals used by mankind, has constituted an era in the history of agriculture, similar in its nature and results to the many discoveries that have flowed from the labor and ingenuity of man, and which have contributed so materially to the amelioration of the different conditions of society. The introduction of these crops in districts where cultivators have had the penetration to discover their utility and value, has completely overturned the mode of farming practiced for centuries—the value of land has been much increased—immense fortunes have been realized, and a better and more regular supply of all kinds of human food, has been provided at profits amply remunerative to the cultivators and owners of the soil. Nearly two hundred years elapsed after the potato was known, before it was cultivated in the field: and notwithstanding the ravings of Cobbett, and the aversion yet shown to its growth as a scourge of the soil—it may be affirmed, that this island is not blessed with any root more valuable, or of more general use, from the table of the grandee to the feeding of pigs and poultry; or with any esculent which will more amply repay the cultivator for his pains. Upwards of sixty years have now elapsed since turnips were cultivated, their uses known and value proved; yet at this day we find many places where they are little known, the cultivation neglected on account of expense, and recommendations yet given by periodicals to farmers, of a plant of long establishment and of acknowledged value. The method of cultivating these crops, the preparation of the land, and the application of manure, and the subsequent management, have been so often described in different publications, that I need not state them in detail; and shall only observe, that the dispute betwixt the methods of drilling and broad-casting may be resolved, by simply stating that the former method has been long adopted by the most extensive cultivators, and by the Earl of Leicester* himself; and that if the additional expense incurred had not been repaid, it must have been ere now discovered and abandoned. Experience also shows that all manures applied to turnips should be heated, and in a state of decomposition, so as to afford immediate support to the plant; and that expense has often been uselessly incurred in reducing putrescent manures to a cold mass, though as good a crop may be ultimately obtained, if the season and the fly have spared the braird, and allowed time for the plant to reach the manure. Of all the inventions in shape of auxiliary manures, none yet discovered can be compared with crushed bones, both in point of cheapness and efficacy: good crops of turnips are raised for 20s. to 40s. an acre—one half, and, in some instances, one-third the cost of putrescent manure. The lightness of carriage is a great consideration, a four-horse wagon carrying a dressing for ten acres, allowing one and a half to two tons per acre. Though the value of this manure has been completely established many years ago, it is very remarkable that no use has been made of it in places most favorable for the application. Bones are sold in London at 2s. per bushel: great quantities are carried by sea to Scotland, and sold at 3s. 6d., and even 4s. 6d.; cattle are fed with turnips raised by the bones, and sent back to London at an expense of £3 a head, and the farmer pays £2 to £4 an acre for the land. This is an anomaly which I think will puzzle Mr. Cayley, with his pockets crammed with one-pound notes, to explain. The London farmer has bones at nearly half price, suitable soils, an early climate, and excellent markets; but he cannot divest himself of the idea of expense he pays in the bill for bones, small as it is: no bill is presented for farm-yard manure, and he consequently thinks it costs him nothing. Drilling at 26-inch intervals appears a waste of land; he drills at 10 or 12 inches, and gets an inferior crop. Turnips are universally applied to rearing and feeding cattle and sheep—the former in stalls and yards, both for feeding the animal and for reducing the straw to manure—the latter on the land on which the turnips are grown. On sands, as in Nottingham and Norfolk, sheep can eat turnips dry and clean; but on wet and poachy loams, on which our best crops of turnips are grown, during rains and thaws the sheep stand deep in mud, having the wet land to lie on, and the turnips dirty and unfit to be eaten. In such cases, I would always prefer to have the turnips carted to a clean lea or stubble field adjoining, where the turnips may be regularly spread, and the sheep have a dry bed and shelter at pleasure. The fields will have the same advantage in this way as in the other—each field being regularly fed on in stubble or in grass.

Notwithstanding the very general use of potatoes, an antipathy prevails against their growth, and some proprietors restrict the farmers from planting beyond a supply for their own use. This absurd prejudice has got deeply rooted; I never could see a green crop impoverish land, and persons who have made this discovery must have clearer perceptions than I can claim. On loams worth 30s. an acre, I have ever found 10 tons an acre, 5 quarters of wheat, and heavy crops of clover, equal, if not superior, to those after turnips; in some places the better crop is always expected after potatoes. Of all green crops they are the most valuable: of surer growth than turnips or beet, and capable of being raised on a greater variety of soils. A part of the crop being sold, the other must be consumed by stock pigs, and poultry, now rendered more economical by steaming. On many soils, turnips are a precarious crop; an indifferent crop of potatoes is equal to a heavy crop of turnips; the same quantity of putrescent manure, with less preparation, will raise the potato crop, and when consumed on the farm, it will produce the same quantity of manure. Comparing quality with quantity, we find that potatoes (Hortus Gramineus Woburnensis, page 388,) yield much more nutritive matter per acre, than any other esculent; one-third more than carrots, twice as much as ruta-baga, and nearly three times as much as white turnips and mangel wurzel. If an ox eat a bushel of potatoes a day, at 1s. 6*d*., and an equal value of Swedes, it will follow that the ox fed on potatoes will eat double the quantity of nutritive matter, and ought to make double progress in the process of fattening; and that an acre of potatoes should feed nearly three times as much stock as an acre of turnips. But experience has not been found to support these refined calculations of Sinclair, however chemically correct they may be; but it may be taken as a fair statement, that a crop of potatoes of 400 bushels is double the value of the best crop of Swedes; affords twice as much nutritive matter; and, consequently, should keep twice as much stock. In the Quarterly Journal of Agriculture, June, 1834, we find statements of the results of trials in feeding on raw and steamed food, which are conclusive in favor of the former in feeding cattle, and of the latter for pigs; and we find 140 lbs. of turnips and 84 lbs. of potatoes, yielding nearly the same increase of beef, keeping the relative value as 2 to 1. These trials proved also that raw potatoes alone will feed cattle, which has been much doubted by many eminent farmers, and seem decisive in favor of raw food for feeding, exclusive of the expense of steaming. In the vicinity of towns and villages, there is always opportunity to carry back manure for the quantity sold; in inland situations they must be wholly or nearly consumed by stock. A turf of weeds is, however, much preferred to such crops; and if a proprietor be at any time induced to plant potatoes, he is soon warned of the destruction of his property; and generally such foolish prejudices weighed against the best crops in the kingdom make the latter kick the beam. Nothing in connexion with agriculture ever adpeared so amusing as to hear prejudice discussing the state of cropping and the relative merits of plants; when just as ignorant of the facts as the quill with which it wrote; and forbidding the culture of potatoes as a scourge.

On stiff soils, not adapted for turnips, mangel wurzel has been cultivated with considerable success. Sinclair states, that an acre of potatoes of 10 tons is equal to 25 tons of beet in nutritive mat-

* Lately the great *commoner* Coke of Holkham.
ED. FAR. REG.

ter, and that an acre of beet affords double the weight per acre of rutabaga, and the nutritive matter in the same weight being nearly equal, an acre of beet should feed twice as much stock as an acre of Swedes, and as much as an acre of potatoes of ten tons. On loamy clays, great quantities of winter food may be produced from beet and cabbages; and experience has shown that fair crops may be obtained on more indifferent soils, and with less manure than general opinion understands. White turnips and cabbages will feed through November and December, then beet and Swedes will serve till the end of June. I have been some time of opinion that cabbages, beet, and potatoes are often too late in being planted in the spring; and that the crops are much hurt by being exposed to the hot suns of summer before they have attained sufficient strength, and before they have produced a shade by their leaves to retain moisture and protect the roots against the influence of that scorching element. The objection is, that these stiff lands cannot be got ready sooner in the spring; but this might be remedied by preparing the land the previous autumn, and laying it dry during the winter. When I visited the Duke of Portland's farm at Welbeck, in 1834, I much admired a field of heavy loam prepared and drilled up to be planted with cabbages in the following spring. This must be a great advantage; the dung may be applied during the first dry weather; the drills reversed: a fresh tilth is thus produced for immediately planting the crops. The cabbages might be planted in autumn, but would certainly be destroyed if near a preserve of game; and if the manure were applied in autumn, it might be wasted before the roots of the plants come in contact with it. Winter and spring vetches rank high in the scale of green crops, and are either eaten on the ground by sheep, or cut for stall feeding. As to eating on the ground, I am of the same opinion as in the case of turnips, and would always prefer to have the tares cut and eaten in the racks. As tares can be grown on damp soils, the sheep trample and waste a quantity, which will amply pay the expense of cutting and racking, and the animals will be more comfortable. Tares are invaluable as green food for horses in well-littered yards: manure may be obtained in great quantities, if proper yards be provided and litter amply supplied. But if all green crops were raised in profusion, the full value never can be obtained, until farm buildings undergo a complete revolution; for we must call it farming when we see one or two large yards and the straw blown about by the wind, the moisture of the whole farmery running on the road, or forming a useless stench-pool behind the yards. Even in the most complete plans of farmeries, furnished by our best modern publications on the subject, we find little or no attention paid to the accommodation of swine, those excellent manufacturers of manure. They run about at pleasure, and lie where they can find a corner; and on farms of 500 acres only one or two sties are found. In place of such neglect, I would have a large square or circular yard, with sheds appropriated for store pigs sunk at least two feet below the adjoining level, and regularly and deeply littered with straw, firm, and alternate layers of any vegetable substances that can be got; the yard being first bottomed with a thick stratum of loamy soil from old fences, head-lands, and ditches. Around this yard, and with back doors opening into it, may be ranged a number of sties for breeding and feeding; the store pigs in the yard to be amply supplied with clover and tares during summer, and during winter with beet and cabbages, turnips and potatoes. Abundance of litter is indispensable; and if it be objected, as usual, that it is expensive and will not pay, it is difficult to know what will pay; for by increasing manure produce is increased, and without produce profits cannot be got. Rye and rape are much sown as catch crops, in the southern counties, for sheep feed, and on suitable soils they supply a bite when most wanted, from a deficiency of the heavier crops. But being usually sown from want of manure, and for feeding on the land before a regular crop, they do not enter into the number of the cultivated green crops.

In order to extend the cultivation of green crops, draining is a primary and indispensable requisite. From want of this operation much of the value of the dung and lime now applied on retentive soils is lost; and were it effectually performed, the number of acres capable of producing green crops would be greatly increased. But we see hundreds of acres very suitable for such crops that have never been employed in that way, and it may be very justly observed, that the cultivation of these soils might be expected to precede the improvements by draining wet lands at a very considerable expense. This neglect shows the most culpable negligence: the production of such crops on drained lands might tend to rouse from their apathy the owners and cultivators of these neglected soils. The system of tile draining was introduced some years ago by the Duke of Portland, on his estates in Ayrshire, in Scotland, where it has been attended with very beneficial results. The climate of Ayrshire is one of the wettest in the kingdom; the soil is mostly loam, or loamy clays, on a bottom of the most obdurate and impenetrable clays anywhere to be found. The drains are in the furrows, or at regular distances, and the land flat, twenty-four inches deep, and covered above the tiles with straw and porous earth. The tenant performs all carriages, and the draining is executed by the proprietor, at an expense of about £5 or £6 per acre, according to the breadth of the ridges, for which the tenant pays 5 per cent. or 6s. an acre, nearly. At the end of a lease of twenty years, the capital is repaid, and the land much improved in value; for it is confessed by the farmers themselves, that they have now four crops for three before, in three years, wholly owing to the cultivation of green crops after draining. Here is a great and lasting improvement effected without the aid of the Chancellor of the Exchequer, and forms a valuable contrast with the vapid declamations of dinner orators about the currency and one-pound notes. The produce is increased to pay the tenant's outlay; the proprietor has a regularly paid interest—a sure investment for his capital—and the land to be let at a highly improved value. The enabling a farmer to grow heavy crops of potatoes and cabbages on clays where no attempt could be reasonably made previously on such soils, is the true way to benefit the farmer, and not to delude him with glittering oratory and visionary projects, which never advance beyond the speaker's lips. This system of draining is extending in East Lothian, and in many cases is performed by the farmers themselves; and some similar system has been adopted by Sir James Graham and a few others. To follow this mode of draining, a subsoil plough has been invented, to move the soil a foot below the ordinary furrow, in order to deepen the mould by the gradual mixture of the soil and subsoil. This is in direct opposition to customary practice, which fixes wheels on the beam of the plough to prevent going too deep; so contradictory are the opinions of men. But reason tells that whatever tends to deepen and increase the quantity of soil, will increase its fertility; and that in order to afford food to plants, the soil must be moved and brought in contact with the roots. In order to promote this object, complete pulverization is essentially necessary, and a minute mixture of the soil with the manure applied; for we know enough of the nature of the food of plants, to conclude that it must be in a state of solution and most minute subdivision. The reducing putrescent manures to a cold mass has been doubted, and is now partly discontinued; but it may still be doubted, if straw and excrementitious matter, though heated and in a decomposing state, lying in a body along a drill, be in the best state capable of affording nourishment to the tender roots of plants. This idea occurred to me in 1827, when, in order to complete the dunging of a fallow field in Northumberland, I applied some very rough manure, almost dry straw, on two acres on a side of the field. The ploughs could not cover it, and the appearance was very unsightly. The field being clear of weeds, the dung was applied in July, and was much pulled about by the ploughing, one extra furrow being given to the two acres, to cover the dung, if possible. When seed-furrowed in October, the soil and manure appeared finely blended, the braird matted flat and thick, a sure sign of prosperity; and to the day of reaping maintained a very visible superiority over the rest of the field. It is now generally understood to apply rough dung evenly over grass lands; to bush harrow, roll, and rake the refuse—great part of the benefit to the grass arising from the temperature produced by the covering of dung. To apply rough dung from the yards to fallows clear of weeds and early in the season, so as to admit of repeated ploughings and harrowings, seems practicable in many cases; but to apply it to Swedes and early sown crops, when the land may require repeated cleanings, and when the season affords fewer opportunities of mixing, admits of more doubt. To settle this point, and to determine if dung so applied and blended, on land prepared in autumn or in spring, would afford equal crops of turnips, beet, or potatoes, with a mass of dung lying in drills, would be a curious and a most valuable experiment. To apply rough dung from yards and sheds to raise turnips, on which so much labor is bestowed in preparation, will seem a most startling doctrine; but let not conceit and ignorance condemn such suggestions, for every improvement has had a similar origin: and if experience confirms it, it will be an improvement of the right kind—to produce a result at less cost. Experience has convinced me that a farmer may plough and sow and reap for his lifetime, and derive no advantage—very probably impoverish himself and his farm; and that the first and most essential requisite is to fill the land with manure, by every possible means; and if the land be then kept in that state by judicious and improving rotations, return and profits may be confidently expected. A farmer may hire a farm, stock it with seed and a few implements, sow and reap and get little; but unless every exertion be used to increase the means whence the produce flows, he will only resemble a manufacturer who erects machinery, and then refuses to buy the raw material to employ it. A miller must buy a quarter of wheat before he can expect the profits of manufacturing it: the cotton spinner must buy the raw material before he can reap the profits of his machinery: in like manner the farmer must buy the basis of production, or he will drudge and puddle on as he has done, in confusion worse confounded.

In the Quarterly Journal of Agriculture, Dec., 1836, we find a review of Mr. S. Lefevre's letter, on the result of the labors of the agricultural committee, passing over much of the inquiries about the foreign and domestic prices of corn, and other matters of little use. I shall make a few remarks on the expenses of cultivation, as connected with my present purpose. The relative expense of cultivation is stated as differing 45s. per acre on land rented at 39s., being more than the rent of the land. In the review we find the following passage:—"If the expenses are not calculated on similar data, there can be no analogy in the results; and even if they had been so calculated, the comparative industry in the application of labor should not be overlooked. Calculating corn consumed by men and horses, and in seed at market price, and the price of labor as if paid by the day or job, can give none but fallacious results. A farmer has no right to estimate the cost of these items of expense at more than they really cost him." This comparative industry, in the application of labor, constitutes the difference of expense, and it seems in this case we must put down 45s. as that difference. The industry used in any art, will show itself in the superiority of the execution; and, by here allowing 45s. in superiority, a balance will be struck. It is a general complaint of farmers, that all crops cost more in cultivation than they receive for the produce: if, therefore, the farmer cultivates these items at the market prices, he estimates at less than they really cost him, and not at more, as stated in the review. The grand objection always found against the convertible system, is the expense. Here is an open uncontradicted statement in an open committee, of less expense in support of private statements, which are always disregarded, and proprietors asserting they cannot support a system that pays most rent. And it seems as if no statement, even Mr. Lefevre's, will be convincing; for an Athanasian creed has obtained in the field as in the temple: Do as we do, say farmers, and you will be right;—if you do not, you are wrong. Many ludicrous opinions have been advanced to account for the superiority of the alternate system. Mr. Poulett Scrope says it is the freedom from tithes and rates; and then reckons them all as rent. One sentence, here, being a flat contradiction to the other, does not require any further confutation. Mr. Cayley is certain it is the possession of one-pound notes, as they make capital more plentiful for undertaking improvements; and, from analogy, they will also make money more plentiful for prices of produce. Now, in this case, produce of every kind is grown in a country abounding in capital, and sent to another, where it is scarce, and finds higher prices. An ox is fed on a depreciated currency, say for £15; he is sent to London, and fetches £20 for expenses and profits, and in gold, and more than can be got in one-pound notes at home. If capital be wanting to raise the ox, whence comes the capital to buy him? Would not the price raise him at home? Gold has reared the ox, and gold has bought him. When one-pound notes were in circulation till 1819, cultivation was no better, and complaints were as loud. The truth is, if Mr. Cayley and others will hear the truth, it is merely an application of capital and labor to the increase of produce under a different system. How one-pound notes can make a good ploughman or mechanic, is certainly difficult to conceive. Manufacturers reckon profits by the quantity of goods they can produce, and commercial dealers by the amount of their transactions, and every corner of the world is explored to find an opening for the increase of trade in farming; prejudice and monopoly restrict the quantity, to a certain amount, arising from an established system that must not be disturbed, and then prohibitions and restrictions are enacted to impose a factitious value on that quantity.

On the much-disputed point of preference betwixt wagons, and single horse-carts, the writer of 'British Husbandry' prefers Mr. Parkinson's single opinion to the practice of half the kingdom. Where the drill system prevails, these carts must be used to suit the drills, and wagons are useless. Abroad, the carts will carry more than wagons; and, judging by a majority of similar results, the usual criterion in such cases, the superiority is incontestable. I remember seeing a farmer, in Surrey, ploughing a sandy loam with a turnwrist plough, four horses, a man and boy, at 15s. a day, and ploughed three roods. Two horses, with an iron plough, would surely have ploughed an acre in nine hours: here are 10s. against 20s.; or, if the four horses had ploughed an acre, there are 10s. against 15s. The answer would be, that labor is diminished by dispensing with the boy; this is just what is wanted, the value of his labor not being required to produce the result of ploughing an acre in a day, remains to be applied to another point. We have lately had a description of a grass yielding 30 tons an acre, by the Central Society of Agriculture; of a newly invented machine to do away with the malt tax; and with a universal remedy for agricultural distress, in the shape of manure, to be gathered in tanks from the water of the common sewers in London. Laying prime cost aside, the expense of carriage to a distance must be considerable; and how it is to be got in quantity and conveyed at a rate to remedy the whole complaints, is a question not so easily answered. The circumstance of proprietors and cultivators forming a society to advance the state of agriculture, and at the same time neglecting all improvements, leaving lands undrained and totally neglected, and actually forbidding any alteration, is certainly an anomaly not often surpassed in the anomalous history of mankind. It might be curious to inquire, if there be shown by the Society as an improvement, a piece of old turf, covered with weeds, with the veto attached—"This must not be ploughed or ————*, but remain as it is." Drilling is reckoned unnecessary labor—thrashing by machinery is not customary—breeding and feeding young stock is fancy farming—and ploughing old turf is complete madness; —draining is too expensive, and perennial grasses, though constituting the best pastures growing naturally, become an absurdity, and little better than weeds, when sown to make a sward. All known improvements being rejected and hunted down, it is difficult to see by what means the art is now to be benefited. Many improvements have been long known, and lie dormant from want of execution: the proficiency of any art, and the superiority attained in it, must depend on the skill and assiduity of the practitioners; a good article always brings a higher price, and consequently its own reward; and, provided each branch of business have fair scope, and be not unduly fettered, the different methods of practice must sink or swim by their own merit.

GOVERNMENT BOUNTIES TO AGRICULTURE, AND TO PRINTERS.

We have just received from Washington a pamphlet of 99 closely printed octavo pages, consisting of a report of the Committee of Agriculture, and various accompanying documents, all serving to detail, and to recommend to the favorable notice and patronage of congress, the plans and labors of Dr. H. Perrine, for introducing the cultivation of valuable tropical plants into the southern part of Florida. It may well be doubted whether any profit will accrue to any person from this publication, except to the public printer, for printing the usual number, and also 5000 extra copies of this large pamphlet. But we wish it may be otherwise Dr. Perrine has no doubt made great efforts to introduce tropical plants into Florida, and not less, nor long, to induce congress to assist and reward his labors; and, as yet, his efforts in both respects seem to have been nearly fruitless. His scheme, if carried into effect, may or may not be productive of great improvement to southern agriculture. But, doubtful as may be the direct benefit, we should rejoice to see some portion of the enormous squanderings of public treasure by the government of the United States, directed, even though but in design, or but nominally, to the object of agricultural improvement; as merely the principle being adopted, and its application commenced, might lead, finally, to a beneficial system. Dr. Perrine asks for a township, 23,000 acres, of public land, on the southern extremity of Florida, to repay his expenditures, and enable him to effect his objects of introducing and acclimating tropical plants. For this, or for any object likely to forward national improvement, congress would make a good bargain to give away not only the 23,000 acres, but the whole of southern Florida; provided the receiver would take its troublesome inhabitants, the Seminole Indians, as part of the grant. The present market value of a tract of

* The original being written with a lead pencil, and having been rubbed at this place, we are unable to make out the word.—Ed.

the size asked for by Dr. Perrine, is probably not more than the cost of public printing already wasted (if leading to no further action than merely paying the printer,) in publishing the documents sustaining the petition. Indeed, it would be a provision for Dr. Perrine, with which he might well remain content. if congress would merely pay to him as much money as has been, and will, without scruple, and as a mere matter of course, be paid for printing and circulating his memorials and documents. The printing of this single pamphlet must have cost more than congress probably would grant directly to aid the true improvement of agriculture. A less sum, for establishing a Board of Agriculture, the legislature of Virginia refused, and with so much slight and contempt, as to leave no ground for any advocates for agricultural improvement to ask again for legislative aid or bounty.

After the foregoing paragraph was in type, we received from Dr. Perrine a second pamphlet, of the same purport and substance, though not in precisely the same form, being the "Report of the Committee of Agriculture" to the Senate of the United States on his petition, with accompanying documents. This publication, though in pamphlet form, would be a bookseller's volume, of 142 pages letter press, and 24 more pages of well executed and handsome copperplate engravings of various tropical plants referred to by the petitioner; and of this, also, 5000 copies were printed, in addition to the "usual number" of congressional documents. This is not only, probably, of double the cost of the other publication spoken of above, but both of them are but second editions, revised, corrected, and enlarged, of prior publications, made in like manner by order of congress—and which course of annual publication will continue so long as Dr. Perrine shall continue to present his claims, even though he may fail to obtain one dollar for the benefit of himself, or his plans. What we before supposed to be probable, is now placed beyond doubt, viz.: that the mere cost of printing his documents, if paid directly to Dr. Perrine, would be certainly equal to the value of the township of land in Florida for which he asks. And, if he could even get half as much as the clear profit of the printers of his documents, he would find the business of petitioning annually more profitable than we fear he will in other respects; and the amount gained greater than any legitimate and honest appropriation that will be made in aid of the objects of his petition.

Some novices in the knowledge of congressional economy, may wonder why *two* such voluminous publications of the same character, and form so nearly similar, and in editions of like size, should be published at the same session of congress; inasmuch as nearly half the expense might have been saved by printing the whole number even of the larger work. But if this cheaper course had been pursued, *one* only of the two public printers would have had a fat job, whereas now one has been given to each of them: and this is an object more cared for, and far more cherished, than either the emoluments of Dr. Perrine, or the diffusion of agricultural information, and the consequent improvement of agriculture.

We copy below the 'Report' of the Committee of Agriculture of the Senate; and heartily wish that its general recommendations and objects may receive from both houses of congress as much favor, and public bounty, as the subject has already served to furnish of profitable jobbing to public printers, and of expenditure of public money, useless except to these government pensioners.

REPORT TO THE SENATE OF THE UNITED STATES ON DR. PERRINE'S PLAN OF INTRODUCING TROPICAL PLANTS.

The Committee on Agriculture, to whom was referred the memorial of Dr. Henry Perrine, late American Consul at Campeachy, praying for a conditional grant of land in southern Florida, to encourage the introduction and promote the cultivation of tropical plants in the United States, have had the same under consideration, and beg leave to submit, to the consideration of the Senate, the following report.

At the express desire of the memorialist, your committee has long delayed its action for the purpose of making a rigid investigation of his suggestions, his services, and his plans, in relation to the immediate domestication of tropical plants in southern Florida, and of their gradual acclimation throughout all the southern and southwestern states; and hence your committee has arrived at the conclusion that his services have been great; that his suggestions are important; and that his plans are laudably patriotic and practicable. In obedience to the treasury circular of the 6th September, 1827, Dr. Henry Perrine appears to be the only Americal Consul, who has perseveringly devoted his head, heart and hands to the subject of introducing tropical plants in the United States; and his voluminous manuscripts alone exhibit a great amount of labor and research, which promise to be highly beneficial to our common country. The memorialist founds his hopes of final success for the immediate propagation and subsequent cultivation of tropical plants in Florida, on four leading facts: 1. Many valuable vegetables of the tropics do actually propagate themselves in the worst soils and situations, in the sun and in the shade of every tropical region, where a single plant arrives by accident or design. 2. For other profitable plants of the tropics, which require human skill or care, moisture is the equivalent to manure, for tropical cultivation essentially consists in appropriate irrigation. 3. A tropical climate extends into southern Florida so peculiarly favorable to human health and vegetable growth, that the fertility and benignity of its atmosphere will counterbalance the sterility and malignity of its soil. 4. The inundated marshes and miry swamps of the interior of southern Florida are more elevated than the arid sands and untillable rocks of the coast; and hence the same canals which may drain the former will irrigate the latter, and afford the appropriate proportion of moisture for both. The memorialist founds his hopes of success for the *gradual acclimation* of many profitable plants of the tropics, throughout at least all our southern and southwestern states, on, 1st, The general history of all tropical plants whose cultivation has been gradually extended towards the poles. 2d. The particular history of our actually great staples of the south and southwest, viz.: tropical rice, tobacco, cotton, and sugar; and 3d, The fact that kindred species of many profitable plants which will be still more important objects of *agriculture*, are indigenous to our worst soils between the Potomac and the Mississippi, viz.: of Agave and Yucca. In relation to the extension of a peculiarly favorable climate of the tropics into southern Florida, your committee believes that the memorialist has demonstrated its existence by the meteorological tables annexed to this report. In relation to the immediate propagation of tropical plants in tropical Florida, on the most arid, the most humid, and hitherto most worthless soils, your committee believes that the memorialist has shown its great probability by the interesting facts and statements made and collected by him, and which are annexed to this report. And in relation to the gradual acclimation, at least the fibrous-leaved plants, whose foliaceous fibres are superior substitutes for flax and hemp, your committee coincides with the memorialist in his opinion, that the tropical species may gradually extend over the most steril districts of all our southern states, and that the indigenous species may be gradually propagated in the worst soils of our northern states. Hitherto, southern Florida has been considered so sickly and so steril as to be unworthy the expense and trouble of surveying and of sale; and, even now, it is seriously contended that this section of the Territory is uninhabitable by the white man, and should, therefore, be abandoned to the savages and runaway negroes from the neighboring states. At all events, it is conceded that many millions of acres are incapable of producing any article now cultivated in the United States, and must lie unemployed and useless for many years, without some experiment such as Dr. Perrine proposes. Hence, when the Indians shall be expelled from the pestilential swamps and impenetrable morasses of southern Florida, they may again become the impregnable fortresses for fugitive negroes and practical outlaws, who will be still more dangerous enemies to the tranquillity of our southern states than the actual savage Seminoles. But if the suggestions of the memorialist, and if his experiments should be successful, the arid sands and arid rocks, and mangrove thickets of the coast, the miry marshes, pestilential swamps, and impenetrable morasses of the interior, may all, ultimately, be covered by a dense population of small cultivators, and of family manufacturers; and tropical Florida will thus form a well garrisoned bulwark against invasion in every shape and shade. Even the statistics of Cuba demonstrate that this celebrated island owes its prosperity and its safety much more to its numerous small cultivators of fruits and vegetables, than to its few large planters of sugar and coffee; and hence it may be considered fortunate for all Florida that its southern surface does not embrace any large tracts of rich soil adapted to the great staples of great planters. Hitherto, the old southern states have been drained of their rural population by the emigration of their sons to the fertile plains of the valley of the Mississippi and Ohio. By the introduction of such new staples as can be propagated, on the worst soils of the old states, more profitably than their old staples can be cultivated on the best soils of the new states, emigration from the south will be prevented, and even its ruined fields and barren wastes will become covered with a dense population of small cultivators; and that rural population may be tripled by the employment of new staples in the really domestic manufactures of their farms, families, and females. At all events, the numerous small cultivators of the south would thus be enabled to furnish the cheapest possible raw materials for the numerous small manufacturers of the north, and would hence create, mutually, a profitable and harmonious dependence on each other of the great pacific masses of population in both sections of the Union. With these views of the national importance of the enterprise of Dr. Perrine, your committee have determined to report a bill, on such conditions as will render it barely possible for him to attract associates and capital to the aid of his future labors, with unity in design, harmony in co-operation, and perseverance in pursuit. Under the conditions imposed, he only hopes to get co-operators among those patriotic persons, who will be influenced by the facts, arguments, and feelings which convinced his own mind of the great probability of ultimate success, and which, therefore, renders him willing to undergo all the intermediate privations and perils of property and person incident to the prosecution of the enterprise.

In other countries, an undertaking of such magnitude is the especial duty of the government; but, in the United States, we are indebted to individual zeal and perseverance for the origin and prosecution of the grandest plans of national utility.

On the 26th of April, 1832, the Committee on Agriculture of the House of Representatives reported a similar bill; and your committee now refer to the accompanying report and other documents. Your committee need not dwell on the services of the memorialist, nor recite the precedents of equivalent grants to foreigners, as the memorialist is content to rest his claim solely on the merit of the enterprise, with the facts that by the terms of the bill now reported, if he succeed, the government and the country will be benefited in the proportion of a thousand to one, and if he fail, himself and his associates will be alone ruined. From the specimens of fibrous-leaved plants and of foliaceous fibrous submitted to your committee, they are convinced that if those plants alone can be propagated in southern Florida, of which they have no reasonable doubt, they will form highly important additions to the agriculture, manufactures, and commerce of the Union. The committee annex to this report several explanatory letters and other important documents, from one to four.

INTRODUCTION OF TROPICAL PLANTS.

[The following communication from Dr. Perrine, arrived after the foregoing pieces, on the same subject, were in type.]

To the Editor of the Farmers' Register.

Washington, D. C., 11*th April*, 1838.

Sir—Five days since, the subscriber had the honor to direct to you a copy of the 'Report of the Committee on Agriculture' of the House of Representatives, accompanying the bill to encourage the introduction, &c. of tropical plants; and he now has the pleasure to transmit you a copy of the 'Report of the Senate Committee' on the same subject. Besides the usual number of 1114 copies of each Report, 5000 extra copies were ordered to be printed; and the subscriber, at his own expense, has purchased 100 super-extra copies of each, from which are taken those presented to you. The subscriber is firmly convinced, that if congress were to pass a general law to grant all southern Florida on the terms of the bill for one township alone, not a single settler would accept a single section on condition of the successful introduction and cultivation of new and valuable staples of agriculture, adapted to the most sandy, swampy, and steril, or hitherto unproductive and worthless soils. Although it has been reaffirmed by all persons experimentally acquainted with southern Florida, that it is uninhabitable by the white man, and hence not worth even the medicines of the soldiers necessary to conquer it; yet the mere fact of the petition of the subscriber for a conditional grant to experiment the correctness of his theory, that the benignity and fertility of the climate will counterbalance the malignity and sterility of the soil—the mere fact of asking for the power of location in this reputedly uninhabitable region, is supposed by suspicious indolence and by jealous ignorance, to indicate that I must have discovered some mine of treasure in a six miles square of country never seen by the subscriber. The subscriber believes firmly in the truth of all the official reports of the sickliness and sterility, and absolute worthlessness of the soils of southern Florida; yet in the 'Reports of the Committee on Agriculture' of both houses of congress, you will see developed the leading facts on which rest his hopes of success for new staples of the tropics within tropical Florida. At all events, the subscriber has not yet encountered any intelligent agriculturist who does not agree that the interests of the government and of the nation would be promoted, by ceding all the worthless public lands, on the terms embraced in the bill for a single township, or the forfeiture to government, within eight years, of every section which should not be successfully occupied and cultivated with new and valuable staples.

It is presumed that every disinterested statesman would at least go so far as to admit, that the government should cede, at the least, one-half of all its *unproductive* lands, on similar conditions, since every other government in the world cedes all its most productive soils to actual cultivators. The subscriber confidently entertains the hope, that if you give due attention to the documents aforesaid, you will give a corresponding support to the enterprise, as he wishes only that kind and degree of aid, which investigators of the subject may consider due to its merits. He has no fear of open hostility from any personage, either in or out of congress, who shall have previously taken the trouble to make himself acquainted with the length, depth, breadth, and bearing of the topic. His only apprehension is from congressional delay—delay—delay already extended to six years since the first bill was as unanimously reported as the last have been. By noticing the proceedings of the agricultural societies of New Orleans and of Charleston, and the resolutions of the legislature, you will be able to decide whether your influence could be beneficially exerted in a similar way, or whether it may be more profitably directed to individual members of congress, with the sole view of having the bill taken up the present session and passed into a law, or entirely rejected, on its merits or demerits, whichever may seem to predominate, after a fair, full and free discussion.

H. Perrine.

[Document annexed to Dr. Perrine's Petition.]

NEW ZEALAND FLAX LILLY.

Curti's Botanical Magazine, Dec. 1st, 1832. *Phormium tenax. Thumb. Diss. Nov. Gen. p.* 94. *First Gen. n.* 24. *Prodr. p.* 325. *Cook. Voy. v.* 2, *p.* 96, *cum. Ic. Thouin in Ann. du Mus. v.* 2, *p.* 228, *et* 474, *t.* 19. *St. Fond. v.* 19, *p.* 401, *t.* 20. *Redoubt. Liliac, t.* 448-449. *Ait. Hort. Kew. ed.* 2, *v.* 2, *p.* 284. *Schult. Syst. Veget. v.* 6, *p.* 621. *Spreng. Syst. Veget. v.* 2, *p.* 76.

Description.—*Root* fleshy, forming a somewhat tuberiform root-stock, creeping beneath the surface of the soil, and sending up many tufts of luxuriantly growing *leaves* from four to eight feet long, and from two to four inches in diameter. They are distichous, vertical, coriaceous, deep green, somewhat glaucous beneath, finely striated, ensiform, the margin and nerve, especially at the backs, are reddish orange; at the base the inner edge has a deep furrow, which sheathes the leaf immediately within it, and upon various parts of the surface a gummy substance flakes off in white spots or scales.

From the centre of these tufts of leaves arises a *scape*, "12 feet high, with 13 branches, of which the lower ones contain about 20 flowers, and the upper ones a less number in gradual diminution as they ascend to the top." These flowers are panicled and secund, ascending or pointing upwards; the *peduncles* and *pedicils* rounded, glabrous, often tinged with purple, and sheathed with scales or bracteæ *margined* with red.

The lower flowers of the branches seem to be very generally abortive and deciduous, breaking off at an apparent joint; the upper ones bear almost ripened capsules, while many of the former are still in full flowers, and these capsules are oblong, tuquetious, brown and wrinkled, attenuated slightly at the base, and surrounded by the withered stamens and floral coverings, acuminated at the extremity, and terminated by the persistent but withered style, somewhat fleshy, three celled, each *cell* bearing numerous, compressed, imbrecated and erect seeds, inserted upon the inner angle of each cell.

In Cook's 1st voyage, Sir Joseph Banks discovered this highly useful plant. Speaking of the productions of New Zealand, he says: "But among all the trees, shrubs and plants of this country, there is not one that produces fruit, unless a berry, which has neither sweetness nor flavor, and which none but the boys took pains to gather, should be honored with that appellation. There is, however, a plant that serves the inhabitants instead of hemp and flax, which excels all that are put to the same purposes in other countries. Of this plant there are two sorts: the leaves of both resemble those of flags, but the flowers are smaller and other clusters are more numerous; in one kind they are yellow, and in the other a deep red.

From the leaves of these plants, with very little preparation, the natives make all their common apparel; and they also manufacture their strings, lines and cordage for every purpose, which are so much stronger than any thing we can make with hemp, that they will not bear a comparison. From the same plant, by another process, they draw long slender fibres, which shine like silk and are as white as snow; of these, which are also surprisingly strong, the finer cloths are composed; while of the leaves, without any other preparation than splitting them into proper breadths, and tying the strips together, they make their fishing nets, some of which are of an enormous size. A plant which with such advantage might be applied to so many useful and important purposes, would certainly be a great acquisition to England, where it would probably thrive with very little trouble, as it seems to be hardy and to affect no particular soil, being found equally in hill and valley, in the driest mould and deepest bog. The bogs, however, it seems rather to prefer, as near such places we found it to be larger than elsewhere."

The seeds brought home by Sir J. B. in 1771, did not succeed; but the New Zealand Flax Lilly was introduced to the Royal Garden at Kew, through the medium of the same enlightened individual in 1789; and thence has been liberally distributed to collections in England and on the continent. Mr. Aiton sent it to the garden of the Museum of Natural History of Paris in 1800; has been cultivated in the open air of many districts, and first produced flowers in the department of *Drôme*, 1812, but it bore no fruit. Messrs. Labillardiere, Faryas de Fond, Desfontaines and Freycinet have devoted much attention to the cultivation and manufacture of this plant. It has even withstood the severe winters of Paris, but in the south of France it has been propagated with considerable success, and survived the winters without the smallest protection. In the departments of the west, particularly in the environs of Cherbourg, it has perfectly succeeded and yielded ripe fruit.

It is readily increased too by dividing the roots. Allen Cunningham, a very intelligent botanist and traveller, gives the following account of the flax lilly. "The Phormium tenax is indigenous to the Islands of New Zealand. On the northermost of the Islands [Equaterward] which has been traversed almost in every direction by Europeans, it is found in greater or less abundance, as well on the immediate coasts in low situations, subject to be overflowed by the tide, as in the inland country, generally, in grounds more or less swampy. Extensively diffused as this valuable plant is over the surface of the Island, it is along its western coast to the southward of the parallel of 35°, and in Cook's Streight, that the greatest quantities have been found, where it is said to grow in fields of inexhaustible extent. The indigenous growth of the Phormium is not limited simply to New Zealand; for it was long ago discovered in a wild state at Norfolk Island, where it forms long tufts along the cliffs, within the influence of the salt spray rising from the heavy surfs which ever and anon lash the iron-bound shores of that small but truly beautiful spot of the Pacific. The preparation of the flax for their own use, or for exchange with Europeans, is effected by the native women; and their method of separating the silky fibre from the long flag-like leaf of the plant, of which it forms the under surface, appears simple enough. Holding the apex of a *recently cut leaf* between their toes, they make a transverse section through the succulent matter at that end with a *shell*, (which they still employ, although they possess every species of iron edge tool) and inserting the shell (said to be of the Genus Ostrea) between that substance and the fibre, readily effect its separation by drawing the shell through the whole length of the leaf. It is to be observed that the separation is always performed by those people when the vegetable *is freshly cut;* as the leaf contains a gum which causes the fibre to adhere more strongly when dry. Nor have the attempts of Europeans to extract the filaments from the leaf *by maceration*, been at all successful; the experiments that have been made at Sydney, showing that the large proportion of the succulent matter, (for so the failure was accounted for) rendered it impossible to effect the separation by decomposition in water, without *materially injuring the strength* of the fibre. Simple as appears this mode of separating the flax from the leaf by a shell in the hands of those savages, still the European has not succeeded in his endeavors to prepare the fibre for himself either by *that* or any other means that have been tried; nor has any instrument or piece of machinery yet been invented to enable *him* to strip off and prepare this valuable filament for the English market. The Port Jackson Traders must still be dependent on the native women and their shells for the cargoes they obtain. The flax thus obtained by the merchants of Sydney, undergoes no heckling, cleaning or other preparation previous to its being shipped for the English market; but it is merely made into bales by being put into a press and screwed. It is manufactured into every species of cordage excepting cables, and Mr. Bigge, the Commissioner of Enquiry to New South Wales, observes, in his Report, pp. 52-53, "that its superiority of strength to the hemp of the Baltic, has been attested both by experiments made at Sydney, and by one that was effected under his own observation in the King's Garden at Deptford."

An experienced captain of a merchant vessel, who had been 35 years at sea, and many years in the trade between Liverpool and Mauritius, spoke much in commendation of the ropes made of the New Zealand flax, having employed them in the ships he had commanded. He had proved its superiority to hemp in ropes upon which there is always a great strain on shipboard; such as stays, braces, tacks, sheets, &c. and such were the strength and elasticity (hence its value for *stays*) and durability of fibre of the New Zealand flax, the ropes could be made of less dimensions, and therefore more convenient to use than those of Baltic hemp required for the same purposes. A *new main sheet*, (which in a cutter is a rope on which there is ever much stress,) after a nine months' voyage, was still good and serviceable, whereas had the rope been made of Baltic hemp it would have been so worn by strain and friction, it would have been necessary to bend another for the return voyage of 7 or 8 weeks' duration.

For many years past, some communication has been kept up by individuals residing at Port Jackson with the natives of New Zealand: but it is only of late that the trade in flax has been found to be a profitable speculation. Of this the merchants of Hobart's town and Launcerton in Van Dieman's Land are now fully aware; and having had their attention turned to its advantages, they are beginning to prosecute it with ardor.

From the experiments of Mon. Labillardiere the relative strength of the New Zealand flax is as follows: the fibres of common flax broke under a weight of $11\frac{3}{4}$; of common hemp $16\frac{3}{4}$, and of the lilly flax 23 7-11—that is, the New Zealand flax is nearly 50 per cent. stronger than common hemp, and fully 100 per cent. stronger than common flax. These *foliaceous fibres* possess also this further advantage over the *cortical fibres* of flax and hemp; that is of the brilliant whiteness which gives them a satinny appearance, so that the clothes made of them need not be bleached by a tedious process, or through those other means by which the quality of flax and hemp is considerably injured. M. de St. Fond asserts that the fibres may be obtained from the leaves by boiling them in soap water. Twenty-five pounds of the split leaves tied in bundles are immersed into a sufficient quantity of water in which three pounds of soap are dissolved. They are all then boiled during five hours until the leaves are deprived of a tenacious gluten or of a gum-resin; and then they are carefully washed in running water. To me it appears this must be an expensive process—yet as the recent accounts from France state that the whole expense of the mode now pursued to obtain these fibres does not exceed six francs the quintal, it seems that French chemistry must have accomplished the desideratum which English mechanics have attempted in vain. Yankee ingenuity, however, has not yet been engaged in the invention of machinery to effect the separation of these foliaceous fibres by simple scraping only. It is true that the machinery will have to be more complicated than the simple apparatus which will suffice for the leaves of the Agaves, of the Bromelias, of the Yuccas, and of all other plants with flat sword-shaped leaves without a midrib. The leaf of the New Zealand flax lilly not only has a midrib extending from base to apex, but also towards the butt the sides of the leaf are folded together, and hence simple machinery cannot be easily applied to scrape the entire leaf. Nevertheless, the simple splitting of the leaves into two divisions through the midrib may overcome this difficulty. The simple process of shell scraping by the natives is undoubtedly the very best of all to preserve both the strength and the color of these foliaceous fibres; and hence the high importance of an American invention to effect the same scraping by labor saving machinery. It is not, however, absolutely essential that machinery shall be discovered to render the propagation of the flax lilly profitable in Florida and in our southern states. Its generic name alone, derived from Phormos, a basket, was given in allusion to one of the uses made of the entire leaves of the plant in its native country. All travellers have spoken with pleasure of the varied uses of the leaves by these rude people for domestic manufactures. Besides their baskets, their mats have excited many encomiums. Some mats are said to be of a peculiarly fine and glossy texture, with deep borders of various devices and different colors worked all round; the style of which, even to a Parisian belle would appear chaste and fashionable. Even the dresses of the natives were made of those leaves, split into 3 or 4 slips, and when dry, interwoven into each other so as to form a kind of stuff between netting and cloth, with all the ends, 8 or 9 inches long, hanging out on the upper side, like shag or thrumb matting. They also made a sort of cloth as coarse as the coarsest canvass, but it was "ten times as strong." Immense fishing nets we have seen, are made by simple tying together slips of the leaves. Of the uses to which the entire leaves and slips of the leaves would be converted to in the United States, some idea may be formed by a reference to the ingenious industry of our country women in the manufactures of hats, bonnets, &c. from the leaves of palms and the stalks of grasses. From strips of the leaves of this flax lilly, hats, bonnets, baskets, &c. would soon be made of much greater beauty, strength and durability than even the celebrated costly hats of Panama; and the price would be reduced proportionately as much as it has been reduced in the price of similar articles now manufactured on the farms and in the families of the New England states, when compared with the sum at which they were sold when imported from other countries. Hence the propagation of this single plant alone on the worst soils of the Southern States, would not only cover them with a dense population of small cultivators, but might also triple that rural population by giving employment to their families in really domestic manufactures. At all events the numerous small cultivators of the south would thus be enabled to furnish the cheapest possible raw materials for the numerous small manufacturers of the north; and would thus create a mutually profitable and harmonious dependence of the great masses of population in both sections of the Union on each other.

The increase of the flax trade with the New Zealanders, may be inferred from the following statistical facts. In 1828, the export of New Zealand flax from Sidney to England was 60 tons, and valued at £2,600 sterling. In 1830, the same exports ascended to 841 tons; and in 1831, to 1062 tons, for the English market alone. That this flax lilly can be profitably propagated throughout all our southern states, may be inferred from the fact, that it is profitably cultivated in the southern departments of France, and from the still more decisive fact, that it has flourished several years in the open air of Charleston, S. C. For my own part, I have not the slightest doubt that it may be spread over all the worst soils of the southern and southwestern states, especially in the pinewoods, magnolia swamps, and other evergreen forests between the Potomac and the Mississippi. Should it not extend farther inland than the live oak, or within the influence of the saline atmosphere of the ocean, it merits to be spread over the whole extent of country heretofore covered with the live oak. At all events, there is every human certainty that the territory of Florida is especially adapted to the flax lilly, and that it might there be extended over millions of acres, as it is in its native New Zealand and Norfolk Island. My convictions of its certain success in Florida, are founded on the descriptions of the climate and vegetation of New Zealand given by all travellers. Although these islands are situated between 34 and and 48° S. L., yet as they are very narrow in proportion to their length, their temperature is more moderate and uniform, and the atmosphere more humid than would be inferred from their latitudes alone. In a voyage to New Zealand in 1814-15, by John Liddiard Nicholas, Esq. and Rev. Samuel Marsden, they say, in speaking of the Bay of Islands, lat. 25° S. "The climate was so salubrious and inviting, that even in the depth of winter no other change was perceptible than a few refreshing showers, which gave mellow and vernal softness to the fields, while no sudden or violent transitions ever disturbed the serenity of the mild atmosphere." Again, on their excursions into the interior of the Northern Island, they remark, "there was one feature of the country which every where struck us with admiration; and that was the fine rich verdure of the landscape wherever we turned our eyes, and which gave us at the same time a high opinion of the genial influence of the climate. In 'Hawkesworth's Voyages,' v. 3, p. 34, it is said, "From the vegetables found here, there is reason to conclude that the winters are milder than those of England; and we found the summer not hotter, though more equally warm. Of musquitoes and sand-flies, a few were found in almost every place where we went ashore." In another place, it is observed that the English vegetables left by Cook on his first voyage, continued to propagate themselves, although many of them were too tender to survive a winter in the open air of England. The character of vegetation also confirms my opinions. Many New Zealand plants are such as are found within the tropics or on their borders. The shores in many parts are beset with mangroves; the interior is covered with arborescent ferns, and in many parts the woods are so overrun with supplejacks, that it is scarcely possible to force one's way among them. Among the trees, were observed two or three kinds of fern like those of the West Indies. At Norfolk Island, where a sort of spruce pine trees are very large and very abundant, cabbage palms, of 10 to 20 feet high, are also a spontaneous growth; and here the flax lilly is still more luxuriant than in New Zealand. In New South Wales they give a decided preference to the flax lilly of Norfolk Island both for quantity and quality.

But in both islands, whether in pine forests or undulating savannahs, whether on the seacoast or in the interior, on hills or in valleys, the flax lilly flourishes in the greatest profusion, as well in the most exposed, as in the most sheltered situations.

Enough, however, I trust, has been said to prove that this flax lilly can be propagated easily, at least throughout all Florida, and probably throughout all our southern and south-western states. As the fields of France already furnish lilly flax enough to afford employment in manufactories to several thousand workmen, it may be anticipated that the forests of Florida will furnish soon flax lilly leaves enough to employ a million of family manufacturers.

HENRY PERRINE.

Washington, D. C., 19th Feb., 1838.

From the Journal of Agriculture.

THE MARRIED AND UNMARRIED.

Some very curious facts on the subject of marriage, as connected with longevity, are stated by Dr. Casper, in a paper of his, lately published at Berlin. It had been long ago vaguely asserted, that bachelors are less long-lived than married men. Hufeland and Deparcieux were of this opinion; and Voltaire observed that there were more suicides among those who had not given hostages to fortune, than among those who had. Odier, however, was the first who set on foot the inquiry with exactitude, and he found (Bibl. Britannique, 1814) that, in the case of females, the mean duration of life for the married women of 25, was about 36 years; while for the unmarried it was about 30½. At 30 there was a difference of four years in favor of the married; and at 35 two years, and so on. It may be said, perhaps, that married females ought to be considered as picked lives; but, as Dr. Casper observes, this is far from being generally the case, especially in the middle and upper classes of society; it is chiefly among the lower orders, where a livelihood is procured by labor, that importance is attached to the bodily health and vigor of the female. With regard to men, we gather from Deparcieux's and the Amsterdam tables, that the mortality of those from 30 to 45 years of age, is 27 per cent. for the unmarried, while it is but 18 for the married; and that for 41 bachelors who attain the age of 40, there are 78 married men. The difference becomes still more striking as age advances; at the age of 60 there are but 22 unmarried men alive for 48 married; at 70, 11 bachelors for 27 married men; and at 80, for the three bachelors who may chance to be alive, there are 9 benedicts. The same proportion very near holds good with respect to the female sex: 72 married women, for example, attain the age of 45, while only 52 unmarried reach the same term of life. Mr. Casper, in conclusion, considers the point as now incontestably settled, that, in both sexes, marriage is conducive to longevity.

THE BLENDING OF WINE, SILK AND DAIRY ESTABLISHMENTS.

To the Editor of the Farmers' Register.

Brinkleyville, Halifax Co., N. C.,
March 16, 1838.

Having reason to believe it not contrary to the wishes of the writer, I send you, and offer for publication, a letter I received by our last weekly mail from N. Herbemont, Esq. of Columbia, S. Carolina; a gentleman, long known by the intelligent American public, as a zealous promoter, by his pen and example, of agriculture in general, as well as of the wine culture in particular. I beg leave, however, to accompany the publicity of this letter with a passing remark or two on some of the topics noticed therein.

As to honoring my name by conferring it on the kind of grape I have been instrumental in bringing into notice, I consider the doing of this rather premature, to say the least of it. The peculiar excellencies of this grape may be merely *local.* In our locality, it has amply proved itself to be as I have described. And it is the opinion of all intelligent visitors to my vineyard, who have seen it, partaken of its fruit, and judged of the wines therefrom, that it will prove a first rate kind for our country in general. But this remains to be tested by experience, the only infallible criterion in such matters. Apart from its locality, it may not be found worthy to retain a name at all.

And the above-named criterion will be had ere long; for I have lately sent vines and cuttings thereof into various sections of our country, as New England, and the states of New York, Alabama, South Carolina, and Ohio. N. Longworth, Esq. of Cincinnati, now noted as one of the greatest *vignerons* of our country, assured me in a late letter, that he would test the qualities of the Halifax as a wine grape in 18 months.

And if permitted to compare facetiously little matters with great ones, I know not but if I assent to Mr. Herbemont's proposition, I might do a like injustice as that done by Americus Vespucius to Columbus. As named, in answer to late interrogatories propounded to me in a letter from a highly esteemed correspondent, A. B. Spooner, Esq. this vine first attracted my attention in a vineyard of a Mr. Smith of this county; or, in an enclosure of his I call *nature's vineyard*, because formed by leaving vines in woods while clearing, and the trees round which they had entwined themselves. But if still thought, by those competent to judge, that the successful *cultivator* ought rather to be entitled to have the honor of the name, than the original *discoverer*, I should, as I have said to Mr. Herbemont, in answer to his suggestion, prefer retaining the *Halifax*, and have the grape called *Weller's Halifax*, if found, in due time, worthy of a *name*, or *change* of name.

On reading Mr. Herbemont's letter, I was highly gratified to find that, in publicly avoiding an opinion that the grape and silk culture might, with the greatest advantage, be conducted by the same hands and in the same establishment, I was but reiterating the sentiments of so good a judge on such subjects.

The peculiar advantages of blending a dairy establishment with those of the vine and silk culture, never occurred to my mind till suggested by Mr. Herbemont's letter. But, as he states, it must be evident to every competent judge on the subject, that *negatively*, the business of the dairy establishment would not interrupt the business of the others, but would *positively* conduce, by its healthy diet and profit, to the advantage of all concerned. But here, I confess that the advantages of stock or cattle for enriching the ground, preparatory to the culture thereon of vines or the mulberry, are not, I consider, so great as some would suppose. According to my 'American System of Vine Culture,' manures (so far as necessary) from the place of *wood-pile*, from low-grounds and sides of ditches, and from the woods, are competent, in general, to ensure complete success. That is, I conceive other than animal manure is better for both vine and mulberry culture; and that the resources on almost every plantation of chip manure, swamp or ditch bank dirt, rotten logs from the woods, surface earth from the same, and, after vines or trees have sufficiently advanced, leaves, pine straw, or green pine boughs strewed thickly underneath, answer all purposes of sustaining the bearing and flourishing. But suppose, as Mr. H. states, the poorer lands of a plantation, (with the above help,) will answer for vine and silk culture, independent of help from the kine of the dairy, yet the richer lands need the latter help to sustain the stock in return, by clover and grasses, and roots, as well as to afford bread-stuff for all.

And here I am tempted to branch off into a long digression on the great advantages of clover, other grasses, and root culture, to support the stock, as well as for other purposes; and advantages of stock, on the other hand, for keeping up and enriching lands preparatory to the above objects of culture; but aware that time and space forbid, I beg leave to add, in conclusion, a few remarks only on the dairy, and means of sustaining one to the greatest advantage in our southern country. And first, a general error is to be avoided; that is, of suffering cattle to run at large, instead of soiling or pasturing, as is done in England, whence come the improved breeds of cattle, and as is done in Goshen, the famous place for butter in New York state. Another error connected with the above, and unknown, I believe, in the above-named places, is that of allowing the calves to suck the milch cows. I say, connected with the above, for I cannot conceive any reason for the practice, except that of inducing the dams, wandering in the woods in the day time, to return to their calves at night. Now field-pasturing avoids the troublesome business of *whipping* calves away from their dams before a moiety of the milk can be obtained, and absurd notion that cows cannot be induced to "let down their milk" before the calves first suck. But here, to avoid these errors, I confess requires preparatory steps—steps almost as necessary as to have a mulberry orchard before you can make silk. The clover, or other grass culture, should be first attended to, in order to sustain both calves and cows; and it is also desirable to enter upon ruta-baga culture, not to name other esculents. And I candidly confess, that in our southern clime, connected with sandy soil, are peculiar difficulties to overcome, in order to successful clover culture; which culture may be called the key to all after permanent improvement and sustaining of lands. But such difficulties (as I, in common with others, have proved) are not insurmountable. I have found that even on most light and sandy soils, by first manuring well, if necessary, (leached ashes highly important,) and sowing clover with wheat early in the fall, after taking off a forward crop of corn, or cutting up some after grains are glazed, good clover lots may be had, and a system of improvement thereby kept up, as well as the dairy. The object in sowing clover in the fall on light sandy soils, is to have the clover grown in the fall beyond danger of being winter-killed, and to have it so well rooted in the spring, as to sustain safely the summer droughts, so heating to sandy soils. For greater security of the crop, by pushing the growth, I sow a mixture of plaster of Paris and leached ashes—say, one bushel of the former to three of the latter per acre, after the clover is in third leaf. An old field of broom sedge enclosed, will answer for a standing pasture till the clover is in blossom, or fit to pasture or cut for soiling.

The ruta-baga I have found a sure and very abundant crop, by manuring plentifully in the drill where necessary, and sowing, or rather planting, about or before the middle of July. No better vegetable, not only for family use in general, but for fattening cattle and making cows give abundance of milk in winter.

By the aforesaid plan of managing cows and calves, I have had both to do far better than those of my neighbors, by the old one in practise here.

From *two* cows, I have had produced more milk and butter than some around me from *two dozen*. It is true, at first, I had to use personal vigilance, as well as example, to prevent ignorant hirelings from bringing to pass, by negligence, their own *prophecies* of cows going *dry*, and calves *starving*, under the *new* plan. Had to supervise the milking process, and teach the calves by insertion of a finger in their mouths, under the milk at first, to drink (their mother's milk for two or three weeks, afterwards corn meal gruel); but this done, even prejudiced ignorance itself had to confess my plan the best. As I am for abridging labor in all feasible cases (my vineyards afford an example, under the "American System," of pruning only in summer, and after prevented being bushy vines not curtailed in length, and no necessary work on plantation by common quota of hands much interrupted,) shall I suggest a method to save the hard work of a hand, where the dairy establishment is considerable; which saving may be considered especially important, where the three sorts of business may be conducted in the same establishment.

The method I would propose, is that of putting the labor of churning upon *dogs;* and that, too, without abridging the plantation usefulness of these animals. Various expedients were once resorted to in the Goshen district of *butter* celebrity, as that of a rolling or log machine drawn by a horse. But finally, they fixed upon a process that combined simplicity and economy. A machine, costing a mere trifle, consisting in part of boards or planks, so put together that the surface resembled a large cart wheel, and this, in the position of an inclined plain, was the receptacle for the dog; so placed thereon that he must *step* and *turn* the wheel, or *choke;* (the former *alternative* he always *chooses.*) The turning of the wheel moved some simple machinery above, connected with the churn within doors.

In fine, Mr. Editor, to bring this communication to a close (now extended to a length unthought of at first on my part,) I would most respectfully suggest, that at this period, when premiums are offered by a wise munificence of some legislative bodies of our country, to encourage silk culture, as well as other agricultural pursuits, that a handsome reward be held out to individuals of *capital*, as well as of spirit and enterprise, to exhibit practically the benign bearing or effects of combining the vine and silk culture, and dairy business, in one large or considerable establishment. And may I here be permitted to express a wish, that the legislative bodies of the Old Dominion and Carolinas would *snatch* the *laurel* from their sister states, in being first to call forth this enterprise by their timely munificence.

SIDNEY WELLER.

A remark or two I wish to add, or wish to be added, if deemed best, by way of notes or P. S.

The entire *Goshen* system alluded to, of managing cows and calves, is to let the calves intended for *veal* suck all the milk of their dams, for three or four weeks, and then butcher them. But those intended for raising, as before stated, are immediately separated from the cows, and learned to drink.

One advantage, not to be overlooked, of combining silk and vine culture, is the healthiness of grape fruit; or that all employed in the blended establishments may have, in the most sickly season of the year, free access to a diet, that not only counteracts or anticipates disease, but excellent, if from any cause disease occurs. Invalids, by advice of physicians in parts of Europe, with the happiest effect, confine themselves for months to a grape diet; making it answer for both *meat* and *drink*.

That a grape diet of the right kind (I mean *ripe* berries of select varieties for American vineyards, not *green* ones, or those *snatched* from the birds and opossums in the woods,) I know is excellent, from the experience of my own family and neighborhood. We are in general never more healthy than in grape culture; and none of my household and hands, of late years, have been *stinted*, but have partaken abundantly of grapes about two months.

I have known persons, in cases of severe and continued sickness, to relish good grapes when they could eat nothing else, and there was reason to believe their lives were thereby saved.

The Isabella grape is particularly recommended in cases of bilious fever, and from trial, I believe the Scuppernong, and my Halifax, are not behind it in point of healthiness. But it may be objected, that grapes for common diet must be very *costly*. Not so. If vineyards have a proper selection and management, there are few things else cultivated will produce more human food from the same space of ground.

Mr. Broddie's Scuppernong vineyard, (I have noticed before,) of half an acre and fourteen vines, yields 20 barrels of wine annually; and all his neighbors partake abundantly, by visitations and carrying away baskets of the fruit.

Of the yield of my vines I intend to speak, in a separate communication, to sustain the same position. Suffice it to say here, that owing to the fatality of the past season to grapes predisposed to rot, my chief dependence for fruit and wine was on the Scuppernong and Halifax. Avoiding particulars here, I will say, that from a small space of ground, canopied with these vines, after bushels being taken away by visitors (often 20 a day) and sold to those sending from a distance, I made upwards of 100 gallons of wine. I have noticed, after a visitation of 20 or more persons to a few vines of the above-named sorts, no perceptible alteration of appearance, but the same thick *purple* or dark *cloud* of fruit remaining. I cannot forbear here stating a particular or so in regard to the yield of these vines. One Scuppernong, a square of ten feet of canopy being measured, produced at the rate of 870 bushels per acre, (a bushel of Scuppernong grapes makes nearly four gallons of wine when well pressed,) and that, too, after giving its share of fruit to visitants. One Halifax, at the 3rd year's cultivation, yielded a half bushel of grapes; another at the 5th year, a bushel; and another grafted one at the 4th year's growth, one and a half bushels. (One bushel of Halifax berries in racemes, makes more than three gallons of wine; if pulled from racemes, would make as much as Scuppernong, I presume.) And considering the space occupied by the foregoing vines, I believe the yield full as great for the ground, as that of the Scuppernong above-named.

By the facts of warning against disappointment of success in clover culture, in our southern *sandy soils*, I would not be understood to discourage sowing clover in the *spring*, in ordinary southern soils. The state of North Carolina is now going *ahead* in clover culture in many sections of the country, through the light thrown thereon by our agricultural periodicals. Last summer, I saw as fine a field of clover as ever I beheld, on the plantation of Mr. Massenburgh, a very intelligent, enterprising farmer, near Louisburgh, N. C.; and if I recollect his information, he was not even indebted to plaster of Paris for his success. My excellent and intelligent neighbor, Mr. William Thorne, has successfully cultivated clover for several years; but the first year he commenced would have been a total failure, had he not resorted to a dressing of plaster. A long dry spell came on in the summer, after he had sowed a bushel of clover seed in the spring, and his young clover was apparently *killed;* but the plaster revived it, and a very fine crop was the consequence of its resuscitation.

S. WELLER.

ON GRAPE AND SILK CULTURE.

To Sidney Weller, Esq.

Columbia, S. C., March 8, 1838.

Dear Sir—I have, yesterday, received your obliging letter of the 26th ult., and also three small cuttings of your grape vine, which you call "Halifax," and which I propose to call "Weller," after you. It is perfectly fair to name plants, or fruit of great value, by the name of the person who introduces them, not only into notice, but takes great pains to extend their culture. By this means, benefactors of mankind have their names honorably transmitted to posterity.

I am glad that your opinion coincides with mine, as relates to the culture of the vine and silk at the same time by the same person. There are, perhaps, no two articles of culture, the prosecution of which interferes as little with each other; for at the very time that the silk worms require all the attention and care necessary to their welfare, the vineyard should not be entered, and indeed with the proper degree of industry required in the culture of any thing, the vines must be, during that short period, in such a state as not to require any thing being done to them. Besides this coincidence, as to time, much is to be done in the vineyard that requires more attention than strength; so that the same persons who are adequate to the cares of the silk-worms, are also sufficient to do much that is required in the vineyard. What sources of wealth and comforts will, I hope, be some day produced, by the joint culture of these two valuable articles. They are the more valuable that they require no capital of any amount to be established, provided there are larger proprietors in the neighborhood. These would always be ready and willing to purchase of their poorer neighbors, their cocoons and the grapes of their own raisings; and these would gradually learn the arts of preparing the silk for market, and of making wine, *secundum artem*, as their profit would, in time, afford them the means of forming suitable establishments for these purposes. Another great advantage attending these cultures, so as to make them suitable for the poorer class of farmers as well as the richer ones, is that both these articles of culture, require land only of inferior quality for their fullest success. It is certainly a fact that the wines produced on poor light lands, are of a superior quality to those produced on richer clay lands. I have no experience in the culture of silk sufficient to enable me to speak of my own knowledge; but the books I have read on the subject, state the fact clearly and distinctly, that the mulberry leaves produced on poor land produce finer and superior silk. Here are, then, two objects as valuable, if not more so, than any other yet cultivated in this country, which offer the incalculable advantage of leaving the richer lands for other necessary articles of culture. I regret much that I am too old to hope to see the immense benefits, which our country will derive from the culture of silk and the vine. (We are never at a loss for finding a good reason for wishing to live long.) There is, I think, another object of rural economy that would harmonize well with the two mentioned above, and would tend to the great comfort of the cultivator, and that is the dairy. It appears to me that a dairy establishment would scarcely interfere at all, either with the raising of silk or of wine, and it would undoubtedly add much to the convenience and comforts, not only of the cultivators, but also of all the country around.

I had no idea at all of writing on these subjects, when I began to write; but my pen would go on, and I gave it its way. I merely intended to say, that I had received the three grape cuttings you were so obliging as to send me; that I gave one of them to one of my neighbors, who is also a zealous cultivator of the vine, and that I grafted the other two. I hope the box you are sending, will also arrive safe and in due season.

I am respectfully, sir, your obd't. serv't.

N. HERBEMONT.

MR. WELLER'S WINE.

We lately received from Mr. Weller, two bottles of wine, made by him from the native grapes referred to in the foregoing and a previous communication. One was labelled "Scuppernong," and the other, "Halifax Grape;" and both were of the pure juice of these grapes, except for the addition of sugar before fermentation. The two wines were tasted and drunk, not at the same time, but at times a week apart; and therefore we may have been mistaken in supposing that there was no difference in the flavor; nor was there any apparent difference in any other respect. From this close resemblance, it would seem that it is the process used, and not any peculiar quality of either grape, which gives character to this wine. Though fond of good wine, we make not the *slightest* pretension to the character of a *connoisseur*; and therefore our opinion on this subject may be worth very little. But according to that opinion, this wine is the most delicious drink that we have ever enjoyed. It is altogether unlike any known imported wine, except champagne, which it resembles in flavor, color, and transparency, but not in sparkling, as these are "still" wines. But what is most remarkable and admirable in them, is the preservation, in a high degree, of the sweet and rich scent of ripe muscadine grapes. Mr. Weller's wine has more of saccharine flavor, and less alcohol, than would please regular drinkers. It is altogether different, in color and flavor, (and often too in ingredients,) from what is sold under the name of Scuppernong wine; and it would be judged of very erroneously, if considered as merely a superior kind of the liquor generally sold as Scuppernong, or other common home-made wine, whether the latter be really principally a product of the grape, or merely a factitious compound.

REMARKS ON SOME PARTS OF MR. GARNETT'S ADDRESS.

Communicated for publication in the Farmers' Register.

Columbia, S. C., Feb. 17th, 1838.

J. M. Garnett, Esq.

My dear Sir—I have read with much pleasure, approbation and benefit, your "Address to the Agricultural Society of Fredericksburg," published in the last "Farmers' Register," and take advantage of a very cold morning, when I cannot go out, to make a few observations on some part of it. (I call this a cold morning; my thermometer was yesterday at 66° and it is now 32°, 9 o'clock A. M.; and now, when I finished writing, 3 P. M., it is 34°, although the sun has been shining ever since morning.

The account of your experiments on corn are very interesting, and it is very desirable that farmers and planters generally would do the same. Besides the advantages expected from experiment, such as the obtaining better and more productive varieties of the articles experimented upon, there is another great one, which is, that it has a tendency of producing a habit of careful culture and of observation; for the experimentor naturally wishes to succeed in what he undertakes, and will pay, in the conducting of his experiments, more care and attention than he would do in the ordinary course of his pursuits. He may do this unconsciously; and even in this he is benefited by the habits acquired by it. Agriculture being the real business of this country, particularly of the southern states, every effort should be made that has a tendency to produce a state as nearly approaching perfection as is practicable, by every means in our power. The aim of a shoemaker should be to become as great at his trade as he can; that of a lawyer to gain, by fair and honest means, as many causes for his clients as he can, that he may have an opportunity of reaching the first rank in his profession, and finally, to be at the very head of it. It is so with every pursuit, and we ought to keep the old adage in remembrance, "that what is worth doing at all, is worth being done well." Now, sir, as without agriculture, we can have nothing to eat, except what nature spontaneously affords, nor any clothing to keep us warm such cold weather as this, it follows that, if every man is not an agricultor, he is interested in the success of agriculture, as much so as he who pursues it as his profession. The natural and fair conclusion of this indisputable mode of reasoning is, that every individual in the country is interested in having agriculture carried up to as high a degree of perfection as it is possible. This renders the thoughtless folly of our legislatures in refusing any and every sort of encouragement and assistance to so useful and essentially beneficial a profession as agriculture, unaccountable, and I hesitate not to say, criminal. We may, it is true, find some excuse for such members of our legislatures as are not agriculturists, and that is that they do not know the wants of those that are, nor in what manner due encouragement and assistance are to be afforded. This excuse, however, does not reach the agriculturists themselves, who have much in their power to promote the great interest of the country and neglect doing so. The principle of "*laissez-nous faire*," which is by some insisted upon, does not apply here to its full extent, because, before we can carry on any business properly, there must be capital and stock in trade provided, and the doctrine of "*laissez-nous faire*" (let us alone) will not go far in procuring these; for they are chiefly knowledge promoted by a judicious application of pecuniary means and judicial enactments. The elements of agriculture should be taught in every school, and a professorship established in every college, that this most essential science in this country should be understood in some degree by every person in it; for there is no useless knowledge, and the professional man and mechanic who reside in cities can be but benefited by any extent of knowledge in a business like this, although it does not apply directly or immediately to the objects of their pursuits. This brings me to notice this most shameful fact for the United States, a country which is able to furnish bread to a great portion of the civilized world, that they have received, within a year or two, grain from Europe to the enormous amount of $5,333,962, as stated by you in your address. But, sir, you may not be aware that there is a considerable and shameful great addition to the amount of agricultural product imported from Europe into this country, to be added to your statement: That is, that a considerable quantity of hay has been for a couple of years imported to Charleston, not merely from the northern States, but from Europe. I believe, that notwithstanding this strange article of importation, there are few countries in the world better calculated for the production of the grasses and the making of hay, than South Carolina, and yet we import it and pay for it sometimes as high as $2 50, or even $3 per hundred weight. Wealthy as this state may be in its other agricultural productions, can the difficulties of the present times be a matter of surprise? It is only to be wondered at, that we have not suffered much more. It will probably be thought that I am of a querulous disposition, which may be true; at any rate, I hope you will not accuse me of this yourself, for if you did, I would say you have awakened the fit in me. Our excuse, is a very natural and aged one, that we have for many years made all the exertions in our power to produce a better state of things, and that, besides, it belongs to our time of life to bear such things somewhat impatiently. This being my acknowldeged infirmity, I beg my friends to put up with it as well as they can, in consideration of the undoubted good motives that prompts it.

There is, however, in the ways of the world, as relates to agricultural affairs, enough to vex the patience of even younger men. The very great liberality of the Editor of the Farmer's Register, in lately proposing to render his most invaluable publication, considerably cheaper than it is now, by additional subscribers, induced me, during the late session of our legislature, to make as much exertion as my feeble health would permit, and I had full expectation to succeed to some extent. Another subject, however, had taken hold of our representatives, and nothing could be noticed by them, but a subject upon which they could not legislate, and which ninety-nine hundredths of them did not at all understand, viz.: the currency. The consequence was a total disappointment; and nothing to which my effort tended was effected. I also endeavored to procure some aid of the marl districts of this state, from the members from that part of the country; but, as I could not mingle *currency* and *banks*, or *no banks* and the *subtreasury scheme*, I could not draw the least attention on the subject I wished to promote. I see, by a short communication, near the end of the last number of the Farmers' Register, by the Honorable F. H. Elmore, who is truly deserving of the epithet prefixed to the names of the members of congress, and a great friend to agriculture, that he sent a small specimen of marl to the editor, whose observations and well deserved reproofs on the inattention paid by the agriculturists of the lower part of the state to so valuable a resource at their hand, and which they totally neglect, and that his (the editor's) "request, advice, and instruction have not served to induce a single cultivator to marl even so much as an acre of land." "Truly," (continues he) "we have but small encouragement to persevere in offering to them advice and instruction."

Is it not surprising, my dear sir, how difficult it is to introduce any thing new, or improvements in our habitual practices? and this is more especially true in agriculture. It is not that they doubt the efficacy of the use of marl and other carbonates of lime, so much as that it is a deviation from their usual practice; for none of those to whom I have mentioned the great benefit derived elsewhere from its use, have shown any sign of disbelief, and the only objection that I could ever observe, was the necessity of making some exertion in a way different from their usual course, and also the expense attending it; although this last would not have been a material objection, if it could have been effected by merely paying the money.

Although I agree very well, generally, with you in your views of agricultural things and policy, yet there is one subject on which I cannot go so far as you do. You seem inclined to the opinion that, in the cultivation of corn, the cutting of the roots by the plough and other instruments is benficial to its growth. I admit with you that generally the benefit obtained from the ploughing out-does the disadvantage of cutting the roots; but I think that the corn does well, not *in consequence* of the roots being cut; but in spite of this mutilation. The land being in good heart, and stirred deep, has undoubtedly, the state of weather being favorable to the strength, caused many small roots with their spongioles to push from the ends of the mutilated old roots, and by this the crop does not seem to suffer. I have often seen, after such a ploughing, the weather being unfavorable, the corn to be much injured, by what is usually called "firing," which I attributed, perhaps erroneously, to the roots having been cut when the corn was not able to produce a fresh supply of them. The producing of these new roots with their spongioles is, however, in every case, an effort of the plant, which might probably be otherwise applied to other useful purposes to the plant's welfare. It is true we have no experiments that I know of tending directly to prove or disprove clearly and distinctly my opinion; but I think the experiment of Mr. James Camak, of Georgia, goes far to prove on one side of the question, that the roots of the corn never being cut in the course of its growth, is not an obstacle to the producing of a large crop. You know that his experiment was, first to plough his ground well and deep, plant his corn, and when it was only a few inches higher, to give it a slight hoeing, and then cover the whole field with leaves from the woods, three, four or five inches thick, and then let the field alone without any further work at all, till it was fit to be gathered. By this method, he obtained more than double the quantity of corn usually produced by the land. Now, I was formerly personally well acquainted with Mr. Camak, and know him fully deserving of confidence in his assertions, and incapable of willfully asserting that which was not most strictly true. His plan of cultivating corn is only practicable in new settled countries, where the abundance of forests affords a full supply of leaves, of which a very great quantity is required to cover a field. The cultivators in the old settled states, have put it out of their power, by their unprovidence in most wastefully destroying their timber; but it seems to me that this experiment favors my opinion very strongly.

There are many other parts of your most useful and interesting address, on which I intended making a few observations; but as these would have been of little worth, and that you must be tired of reading this long epistle, I shall close it here by assuring you that I am, most respectfully,

Dear sir, your obd't. serv't.

N. Herbemont.

Extract from the London Farmers' Magazine.

JERUSALEM ARTICHOKES.

I was determined to prove whether or not they could be cultivated to greater advantage than the potatoe, as *food for cattle.* One sack was consumed by a young calf at hand; it eat them with avidity, and improved on them. I took the other two sacks, and planted them in the midst of a five acre piece of potatoes. I set them without cutting,—measuring correctly an eighth part of an acre; the produce was in proportion to 630 bushels per acre,—the potatoes 327 bushels. The following year, the memorable one of 1826, I planted half an acre on a piece of thin gravel, old tillage land, in its regular course of preparation for a vegetable crop after wheat; they maintained their verdure through that extraordinary dry summer, and produced 150 bushels; but the potatoes by the side of them were completely set fast; they never formed a bulb. The year following, I set an acre on part of the same kind of soil, but of better quality; it produced 570 bushels, *without any dung.* A half acre on the same land, with the usual quantity of dung for turnips, produced 290 bushels (a bad compensation for eight loads of excellent dung.) This present season, an acre on the same land (part of my turnip-fallows) produced 576 bushels, but the wet state of the soil when taken up, and being a vegetable of uneven surface, which causes the soil to adhere to it more than to a potatoe, renders it difficult to come at the exact quantity. From an experiment I made of washing a sack, I can safely assert, I have 530 bushels of clean roots; whilst the vegetables on our flat gravels do not equal this by full 50 per cent. in value, except the potatoe, which produced 308 bushels on the same soil. I never could raise more in favorable seasons.

"The cultivation of the artichoke is the same as of the potatoe, except that it requires to be set early—not later than March; if laid above ground all winter, it is proof against the severest frost. When once cleaned, no weed can live in its dense shade; horses, beasts, and sheep consume it with avidity; pigs prefer a potatoe to it in its raw state, but prefer the artichoke when boiled or steamed. It attracts the game in a most extraordinary way; they resort to its shade in autumn; it forms one of the finest covers in nature. We are so fortunate as to have but little game in our lordships; I do not recollect ever having seen even a Swedish turnip bitten by a hare or rabbit, notwithstanding they will consume the artichokes left by the men in securing them.

If potatoes can be profitably cultivated as food for cattle, compared with Swedish turnips, mangelwurtzel, the sugar beet, &c. (which I much doubt,) the artichoke is vastly superior to them. The expense of culture is no more; it is not liable to be injured by frost; can be taken up at pleasure; it produces at least 30 per cent. more, and on poor land full 50 per cent., *is far more nutritious*, and leaves the land perfectly clean. The only objection that can be urged against their cultivation for cattle in competition with potatoes, is, that they require more care in taking them up. The frost not acting upon them so as to destroy vegetation, what are missed will, of course, grow among the succeeding crop, but I have found very little inconvenience in this respect."

From the British Farmer's Magazine.

BENEFICIAL EFFECTS OF BONE MANURE.

The very interesting details of the efficacy of the bones of animals when employed as manure, as set forth in Mr. Johnson's paper in your last number, induces me to trouble you with a short relation of their lasting effects on a small farm with which I was intimately connected.

On the northern slope of the river Colne, which separates the counties of Buckinghamshire and Middlesex, and within a mile or two of the town of Rickmersworth, lies a little farm which is famed for its great fertility. The lands on each side of this little Goshen were of the same quality, had the same south-east aspect, and were in every respect similar to the little farm itself; but the crops on this were invariably and constantly better than on the neighboring fields. It was an appendage to a much larger farm at some several miles' distance, at which the owner resided, and at which his numerous flocks and herds were kept; except a score or two of store sheep, which were occasionally sent to have the run of the leys and stubbles of the small farm.

The system of cropping was the same on this as on the surrounding farms, namely, the five-course:—fallow for turnips—barley and seeds—clover mowed twice—wheat—oats. But whatever were the crops, they were always superior, and created envious feelings among the surrounding farmers. I, as one of these, set my head to work, to discover what local circumstance could possibly render this spot more productive than the lands adjoining. It was, like all other land sloping to the east, of a deeper staple, and a finer loam, than the more abrupt and gravelly or rocky slopes which faced the westward. For this is a geological fact, and observable over all the continents of Europe, Africa, Asia, and America, that the western sides of all their hills are more precipitous than the eastern; and the western shores of these continents are more abrupt and broken than the eastern.

This has been accounted for by the supposition that the grand current of the Noachian deluge flowed from the westward, washing bare the western sides of hills and continents, and depositing the finer earths, thus removed, on the eastern slopes, as we find them at the present day.

That the surface of the little farm we are noticing was of this diluvial deposit, was very evident; but not more so than the other lands to the south and north of it; and yet, as already stated, it was of superior fertility.

In questioning an aged laborer who had long been employed on and about the said farm, as to how long it had had the character of being eminently productive? he answered, ever since it was farmed by the grandfather of the present owner, who, he said, was a very curious man in his farming; for he not only chalked all his land, but limed it frequently for turnips. And besides laying on it all the yard dung, he used to buy all other kinds of dress he could muster from the skinners and curriers of the neighboring town. But, above all, he used to collect bones from all the dog kennels around, had them broken into small pieces with sledge hammers, and spread them upon, and ploughed them into, the land, for any crop he wished to raise; and this he continued to do as long as he lived.

At his death this dressing with bones was given up; his son thinking them of no great value; and the larger farm at which he resided engrossing his chief attention, the small farm was but seldom visited, notwithstanding it still continued to maintain its old character.

The operations of the grandfather in improving his little farm, must have been carried on about 1765, and were almost forgotten till about fifteen years ago, when a Lincolnshire bailiff was hired to superintend the business of a large farm in the immediate neighborhood. This stranger began his improvements by applying crushed bones upon his turnip fallows, and upon some of his upland meadows. And when this was observed by the old laborer before alluded to, he declared that it reminded him of what he had seen done when he was a boy, by his old master on the little farm.

The discussions which took place among the farmers, as to the effects and value of bone manure, as recommended by the Lincolnshire bailiff, and the reports which appeared weekly in "The Farmer's Journal," produced a conviction in the minds of every one acquainted with the history of the little farm, that its extra fertility arose entirely from the great quantity of bones which had been imbedded in it so many years before. And it was strong proof of what was asserted by the bailiff, that their effect as manure would last for forty years.

The above account is a corroboration of what now appears to be a very general opinion respecting the use of bones as a powerful and lasting manure; and in this instance, the imperfect manner in which the bones were broken, has caused them to act more permanently than if they had been crushed into dust.

VERITAS.

EXTRACTS FROM THE REPORT ON THE AGRICULTURE OF ESSEX, MASS., 1837.

By the Rev. Henry Colman.

Essex county lies at the north-eastern part of Massachusetts; and is bounded on the northwest by New Hampshire; on the east and northeast by the Atlantic Ocean; and southeast by Massachusetts Bay; and on the southwest by the county of Middlesex. It embraces in extent 360 square miles. Its population in 1830 was 82,887; its present population 93,689; being about 260 inhabitants to a square mile. It contains twenty-six towns. It is intersected through its whole width by the river Merrimack, which empties into Massachusetts Bay at Newburyport; and the rivers Shawsheen and Agawam or Ipswich. Parker and Saugus rivers are likewise found, but are inconsiderable in length and magnitude.

The general surface of the county is uneven; but there are no hills of great elevation, and few, which may not be cultivated to their summits. The county, for its whole length on the eastern side, is washed by the Atlantic Ocean. Cape Cod, its eastern extremity, projects into the sea, a distance of sixteen miles; and the coast is lined with a rocky shore or extensive beaches; and pierced by innumerable inlets and creeks, on which are extensive tracts of salt alluvial meadow. The county abounds likewise in tracts of a greater or less extent of fresh meadow or peat-bog. A considerable amount of this land has been drained; and by the application of sand, gravel or loam to its surface, has been converted into profitable mowing. Much of this same description of land remains to be redeemed; and will fully compensate for the expenditure, which this improvement may require. There are considerable tracts on the Agawam river, the waters of which are forced back by the mill-dams thrown across it near its mouth, which must be regarded as irreclaimable while those obstructions remain.

The climate of Essex county is affected by its maritime situation. The proportion of snow which falls in the course of the year is considerably less than falls in the interior and western parts of the state; the proportion of moisture in the form of vapor, snow, and rain, is greater. The degree of cold is sometimes as intense, but not as long continued. The spring is in advance of the interior of the state generally, from a week to a fortnight; and the frosts, excepting in some particular localities, are not so early, nor severe. For healthiness, as far as this may be determined by the tables of longevity, this county may be safely compared with any part of the known world.

The whole number of acres in Essex county according to the reports of the valuation committee in 1831, is as follows:

	Acres.
Tillage,	14,113
English and Upland mowing,	31,947
Fresh meadow	15,471
Salt marsh,	14,139
Pasturage,	100,309
Wood,	22,058
Unimproved,	34,281
Unimprovable,	10,417
Owned by towns and other proprietors,	3,604
In roads,	6,606
Covered with water,	17,176
Total,	270,121

The soil of Essex county is of a primitive formation; and of various characters. There is a locality of limestone mentioned by the geological surveyor in Newbury and Bradford; but it is believed of small extent. There is little purely sandy land excepting on the sea-shore. There are extensive tracts of peat-bog. The soil on the sea-shore among the projecting cliffs and ledges, on the peninsulas and islands on the coast, with the exception of Plum Island, which is almost unmixed sand, is a deep rich loam, highly productive in grass, corn, oats, and potatoes. On the main eastern road from Salem to the extreme line of the country, there prevails generally a gravelly loam from six inches to a foot in depth; not difficult to be worked; and productive under good cultivation. The lands bordering on the Merrimack are much broken; but the hills are generally rounded, of not difficult ascent, and composed of a rich dark clayey loam. They ordinarily produce good crops of wheat, barley, corn, oats, and potatoes. This variety of soil embraces an extent of three or four miles from the river on the south side. On the west side the land is much more charged with sand, and is not so fertile. With the exception of a considerable tract in Haverhill and an island of fifty acres lying below the bridge in Haverhill, there is no fresh alluvial meadow on the river. The towns in the interior of the county are of various character, in some places presenting long strips and high eminences of rich clayey and gravelly loam; and in other parts a broken, thin, hungry, and stony soil, the cultivation of which is difficult and unproductive. The primitive forests have been long since removed; but there are extensive tracts of wood in different parts of the country. The maritime parts are principally supplied with fuel by importations of wood from Maine, or coal from Pennsylvania. The interior have a supply from their own wood lots; or their peat-bogs, the value of which is becoming more highly appreciated.

The soil has in parts of the country become exhausted; and in no part of it can it be advantageously cultivated without manure. The stony and rocky character of the soil is in some places an impediment to cultivation; but a large proportion of the land in the county is already under partial improvement or susceptible at present prices of labor, while present prices of produce remain, of profitable culture.

The county is well watered; and contains several ponds of some extent, the scenery in the neighborhood of which is picturesque and beautiful. Some of the situations on the Merrimack and many on the sea-shore are commanding in their position, and present views of large extent and great variety and beauty.

The farmers in Essex are particularly favored in respect to markets. Boston is easily accessible to most parts of this county, being from its farthest point not more than forty miles distant; and the large commercial and manufacturing towns of Salem, Lynn, Newburyport, Marblehead, Danvers, and Lowell, furnish a ready demand for whatever the farmer will produce. Of the whole population in Essex, there is reason to believe that not one-fifth part are engaged, properly speaking, in agriculture. The remaining four parts are consumers, not producers. The county of Essex is essentially a commercial and manufacturing district. Besides what may be called marketing, including the selling of hay, she sends no agricultural produce away; and she imports largely of bread-stuffs, vegetables, dairy-produce, mutton, beef and pork, together with a great amount of oats and corn for horse-feed. Rye is cultivated to a small extent, and the bread of the population is almost entirely composed of the superfine flour of western New York and the middle states.

Size of farms.—The average size of the farms in Essex, will not exceed one hundred acres, and farms of three or four hundred acres are scarcely to be found. The population of the county becoming daily more numerous, the land is continually undergoing subdivisions; and a large proportion of the persons engaged in the manufacturing and mechanic arts, are anxious to secure to themselves small parcels of land, for the sake of keeping a cow or raising their own fruits and vegetables.

Farming in the county is scarcely pursued as a distinct or exclusive profession; but as subsidiary to some other business or pursuit. In this way it has been eminently conducive to health, and productive of innumerable comforts; but no fair experiment has been made of it under the fair advantages of capital and labor and exclusive enterprise and attention, as matter of pecuniary income and profit.

From the same.

SALT HAY.

A large amount of salt hay is cut in the county. The marshes in Saugus, Lynn, Essex, Ipswich. Rowley, Newbury, and Salisbury, are extensive and productive.

The grasses produced on the salt marshes are various in kind and value. I prefer to give the common names, though these names may be regarded as local and provincial.

Black grass—deemed the best product: grows on the higher parts of the marsh, where it is only occasionally flooded by the tide; it is often thick and heavy, and it is desirable that it should be cut early. When well cured it is much relished by cattle; and deemed of almost equal value as the best English hay. I have seen this grass growing luxuriantly high up on the upland, where the seed was dropped from the cart; and it would be well worth the experiment to test its value as a cultivated grass in such locations. A farmer in Ipswich is of opinion, that if this grass is not cut very early, it should be cut very late, after the season of the fly has passed, which is apt to impregnate it, and occasion maggots in the mow, offensive to cattle. Other farmers deem this matter of little moment. The cattle themselves ought to be judges in the case.

The next grass is the *red grass* or *fox grass*, a very fine reedy grass, abundant and excellent.

The next is *goose grass*, deemed excellent, but not abundant. Sheep, it is said, will entirely destroy this grass, if suffered to feed on the marshes.

Branch grass, a short reedy grass, resembling much the fox grass, and by some persons pronounced the same; it branches much, and from this circumstauce derives its name; it is not abundant, but the hay is much valued.

Sedge, a pointed long flat-leaf, grows in low places and on the sides of creeks, much valued when not too large.

Thatch, a grass differing little from sedge, which grows in creeks as high as the tide rises; and is cut principally for litter or manure.

The average product of well-managed salt marshes is from three-fourths of a ton to one and a quarter ton. The hay is valued at half the price of English hay. In Salem and Boston markets, where it is purchased for a change of diet or to be mixed with English, it usually bring two-thirds of the price of English.

The farmers in the interior of the county, even at a distance of fifteen miles or more from the sea-shore, are glad to own or hire a piece of salt marsh, considering a portion of this fodder of great service to the health of their stock. A shrewd farmer in Lynn considers salt hay as worth five dollars a ton, merely to spread upon his grass land for manure. His judgment is to be relied on. It is stated likewise that those farmers, who carry it into the interior in a green state and cure it in their fields, find this process almost equal to a top-dressing of manure. This comes undoubtedly from the salts, which it deposites. The quantity of salt hay which is cut, enables the farmers to sell much of their English hay, without injury to their farms. These lands, according to their situation, are valued at from ten to fifty dollars per acre. Their value is likely to be much increased in many places from improvements of which I shall speak presently.

Considerable quantities of fresh meadow or swale hay is cut; but it is composed of aquatic plants, which contain little nourishment; and is of comparatively little value. The manure of cattle fed upon it or littered with it is of inferior quality.

From the same.

ASHES AS MANURE.

The farmers on Long Island have been accustomed to send to towns on our sea-shore, to Marblehead for example, to purchase for their wheat fields, our leeched ashes, at ten cents per bushel;

these contain a good deal of lime, which had been used by the soapboilers.* They ascertained that there was an advantage in it. It is known likewise, that foreign agents are visiting different towns and places on the sea-board, to purchase the refuse bones, and the animal carbon, after it has been used by the sugar refineries, in order to enrich the wheat fields in Europe, which have been, for the last two years, to a considerable extent, and to our great disgrace, the granaries of the United States.

From the same.

NEAT CATTLE.

Essex county is not a grazing territory. Few cattle are raised in it. The stock generally to be found in it is what is called our "native stock," which is a mixture of no certain origin; but in which the Devon race greatly preponderates.

Some cows, which have been owned in Essex, have probably never been exceeded, for their dairy produce, by any in any part of the country. The Oakes cow, owned in Danvers, made in 1813, 180 lbs. of butter, in 1814, 300 lbs.: in 1815, over 400 lbs.; in 1816, 484¼ lbs. At the same time, the family reserved one quart of milk per day for their own use; and she suckled four calves four weeks each in the course of those years. She made in one week 19¼ lbs. butter; and she averaged over 16 lbs. of butter per week, for three months in succession.

The Nourse cow, owned in North Salem, made 20 lbs. of butter in one week; and averaged 14 lbs. butter per week for four successive months.

The Haverhill heifer, two to three years old, produced 14 lbs. of butter in a week after her calf was killed at six weeks old; and more than 18 lbs. of butter in the ten days after her calf was killed. These cows were all of native stock.

The largest amount of milk given in one day by the Oakes cow, is 44½ lbs. In the case of the two first cows, they were fed in the most liberal manner, with meal and their own skim milk. In the case of the heifer, the feed was grass and pumpkins.

I subjoin a list of a few other cows in the county, whose yield is well authenticated.

1. Cow owned by John Barr, in Salem.

In 274 days the weight of milk was		7611 lbs.
1822.	No. of quarts, beer measure,	2965½
1823.	In 268 days, weight of milk was	7517 lbs.
	No. of quarts, beer measure,	2923.

The sales from this cow, including the calf at 5 dollars, and milk at 5 cents per quart, in 1822, was $153.25. In 1823, $151.15.

2. Cow. John Stone, Marblehead. From June to October, this cow averaged 11 lbs. of butter per week.

3. Cow. N. Pierce, Salem. 3,528 quarts milk per year,—nearly 10 quarts per day.

4. Jeremiah Stickney, Rowley. 19 quarts daily; calf at six weeks old weighed 196 lbs.—gain 2¼ lbs. per day.

5. Cow. Isaac Osgood, Andover. 17 quarts of milk per day; made 50 lbs. of butter in the month of June.

6. Cow. S. Noah, Danvers. In 148 days from 2d May, gave 587½ gallons milk;—more than four gallons per day for that time.

7. Cow. T. Flanders, Haverhill. From 20th April to 22d September, besides 46½ gallons milk used for family, made 163 lbs. 4 oz. butter.

8. Cow. Daniel Putnam, Danvers. "This cow calved May 21st. The calf was sold June 20th for $7 62½. During the 30 days that the calf sucked there were made from her milk 17 lbs. of butter. From June 20th to September 26th (14 weeks) she gave 3370 lbs. of milk, or more than 34 lbs. 6 oz. per day. The greatest quantity on any one day was 45 lbs., or 17½ quarts. The weight of a quart of her milk is 2 lbs. 9 oz. The greatest quantity in one week was 288 lbs. The quantity of butter made in the same 14 weeks was 139 lbs. The greatest amount in one week was 12 lbs. 2 oz."

9. Cow. Owned by William Osborn, Salem. The milk of this cow from January 24th to April 10th, was 3127 lbs., varying from 33 to 48 lbs. per day, averaging 40¼ lbs. per day during that time.

10. Cow. Owned by Richard Eliot, Danvers. This cow's milk gave 16 lbs. of butter in one week; and she yielded on an average from 15 to 18 quarts per day, beer measure, for a length of time.

All these cows were what is denominated our native stock. An intelligent gentleman, the owner of an extraordinary cow in the interior, remarks, in a letter detailing her yield, what is highly important to be remembered. "From the experience I have had with this cow, I feel quite sure that many cows, which have been considered quite ordinary, might, by kind and gentle treatment, good and *regular* feeding, and proper care in milking, have ranked among the first rate."

The yield of a cow now owned in Andover, is remarkable. Her origin is not known, but her appearance indicated a mixed blood; and I was led to believe she partook of the Yorkshire blood, a race of cattle which I have found in the neighborhood of Moultenboro' and Canterbury, N. H., but whose introduction I am not able to trace.

In 1836, besides supplying the family with cream and milk, there were sold 127¾ gallons milk

at 14 cents per gallon,	$17 88
166 lbs. butter at 25 cents,	41 50
Calf sold,	8 00
	$67 38

"The keeping was good pasture and swill of the house, including the skim milk, with three pints of meal per day." These statements show, in a strong light, the difference between a good and a poor cow; and the utility of liberal keeping.

The difference in the butter properties of different cows is not generally considered. In a yard of five cows, upon repeated trials, made at similar times, and as near as could be under the same circumstances, by a farmer in this county, the difference in the yield of cream upon 9 inches of milk, was found to be as 13 to 3.

Attempts have been made to introduce some improved foreign stocks into the county; the Alderney, the Holderness, and the improved Durham short-horn. These experiments are report-

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* And also, a much larger proportion of the carbonate and phosphate of lime, as original ingredients of all wood-ashes.—Ed. Far. Reg.

ed to have been satisfactory to those who have made them; but I have been unable to procure any exact returns. Admiral Sir Isaac Coffin presented a valuable improved Durham short-horn bull and cow to the Massachusetts Agricultural Society, which were placed on the farm of a gentleman in Salem, who retains some of the half-blood stock. The amount of the yield in milk of this short-horned cow is mislaid; but the owner states from recollection, "that her milk night and morning, weighed 48 lbs., when she had nothing more than pasture feed in June." Respecting this stock, the gentleman adds,—"In my opinion, they combine the two qualities of milk and beef in a greater degree, than any other stock I am acquainted with. With me, the pure bloods, and a large proportion of the mixed blood, have proved great milkers, and, when not in milk, take on flesh very rapidly. I have slaughtered two half-blood heifers, which have weighed at four years old over 700 lbs. A pair of half-blood steers, at four years old, became so very fat from common keep, that I was induced to dispose of them to the butchers; they weighed 1100 lbs. each. The greatest objection to them, in my opinion, is, that they incline to go dry a longer time than our native stock."

My own experience differs somewhat from the respectable authority just given. I have had some of the full-blood and some of the mixed breed; and I am not able to say any thing in favor of their milking properties. I have seen some remarkably fine specimens of early maturity and thrift among them; and more beautiful models of cattle than some specimens which I have seen of them, I believe are no where to be met with.

Another public-spirited gentleman, in Bradford, imported some of this fine stock for his farm. His expectations do not appear to have been fully answered, though I was not able to obtain any exact information of their yield in milk or butter. From the letter of his correspondent, whom he employed to procure these fine animals for him without limit as to expense, I extract as follows. "I must observe that this breed of stock has not been held, of late years, in great estimation for milking." He adds, that "short-horns are only calculated for the best and most powerful land; on poor soils they will do nothing. The most improved plan of keeping them in winter is to have them loose in open warm hovels, two or four together. The bulls you will find it necessary to keep in altogether, from one year old. The milch cows are kept at the stake in enclosed houses; and turned out a short time in the day time—they bear the cold badly."

There is another very strong testimony, that of Mr. Shiriff, who travelled in this country for agricultural information in 1834-5; and who is pronounced, by one of the most eminent breeders of the Durham short-horns in England, a farmer of the first rank. In his journal, he remarks,—"There was a fine short-horn bull, intended to improve the dairy stock, which I did not see. I took the liberty of advising the cross to be tried on a small scale, believing the short-horns the worst milking breed in Britain."

I give these opposite authorities, in justice to the agricultural community. The subject deserves much farther inquiry, and the test of actual experiment. On this account, it were greatly to be desired, that the gentlemen who own this fine stock, and from the most public-spirited designs have introduced them into the country, would give the public exact statements of their product. Some oxen in the county, descended from the short-horned bull Admiral in the second generation are very fine cattle, in point of size, docility, condition, and work. I have seen the importations of this stock made by the Ohio Company; and it seems impossible to imagine animals of more perfect symmetry and beauty; or of better promise in point of thrift and condition. They may, however, suit far better the luxuriant meadows of Ohio and Kentucky, than our bleak and short pastures.

From the same.

MANURES.

Much and increasing attention is paid throughout the county to the saving of manures and the formation of compost. Vastly more remains to be done. In many parts of the county, cellars are considered a necessary appendage to the barn, where the manure is sheltered from the sun; and, by some of the most careful, from the external air likewise. A Danvers farmer, on whose good judgment I place great confidence, expresses his strong conviction, that the value of his manure is doubled in a closed cellar, in comparison with it under the former mode of exposure to the sun, and air, and rain. In most of these cases, the barn is placed on a side hill; the cellar is high enough to load in and turn the team and cart; and a trap door is in the barn floor, so that bog-mud, litter, or other refuse, may be easily thrown in to be formed into compost by the store hogs, which are put there to work, and which faithfully earn their living. In two places, I found provision made for saving all the liquid manure from the stalls and the barn yards. It was conveyed by gutters into a capacious cistern, from which it was occasionally pumped into a watering cask, like that used in the streets of cities, and distributed on the grass ground. This was done with great advantage. The liquid manure of a large herd of cattle, could it be properly husbanded, would be of equal value as the solid manure. The subject of saving manures, and collecting and compounding them, is a matter which cannot be too strongly pressed upon the attention of farmers. It is the very life-blood of successful agriculture.

The subject of the application of manures, whether in a perfectly green and unfermented, or in a decomposed state, has been matter of much inquiry among the Essex farmers. The general impression is, that they should be used in a green state, as their most valuable parts are lost in the progress of decomposition. The philosophy of manures is as little understood as the philosophy of digestion. Nature draws a veil over many of her processes, which no prying curiosity has been able to raise, and no solicitude has induced her to uncover these operations. By what means the food received into the stomach goes, in its wonderful subdivisions and changes, to the formation of blood and bone, muscles and skin, hair and nails, is a matter about which we know as much as we know how the food of plants is taken up and elaborated, and goes, according to the seed which is sown, to the formation of the stem and leaves, the coloring and taste, the flowers and fruit. It may operate as a stimulant, waking the dormant powers of the earth into action. It may serve as the substance, out of which the plants are to be formed; and to a degree, the evidence of this is perfect. It may so affect the earth and the atmosphere, that these great reservoirs of the elements of vegetable and animal life, may at once furnish their proper and required contributions. But conjecture here is in a great measure idle. We may talk very learnedly on the subject without knowing any thing about it, or being able to communicate any valuable information. On this matter, experience and intelligent observation must be our guides. In actual bulk, manure, which is thoroughly decomposed, loses one-half. Its activity, its power of producing heat, one of the ascertained principles of vegetable life, is likewise lost. On these accounts, it is obviously best to apply it green. The experience of intelligent farmers almost universally confirms this. But unfermented manure, if applied immediately to the roots of plants, may, by too much action, or too much heat, or by supplying their food in too lavish or too concentrated a form, destroy them. There is no danger from this when manures are spread and ploughed under the soil, or scattered over its surface. But where their immediate action is desired in the soil, it is important, before they are taken out of the yard, that they should be in a partially decomposed state, or rather in an active state; and for that reason, they should be turned over and thrown into heaps in the cattle yards in the spring, that they may become in a degree warm before they are applied. If they are to be applied directly to the roots of crops, they should be either mixed with earth, or so far advanced in their decomposition, that no evil may result from the heat of their first action; and that they may be so subdivided and dissolved as to be in a condition to be at once taken up by the absorbent vessels of the plants.

These views will explain what I wish to say in regard to our great crop, Indian corn; and what long experience and observation have confirmed. The question is often asked, shall the manure be spread or placed in the hill? I answer, do both. Its immediate action is needed to bring the plant forward as soon as possible; and therefore partially decomposed manure should be placed in the hill. It is equally necessary that the plant should not suffer from want when its roots spread themselves beyond the hill in pursuit of food. The unfermented manure, spread and ploughed in lightly, will be in a condition for the use of the fibrous roots when they advance to receive it. Another question often proposed is, should the manure which is spread be ploughed in deeply, or covered lightly, or simply laid on the surface? If the plant to be cultivated be a tap-rooted plant, it will find the manure, though it should be buried deeply. If it has a spreading and fibrous root, like all the cereal grains, the nearer it is to the surface, without being entirely exposed on the top of it, the more available it is to the growth of the plant. If laid upon the surface and not covered, much of it must inevitably be lost by the sun and rain and wind. In respect to Indian corn, especially recollecting the cold seasons of the two last years, it is important by every possible means to get the plant forward as fast as possible; and for that reason to select the warmest and the driest land; to manure with fine manure in the hill, and with unfermented manure spread broad cast; and to plant as soon as the land can be made dry and warm enough to receive the seed. There is no crop that will better reward the most liberal cultivation.

In respect to the manuring of wheat, fermented and finely dissolved manures may be safely applied the year of its being sown; but not so with unfermented manures. In general, it is best that the crop which precedes the wheat, rather than the wheat itself, should be manured.

In regard to the application of manure to potatoes, the almost universal opinion has been, that when manured in the hill, the seed should be laid upon the manure. Many farmers have reversed this practice; and now place the manure upon the seed, they say, with superior advantage.

Besides barn manures, slaughter-house manure has been used with great effect; but it is necessary it should be mixed with loam. Night soil, mixed in the proportion of one part of night soil to four of loam or fine gravel, has been used with extraordinary efficacy, upon peat or bog meadow. Muscle bed is much used, especially by the Danvers farmers, for their onions and vegetables for the market. It costs in Salem about one dollar for a large horse load, and is applied liberally. At Manchester, where it is quite accessible, it is used with great advantage either as a top-dressing or ploughed in. At Beverly, I have seen its excellent and lasting effects as a top-dressing on grass land. A farmer in Danvers states that a gondola, containing eight four-ox loads of muscle bed, will deliver its cargo near to New Mills, for seven dollars. This is a low price. He is accustomed to spread six or seven loads to the acre, in winter, when frost will render it pliable. It will do well to apply it once in four or five years; oftener than this, it binds the land and renders it hard.

He says, it is of excellent use when applied to land which is to be laid down to grass with barley or oats. Its effects are lasting; and no other application will be required for years.

In the town of Essex, a great amount of clams are dug for fish-bait. The shells are much used for manure. The keeper of the alms-house in Essex, whose management is highly creditable, says, "as to the value of the clam-shells for manure, I think the broken and the whole shells very useful to low land, either to be spread on or ploughed in. They render the ground light and warm, and are very durable. They likewise enrich the land very much." The same may be said of oyster shells, which are obtained in some quantities in the cities.

The great amount of squashes mentioned in a former part of my report, as obtained from two acres of land, is in some measure to be ascribed to the use of fish oil or blubber oil. The farmer, living near the fishing village in Lynn, obtains in the winter time a great quantity of fish livers and garbage. From this he procures the oil. After his casks are emptied of their oil, he fills them with water, which remains some time; and this water, thus considerably charged with oil, he applies to his squash vines. The effects are powerful.

One farmer, whose farm lies on the sea, has this year made some trials of fish as a manure. The

Munhaden, Alewives, or Hardheads, as they are called, come to the shores in the early part of the season, in great numbers, and are easily taken in seines. In the southern parts of this state, and in Rhode Island, they are used in great quantities; either spread upon the grass land, or laid near to, or placed in, the hill of corn. They are very powerful; but their effects not lasting. The animal matter contained in them is considerable; and the bones are composed of phosphate of lime, which is a strong and active manure. The great objection to their use is, that to a person not interested, they render the air extremely offensive. Not so to those who find a profit in their application. To most men, a golden breeze is always fragrant. There are other marine manures of great value. I have found sea sand, put in the hill of potatoes, in low land, of great efficacy. My experience in this matter is not singular. The silicious matter divides the soil; and the salt which adheres to it serves to stimulate the plant. Sea sand has been used with advantage at Sandy Bay. The marine plants are used with very beneficial results. The eel-grass is of little value excepting as litter. Nothing seems more grateful or healthful to swine than an abundance of this grass in their sties. It serves to increase the compost heap; but it becomes light and does not leave much when dried. Rock weed and kelp are valuable when ploughed in; but they are used to most advantage when applied directly as a top-dressing upon grass land. Then their effects are remarkable, and no more efficacious manure can be used. If left in heaps for any length of time, they soon become heated and decomposed; and are gone.

The refuse of the comb manufactories, horn tips and horn shavings, are greatly valued as manures. The refuse of the glue manufactories, are used with great advantage. Ashes, leeched or crude, have been applied by different individuals with various success. A farmer of high authority, in Newberry, states:—"I think leeched ashes very valuable to spread on grass land; likewise for onions and grain. I use twenty or thirty cart loads. I gave this year three dollars per load of fifty bushels." A respectable farmer states, that he deems them of no use, unless applied in conjunction with other manure, and then of great efficacy. In their application upon a rich loam to corn, both in the hill and spread round the hill at the first hoeing, I have seen no beneficial results from them. The experience of J. Buel, Esq., of Albany, he told me, in the use of ashes, coincides with mine. Leeched ashes, or soap-boilers' waste, which contains always a quantity of lime, I have used with advantage for wheat. These different results may depend upon soil, season, modes of application, or various circumstances, which we have not yet been able to determine. There can be no doubt of their efficacy and utility in some cases. There are many good authorities to this effect.

The ashes of anthracite coal have been spread upon grass land in Gloucester, with obvious advantage. Peat ashes have been used in Newbury on grass ground with much advantage; but in excess, or when frequently repeated, their effects are stated to be injurious.

The use of gypsum in the interior of the county, has been successful; but not so on the seaboard. In Haverhill, Andover, and Methuen, its effects are marked; and, in some cases, are as distinctly observable in parts of a field on which it has been used, where the other parts have been omitted in the distribution, as the enclosure is by the fences. The testimony of an experienced and careful farmer in the interior is subjoined. "As to gypsum, I have used it with good success. It is the opinion of many of our farmers that it injures the land. But from actual observation, I have been led to believe otherwise. There are pastures in our vicinity, in which plaster has been used twenty years without ploughing; and they are now the best pastures in the vicinity. I think, that in some instances, our crops have been doubled by the use of it. We usually apply about two and a half bushels to the acre." This is a large application; and it is questionable, whether the benefits are large in proportion to the quantity applied. In Berkshire county, a bushel to an acre is deemed ample.

Of the ploughing in of green crops for enriching land, I know of but one decisive experiment; and this made by one of the most intelligent and best friends of the farming interest in the county. This was made in 1832-3; and honored by the premium of the Essex Agricultural Society. This was a crop of buckwheat ploughed in when in full flower. "The committee say, on examining the land on which the experiment had been made, they found the growing crop thereon was in a much more promising and flourishing state, and much better sustained the severity of the drought, to which all lands in that vicinity were then exposed, than the crops of corn which were then growing on the contiguous ground of a similar soil; and which had been cultivated and manured in the ordinary manner." Besides the ploughing in of the green crop, the field was manured in the same manner as the other lands with which it is here compared.

The price of manure, in Essex county, is extraordinary. Three dollars and a half a cord for stable manure have been paid at the stables in Methuen; $4 50 in Andover; and I have known $6 paid in Salem for compost of night soil and muscle bed. A farmer in Middlesex, told me he was content to pay $5 50, for unmixed cow manure in Lowell, and cart it a distance of four miles. The expenses and trouble of transportation are often fully equal to half the cost of manure. It is surprising to find farmers willing to pay such prices; and it would be well to inquire, whether it would not be expedient to keep one man, whose sole business it should be, whenever the team could be spared, to collect the materials for a compost heap, which are to be found in abundance in almost every vicinity for the labor of going after them. At the prices above-named, manure may well be called the gold dust of the farmer.

I am unwilling to quit this homely subject without remarking, what always strikes me with great force, that beautiful and sublime miracle of the divine Providence, by which the very refuse, which man casts out and loathes, returns to bless him in the verdant fields, and the teeming harvests, in the most fragrant flowers, the most delicious fruits, and the most substantial products.

The use of clover sowed among grain and even among corn for ploughing in as the means of renovating the soil, has not prevailed within my knowledge in Essex county; but is commended to their attention as likely to be eminently beneficial. For this purpose we recommend most strongly the June, southern, or early clover so called.

No considerable experiments in the use of lime have come under my notice. A farmer in Haverhill, who has applied lime as a top-dressing upon his grass lands, is disappointed in his expectations of advantage from it. Extensive beds of clay-marl have been discovered; and this has been applied with great advantage on peat lands or bog meadows.

From the same.

MILK WEED.

Experiments have been made with the stalk of the common milk weed, in procuring from it a thead or fibre, capable, as was represented, of making a fabric as fine and strong as flax or silk. A patent was secured for the discovery, but it has not been pursued.

GENERAL WANT OF LIME IN THE SOILS OF MASSACHUSETTS AND MAINE, THE CAUSE OF THEIR UNFITNESS FOR THE PRODUCTION OF WHEAT.

Letter from the Geological Surveyor of Maine and Massachusetts to the Rev. Henry Colman, Commissioner of the Agricultural Survey of Massachusetts.

[We rejoice that the important truth which we have stated in the above caption, and which has been so often repeated in our remarks in this journal, is now presented in a manner, and on authority which, it may be expected, will command more respect and attention, than has been given to our attempts to make known and to enforce the same general proposition. Let the naturally poor (or "acid") soils of New England be but limed, or marled, and the alleged general incapacity to produce wheat will no longer exist.—Ed. Far. Reg.

Boston, Jan. 15th, 1838.

Dear Sir:—In accordance with your request, I now beg leave to offer you a few general remarks on the subject of soils and the raising of wheat crops in the New England States.

A general opinion has prevailed in the community that our section of country was incapable of producing its own supply of bread-stuff, owing to the nature of the climate and the composition of the soil. So far as the climate is concerned, there is not the least difficulty in raising any kind of grain, but it is true that many of our soils require some modification, by means chiefly of mineral manures, before they can be made productive.

I have, for several years, been an attentive observer of the management of soils, and believe that I have a good reason to conclude from my observations that the amelioration of the soils of Massachusetts, may be conducted in such a manner as to render them very productive at small expense.

I find, by chemical examination of several remarkable soils, that a very minute quantity of carbonate of lime, viz. from 1 to 2 per cent., is amply sufficient to render them capable of bearing heavy crops of good wheat. I am also satisfied that a soil is incapable of producing wheat of good quality, if it does not contain carbonate of lime; for this substance is an essential ingredient of the grain.

I have found during my geological researches in Maine, that those soils which were derived from the disintegration and decomposition of limestone rocks, were the most remarkable for their wheat crops. Such districts are very extensive in Maine, and will ere long become exceedingly valuable as grain soils.

I have seen, on a single farm of less than 30 acres of unmanured land upon the Aroostook river in Maine, no less than 1000 bushels of grain, principally wheat, which was raised this last summer. The soil is alluvial and derived from limestone. In York and Oxford counties, I also noticed very excellent crops of wheat in soils derived from the disintegration of limestone, which alternates with gneiss. The whole of the district between Houlton and the Aroostook river, which is a portion of the public lands, is a most valuable wheat soil of immense importance to our country; north of the Aroostook to the St. John, a similar tract of good soil exists, which in the course of time will become a most valuable farming country.

In the western part of Maine and throughout a large portion of Massachusetts the soil is wanting in lime, and is frequently charged with sulphate of iron. Such soils require liming in order to render them productive. In general we may say that wherever ferruginous waters percolate from a soil, that soil requires treatment with lime. The sulphate of iron in this case is decomposed by the lime or by the carbonate of lime, and gypsum is the resulting product, while the iron is left inert. Now we have a very simple calculation to make as to the quantity of lime required for a soil which is destitute of it, or which contains matters to be decomposed by it. Calculate by a simple trial how much lime is required for a given measure of soil, and then calculate the superficial contents of the field and multiply it by the depth to which the lime will extend; other things being equal, one per cent. of lime will be sufficient. Ground bones form a valuable manure, and there are mills now at work preparing them for our farmers. Mr. Winchester, the soapmaker, formerly threw his refuse bones into the sea; but lately, I understand, he has hired laborers to dig them up for agricultural use.

Burnt bones are easily crushed to powder in a break mill, and will answer admirably as a top-dressing. A few fagots are sufficient to burn a large heap of bones, since the fat they contain aids in the combustion.* The refuse bone black of our sugar refineries is also a very valuable manure, insomuch that proposals were made to the East

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* We should consider it very far better economy to use this "fat" contained in bones, as additional manure, instead of as fuel to burn and soften the harder parts.—Ed. Far. Reg.

Boston Sugar Refinery, by Havre merchants, to send here for all the refuse bone black, which they wished to purchase for agricultural use in France.

Is it not a shameful fact, that the French farmers are so much our superiors, that they can afford to send here for manure, and then raise wheat, beans, corn, and other vegetables, cheap enough to supply a large share to our market? Such you will notice by the importations last year is the fact.

If our farmers knew more respecting the chemical nature and methods of amending their soils, then we might indeed look to our own fields for bread, but alas! there is a great deal of empiricism in agriculture, and it is no wonder that farmers distrust what they call "book learning," when they obtain so very little practical information from it. The fault is on both sides, first, because the books we have at present are very inaccurate; secondly, because the farmers generally do not know how to apply the information contained in books, since they do not know the composition of the soils in question.

If the Agricultural Survey is supported as it ought to be, and a degree of liberality is extended towards it, such as its importance merits, then we should soon be able to say with truth, that agriculture is a science.

In order that we should come to this result, we have to learn 1st, the geological origin; 2d, geological distribution; 3d, chemical composition; 4th, capabilities of soils. These three topics I shall endeavor to discuss in my Geological Report to the legislatures of the two states of Massachusetts and Maine. We must not expect to make a perfect work at once; several years of assiduous labor must be devoted to each of the questions before us, before a good book on agriculture can be produced. All the old works are too inaccurate to be relied upon. The light of modern science is required.

There are, I believe, several other questions proposed for discussion; but time will not allow me at present to enter upon them.

I will therefore now conclude this letter by offering you my best wishes for your success in the Agricultural Survey of our state; and shall be most happy, when my present labors are completed, to co-operate actively in your important avocations. Most respectfully, your ob't. serv't.,

CHARLES T. JACKSON.

For the Farmers' Register.

WHICH IS THE MOST PRODUCTIVE CORN?

Mathews, Feb. 21st, 1838.

Those farmers who have had sufficient experience with the Maryland twin corn, are requested to state which is the most productive—that or the common corn? No subject in our mode of farming is more important, than a satisfactory knowledge of the most prolific species of corn. It is our staple, and if, as has been asserted, the twin corn will produce 20 per cent. more than the ordinary corn he who will satisfactorily establish such a fact would deserve a crown of laurel.

S.

From the Quarterly Journal of Agriculture.

ON FATTENING CATTLE ON DIFFERENT KINDS OF FOOD.*

By Mr. JOHN BRODIE, Amisfield Mains, Haddington.

Agreeably to the conditions, the Committee of Management, immediately after I had intimated my intention of competing, appointed an efficient sub-committee to assist me in dividing a lot of twenty Aberdeenshire polled cattle, into four lots of five each, and also to superintend and report upon the manner in which the experiments were conducted.

The cattle were bought at Falkirk on the 12th of October, and on the 24th were lotted, and put into separate yards, each of which had ample space, and shelter from the weather, by covered sheds, for the several lots which were distributed among them; and conceiving that the object which the Agricultural Society had in view in offering this premium, was to find out a substitute for turnips, each lot of cattle had a mixture of food allowed them, with the exception of lot No. 1, which was altogether fed upon turnips and straw, and may on that account be designated the trial lot; No. 2 had half the quantity or weight of turnips which was allowed to No. 1, with 30 lb. of linseed-oil cakes, as a substitute for the remainder of the turnips; lot No. 3 had the same weight of turnips which was given to No. 2, and had ground corn in place of the oil-cakes; the fourth lot got offal from a grain whisky distillery, and a portion of ground beans, which was mixed into their draff every morning. By following out this arrangement, we have ascertained the quantity of turnips saved; the value of the turnips in feeding by themselves, contrasted with the other substances; and their value as an auxiliary feeding when used with those richer substances, which, without some coarser food, will neither be an economical nor a beneficial food for cattle. All the lots had fresh straw given to them daily, which was not weighed, and below is a statement of the food consumed, and the expense incurred in the fattening of each lot:—

Lot No. 1. fed on Turnips.

1836.					
October	12. To	price of five cattle,	£55	0	0
	24.	10 days' keep of ditto on turnips and straw, at 8*d*.	1	13	4
January	1.	34 tons white globe turnips, at 8*s*. 4*d*. per ton, since 24 October till this date, being 10 cwt. per day,	14	3	4
April	7.	38 tons, 16 cwt. ruta-baga, at 12*s*. 6*d*. per ton, since 1st January till this date, being 8 cwt. per day,	24	5	0
			£95	1	8

At this date the Judges appointed by the Committee of Management,

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* Report made by Mr. Brodie in 1837 on this subject in competition for the premium offered by the United East Lothian Agricultural Society.—EDITOR.

1836.		inspected the cattle, and reported their value to be £82.			
June	7.	21 tons, 9 cwt. ruta-baga, since 7th April till this date, at 12*s*. 6*d*.	£13	8	2
		Brought over,	95	1	8
			£108	9	10

The average expense of the keep of this lot is about 6*s*. 3*d*. per week each beast.

Lot No. 2. fed on Turnips and Oil-Cakes.

October	12.	To price of five cattle,	£55	0	0
	24.	10 days' keep on turnips and straw, at 8*d*.,	1	13	4
January	1.	17 tons white globe turnips, at 8*s*. 4*d*.	7	1	8
April	7.	19 tons, 8 cwt. ruta-baga, at 12*s*. 6*d*.	12	2	6
		1 ton, 18 cwt. foreign linseed-oil cakes, at £7, 15*s*. per ton, since 16th November till this date, being 30 lb. per day,	14	14	6
			£90	12	0
		Estimated value at this date, £88, 10*s*.			
June	7.	10 tons, 15½ cwt. ruta-baga, at 12*s*. 6*d*.	6	14	1
		16 cwt. 38 lb. linseed cakes, at £8,	6	10	8
			£103	16	9

The average expense of the keep of this lot, is about 5*s*. 9*d*. per week, each beast.

Lot No. 3. fed on Turnips and Ground Corn.

October	12.	To price of five cattle,	£55	0	0
	24.	10 days' keep on turnips and straw, at 8*d*.,	1	13	2
		17 tons white globe turnips, at 8*s*. 4*d*.	7	1	8
April	7.	19 tons, 8 cwt. ruta-baga, at 12*s*. 6*d*,	12	2	6
		1 ton, 14 cwt. 98 lb. of bean-meal, or 63 bushels ground beans, weighing 62 lb. per bushel, at 5*s*.	15	15	0
		9 bushels bruised oats, at 3*s*. 6*d*.	1	11	6
			£93	4	0
		Estimated value at this date, £77.			
June	14.	10 tons, 14½ cwt. ruta-baga, at 12*s*. 6*d*.	6	14	1
		1 ton, 9 cwt. 100 lb. bean-meal, or 54 bushels ground beans, weighing 62 lb. per bushel, at 5*s*.	13	10	0
			£113	8	1

The average expense of the keep of this lot, is about 6*s*. 8*d*. per week each beast.

This lot had latterly the rough seeds of oatmeal, at 1½*d*. per bushel, as a mixture to the bean-meal, which are not charged, being worth the price as manure.

Lot No. 4. fed on Distillery Grains and Ground Beans.

1836.					
October	12.	To price of five cattle,	£55	0	0
	24.	10 days' keep on turnips and straw, at 8*d*.	1	13	4
November	7.	3 tons, 5 cwt. white globe turnips, at 8*s*. 4*d*.	1	7	1
April	7.	72 quarters draff, at 4*s*. 6*d*.	16	4	0
		60 puncheons dreg, at 2*s*. 6*d*.	7	10	0
		1 ton, 14 cwt. 62 lb. bean-meal, or 62 bushels ground beans, weighing 62lb. per bushel, at 5*s*.	15	10	0
			£97	4	5
		Estimated value at this date, £81, 10*s*.			
June	14.	37½ quarters draff, at 4*s*. 6*d*.	8	8	9
		28 puncheons dreg, at 2*s*. 6*d*.	3	10	0
		19 cwt. 104 lb. bean-meal, or 36 bushels ground beans, weighing 62 lb. per bushel, at 5*s*.	9	0	0
			£118	3	2

The average expense of the keep of this lot is about 7*s*. 2*d*. per week each beast.

At the commencement of these experiments, the different divisions of cattle had each their places, as well as kinds of food, allotted for them; and those of the trial lot, No. 1, whose feeding was destined to be turnips alone, from being the kind of food which they were formerly accustomed to, made a more immediate improvement than the cattle of the other lots, so much so indeed, that several of my friends who saw them during this period, could not believe that a proper division of the cattle had been made, as this lot was then, about the end of November, £5 better than any of the other lots.

By the above statement, it will be observed that the feeding of the lot upon turnips and oil-cakes, was the least expensive mode which was adopted in making the experiments; and that these cattle made the greatest improvement (although after ten or twelve days' trial with oil-cakes, they were so obstinate in refusing them, that it was found necessary to take away their allowance of turnips for some days, and give them water instead, before they were induced to begin). This was sufficiently proved by the marked difference in value put upon them by the judges appointed to report upon the comparative value of each lot, at the Society's Show in April. This continued in rather an increased degree during the remaining time they were here, particularly as contrasted with the trial lot, which was altogether fed upon turnips, having been estimated by good judges about the beginning of June, to be worth about forty shillings more each beast, than those of the trial lot.

The improvement of the cattle in lot No. 3 was much retarded by one of their number being naturally of such a restless disposition, that he himself would not take time to eat, nor would he allow the others to do so, and although the yard which they occupied was of sufficient size for a greater number, it was not until the turbulent ox was taken away and fed by himself, that the cattle made the improvement which they ought to have done; after that, however, a very perceptible improvement took place, and by adding a little to their daily allowance of ground beans, their value when killed, as it appears by the flesher's return, was very different from what it had been when valued comparatively with the other lots at the April show. This untoward circumstance, caused a greater expense in the keeping of this lot than would have been otherwise necessary.

In the charge against lot No. 4, it will be observed that keeping upon distillery offal is more expensive than the keeping of lots No. 2 and 3 with their half allowance of turnips. The turnips, however, were the produce of the farm, and the prices were fixed by the Committee, and high as they are, I could not have purchased turnips to carry here, unless by giving four or five shillings advance upon the ton weight; therefore a part of the charge against the distillery offal, will require to be set down for manure, and the same ought also to be deducted from the beans, which are charged at rather a full price.*

Upon the whole, it is evident by these experiments, that feeding with turnips as an auxiliary, has been the most advantageous mode of using turnips, as by the state it is apparent that if the cattle of lot No. 1 had only been allowed half the quantity of turnips which they consumed, and had got oil-cakes in lieu of the other half, as was given to lot No. 2, the expense of their keeping would have been lessened £4, 13*s*., and from superior quality their value would have been increased £10, making together £14, 13*s*.; therefore, by bestowing the remainder of the turnips, with the addition of oil-cakes, upon other five cattle, the realization upon the turnips eaten by lot No. 1, would have been £29, 6*s*. additional to what it has been.

These experiments were carried on for two months after the valuation was made at the show in April; as from an over supply in the market, caused by a scarcity of turnips, the cattle would not then have paid for their keep; but by continuing till June, I have been amply remunerated for all my outlay and trouble, without taking into account the great advantage of the additional and enriched manure of twenty cattle fattening upon the farm, where ten only could have been kept, had turnips alone been used for that purpose; and to any person at all acquainted with agriculture, it must be evident that one cart-load of manure made by cattle thus fed, will be at least equal to two, if the cattle had got only straw and water.

The above experiments, which are corroborated by those conducted last season by Messrs. Andrew Howden and Alexander Brodie, junior, tend to show that the winter feeding of cattle is more capable of successful extension by those who have a sufficiency of straw, but who have not such abundance of turnips, as to be able to make all their straw into manure by cattle upon full feeding, than was formerly imagined.

From the cattle having travelled to Glasgow, their weight has not turned out in the manner it would have done had they been slaughtered nearer home; besides, from a very great dulness taking place in the butcher market there, Mr. William Thomson, who purchased the cattle, found great difficulty in disposing of the beef so quickly as the time of lifting required, therefore lot No. 1, which was first slaughtered, had an advantage by not being allowed to fall off from being kept after being driven such a distance.

Live Weight of Cattle before being travelled to Glasgow.

Lot 1. Fed on turnips alone.	Stones.	Lot 2. Half Turnip & Oil Cakes.	Stones.	Lot 3. Half Turnip and Ground Corn.	Stones.	Lot 4. Draff, Dreg, and Ground Beans.	Stones.
No. 1 weighed	118	No. 1 weighed	115	No. 1 weighed	95	No. 1 weighed	109
" 2 "	104	" 2 "	118	" 2 "	115	" 2 "	109
" 3 "	111	" 3 "	105	" 3 "	105	" 3 "	129
" 4 "	107	" 4 "	122	" 4 "	111	" 4 "	110
" 5 "	96	" 5 "	92	" 5 "	91	" 5 "	88
	536		552		517		515

Flesher's Statement of the Weight of Beef, Tallow, and Hides.

The Carcasses in Imperial Stones, Tallow and Hides in lbs.

Lot 1.				Lot 2.				Lot 3.				Lot 4.			
No.	Beef.	Tall.	Hides.	No.	Beef.	Tall.	Hides.	No.	Beef.	Tall.	Hides.	No.	Beef.	Tall.	Hides.
	st. lb.	lb.	lb.		st. lb.	lb.	lb.		st. lb.	lb.	lb.		st. lb.	lb.	lb.
1	62 1	112	96	1	61 11	103	86	1	51 9	119	79	1	57 6	119	72
2	57 2	104	83	2	61 8	119	97	2	63 0	84	85	2	54 6	90	80
3	58 12	101	75	3	55 12	115	77	3	57 5	118	76	3	66 1	112	77
4	54 4	98	68	4	66 9	146	84	4	59 12	115	75	4	55 6	82	50
5	50 12	99	69	5	49 12	97	68	5	48 9	84	62	5	46 9	112	78
	283 3	514	391		295 10	580	412		280 7	520	377		280 0	515	357

* We think that in all such calculations, the value of any produce consumed on the farm ought to be taken at what it really costs the farmer to raise it, and not at its market price, for that includes the profit on it; and it is surely unreasonable to attempt to superadd a profit above the profit included in its market price.—Editor.

From the Quarterly Journal of Agriculture.

KYAN'S PROCESS FOR THE PREVENTION OF DRY-ROT IN TIMBER.

Until the privileges of the patent granted to this invaluable discovery were secured by act of parliament to a company, its excellence made little impression on the proprietors of wooded properties. The company, aware that no conviction inspires confidence like that derived from reference to facts, has never ceased, since its formation, to adduce the most authenticated facts in favor of the efficacy of this simple process. Like every great practical improvement, it is now, slowly it is true, but not less securely, establishing itself in public confidence. The whole process, we believe, consists simply of steeping timber in a solution of corrosive sublimate, the *bi-chloride of mercury*. Mr. Kyan, in claiming credit for this process, does not pretend to the discovery of any new principle; it is only in the application of a known principle to practical purposes that his claim consists. It was well known before that a solution of corrosive sublimate was commonly used for the preservation of cases of morbid diseases in anatomical preparations, and even that the delicate texture of the brain was preserved in a firm state by it; but it was never known, or even conjectured, until Mr. Kyan published the fact, that it would also preserve timber from decay, that it would prevent that internal decomposition in timber, which terminates in what is commonly termed dry-rot, a term quite descriptive of the effect of the disease.

For many years Mr. Kyan endeavored to impress on the admiralty the importance of his discovery in preserving the timber intended to be used in ship-building, but to no purpose. It is no wonder so simple a process did not at once obtain credence of its efficacy. At length, however, so many facts of its efficacy in preserving isolated pieces of timber from destruction in unfavorable circumstances were adduced by Mr. Kyan to architects and others, that a parliamentary inquiry was instituted, and the evidence published. Sir Robert Smirke, among other eminent architects and timber-merchants who were examined, stated before the committee, that he had taken a cut from a log of Canadian yellow pine, poplar, and Scotch fir, after being prepared in Kyan's process, and put them in cess-pools and common sewers for six months, in hot-bed compost-frames for other six months, in flower-border for the succeeding six months, and had them watered along with the flowers, and in damped cellars, excluded from the air for the last six months, but contrive all he could, he could not rot them. Every one is aware these soft pieces of timber, unprepared, would have rotted under such treatment in a very short time. This evidence, however, leaves the question unanswered, whether it is necessary, in the first instance, to season the timber thoroughly before the process will preserve it from dry-rot. If the utility of the process were even confined to seasoned timber, it would still be a valuable discovery, for the ships of the navy that were affected with dry-rot were all built of seasoned timber of at least three years' exposure to the air; but before the timber is considered seasoned only conceive the destruction occasioned by the dry-rot. During an inspection which took place in Deptford yard, in the months of October, November, and December. 1801, to ascertain the quantity of defective timber after the lot had been seasoned, it was found that out of 870 trees of sided timber, containing 611 loads of 50 cubic feet each, 239 trees, containing 169 loads, were defective. In Deptford, in October, November, and December, 1803, out of 138 trees, containing 114 loads, 74 trees, containing 60 loads, were found defective. Again, in Deptford, in April, May, and June, 1805, out of 230 trees, containing 268 loads, 65 trees, containing 99 loads, were found defective. And in Plymouth yard, on January 20, 1806, 636 trees, containing 990 loads, were found to be defective. It may be safely asserted, that at least one-third of the sided trees which are put past to season in the navy dock-yards become unfit for the building of ships in the course of three years. The national loss in this item of public expenditure must therefore be considerable, especially when we bear in mind that a first rate man-of war of 120 guns requires 5880 loads of timber to build her; a 74, 3600 loads, and a 28 gun frigate 963 loads. Now, Kyan's process as well seasons timber in a short time, as preserves it when seasoned, from dry-rot, as will be seen from this testimony of Mr. George Ward, Dorset street, Salisbury square, London, joiner, who cut a piece out of a log of Hispaniola mahogany, on 9th March, 1833, sent it to be steeped on 12th April, and used it in a wrythed hand-rail on 21st June of the same year. He cut another piece out of a log of the same kind of mahogany on 25th March, 1833, sent it to be steeped on the 4th June, and used it in a clampt flap and frame on 30th August of the same year. On 5th July, 1834, he says, "in neither of the above instances has there been the least shrinking of the wood since it has been used, nor has the color of the mahogny been at all injured by the process." It must be owned no severer trial for warping could unseasoned timber be subjected to, than in hand-railing and clampt-framing. We observe in this city that many cabinet-makers, rather than place their capital in a dormant state by storing up timber to be seasoned, send it to Kyan's tank to be steeped and seasoned just as they require it.

The ravages of the dry-rot among the ships of the navy are fearful. Independently of the enormous cost for repairs which this disease causes to be incurred to the nation, the jeopardy in which men's lives are placed at sea in ships in a state of dry-rot is worthy of the nation's consideration. It is not uncustomary for vessels to cruise on foreign stations for three years, and yet many of the ships of the navy have been obliged to be docked for repairs in a shorter time than that after they have been prepared for sea. Out of 23 seventy-fours, only nine exceeded three years before they were obliged to be docked for repairs after being built. The Ajax, seventy-four, was only five months at sea after being finished in 1798. The l'Achille, one year five months; and six others not exceeding two years. The Kent was longest in being docked, being seven years one month at sea. The average of the whole number did not exceed three years five months. But it is not the loss of service alone of such valuable ships when in dock that is most to be deplored, the pecuniary loss arising from repairs, entirely occasioned by the ravages of the dry-rot, is of greater importance. The hull of the Ajax cost in building £39,039, and after she had only been five months at sea, the repairs for dry-rot cost 26,683*l.* The six ships that had only served two years at sea cost in building their hulls in 1810, 1811, 1812, and 1813, £349,974, and afterwards in repairs for dry-rot £297,368. Eighteen frigates, rating from twenty-four to thirty-six guns, cost in repairs in 1805, £253,148 17*s.* 5*d.* and if they had been built anew, would only have cost £150,208 15*s.*, being in the proportion of three for building, and five for repairs. But the case of the Victory we shall particularize as a ship that can never cease to excite public interest The building of a 120 gun ship during the war, according to Edye's calculations, costs £97,400. In the very first year, 1800, the Victory, 100 guns, was repaired in Chatham, and her repairs did not terminate until 1803, until after they had cost £96,020. This was before the battle of Trafalgar in 1805. But in 1814, 1815, and 1816, she was again repaired at Portsmouth at the cost of £47,558. So that she has altogether cost for repairs £143,578 in fifteen years. But all these are isolated instances. The total sum for repairs for the whole navy cut a conspicuous figure. From 1800 to 1820, over and above the ordinary repairs of wear and tear, which were £6,412,592, the repairs cost £11,037,188, being an annual average of £551,859. The greater part of this period was in the time of war, but even in time of peace the dry-rot appears to have made as great ravages; for from 1822 to 1832 the cost for all repairs amounted to £7,971,852: 7: 4, being an annual average of nearly £800,000, which was about the war average. As the usual wear and tear should be much greater in war than in peace, it follows that the dry-rot is committing greater ravages now than in the war. That beautiful ship the Vernon, 56, has been siezed with this hurtful disease, and must, of course, go into dock at an enormous cost for repairs.

These facts call loudly for the adoption of some means for the prevention of so raging a malady. Many expedients, we believe, have been attempted by the Admiralty to assuage the evil, and tests have been used to ascertain the soundness of timber by immersing it in fungus-pits, but all have failed. Now, however, that Kyan's process has been proved to be efficacious in preventing this dire disease, the Admiralty ought to make a trial at least of one ship so prepared. Much money would no doubt be saved to the public by its adoption. What with extraordinary repairs, and building and ordinary repairs, the annual expenditure for timber in the navy-docks during the war was about two millions, one half of which might have been saved by the adoption of this process. But besides the prevention of dry-rot in ships, the stock of timber kept for seasoning may be dispensed with, besides the saving in repair of public works, such as docks, buildings, &c.

Important as Kyan's discovery is, in a national point of view, in regard to the navy, it is also important, in a national view, to the landed interest. If by this process proprietors of wooded estates can not only use the timber they grow in buildings, fences, implements, and for all country purposes; but dispose of it to others who have no wood fit for use, a stimulus will be given to planting which will soon clothe the waste places of the country with growing timber, and in time render the agricultural interest entirely independent of foreign timber. Indeed, it is proper to be prepared for such an event, for the settlement of the Canadas by emigration will in time so denude them of their magnificent forests, that no timber will then be available for exportation to this country. The value of this process is not confined to hard timber, it seasons sap-wood in as short a time, and preserves it also from decay. This property of it will have the effect of increasing largely the quantity of useful timber, if a tree, for instance, which may be squared to thirteen inches of heart timber, can be squared to sixteen inches including the sap-wood, its value as a marketable commodity will, by this process, be greatly enhanced; much timber being thus rendered serviceable, which would otherwise be wasted. The applicability of home timber to every purpose of building, fencing, and implements, would insure a great saving to the landed interest. That this process renders wood for any species of work durable, may be shown from the testimony of many credible witnesses. Two pieces of the same wood and from the same part of the wood, the one prepared the other not, were put into a pit in Wesminster where a great deal of rotting was going on; that piece which had undergone no preparation became pulverulent and crumbled down under the pressure of the fingers, the other, both being sap-wood, became like heart-wood, and manifested no tendency to crumble, though it had been cut with a knife. Captain Alderson, of the Royal Engineers, made some experiments in the Royal Carriage Office, Woolwich, to ascertain the effect of the process upon timber used in the construction of gun-carriages. He obtained pieces of oak, ash, and elm, quite green, with the bark on and twigs with leaves upon them. Half of the pieces were steeped in the solution, and the whole of them put into the fungus pit to rot in March 1835. They were taken out in September 1836, when the unprepared were quite rotten, and the other, even to the preservation of the bark, sap-wood, and leaves, were perfectly sound. The spokes, felloes, and shafts of carts and carriages could thus be rendered durable for an indefinite length of time. Sir Robert Smirke put a couple of posts under a dropping eave, and both were exposed to the same actions. After a certain time the unprepared decayed, the other still stands. He also put up a considerable quantity of paling about three years before he gave his evidence on this subject before the committee of the House of Commons, when it was in quite as good a state as at first, though it was partly in the ground; whereas, some paling which he had put up the year before, not fixed into the ground, but close upon it, unsteeped, was obliged to have its lower part cut away in three years. The fencing of plantations, young hedges, and the preservation of hurdles, field gates, watering troughs, thus may be almost permanently insured.

The sleepers used for railways may be used by this process with advantage instead of stone, and to all who have ever travelled on a railway laid on wood, it is obviously a much pleasanter motion than on stone. Now that the rage for railways prevails, the supply of timber in any part of the country through which the railway passes, will render its construction more economical. Pieces of green larch were used as sleepers on the Southampton railway; some of them having cracks wide enough to admit a penny piece. After being steeped they became compact, and the cut diameter which had been flat became curved, and the pieces more fit for the purpose they were intended.

The yearly destruction of poles in the hop grounds in England is very considerable. They have to be renewed every six years, besides being repaired every year. When steeped they will last thirty years, barring breakage. The annual expense of maintaining and repairing these poles is estimated at £10 an acre, so that by using this process the hop grower might supply himself with poles at one-fifth of the present cost.

It is equally efficacious in preserving flooring. Messrs. Harris and Warner, hatters, Southwark London, laid a piece of flooring partly prepared. In three years the unprepared part entirely gave way, whilst the other remained as fresh as the day it was laid down.

The process is a protection against the attacks of insects, both terrene and aquatic. A naturalist who has long been in the habit of collecting insects on old rails, cannot now find them lodged on any that have been subjected to the process. The piles used in jetties and dock gates, are effectually protected from the attacks of marine animals. We have seen two pieces of elm which had been cut out of the same log, and placed under water at the Trinity Chain Pier near Newhaven; after being a twelvemonth immersed, they were both taken up covered with young muscles. The prepared was quite fresh and sharp at the angles, whilst the other was decayed or rather eaten away at the angles and ends.

The commercial navy have taken advantage of the process. The ships Enderby and John Palmer of London were built of prepared timber, and both are South Sea Whalers. The Enderby sailed from London on 11th October 1834, and returned to Gravesend on 7th March 1837, having been absent twenty-nine months. She fished about the Equator, and although much subjected to a tropical and vertical sun, her seams remained entire. The John Palmer was away for three years and a-half, and came home equally tight. The bilge water in both cases was much sweeter and freer from noxious effluvia than usual. Apprehension was expressed about the healthiness of the crew of a ship that had been built of timber prepared in mercury. A similar dread prevented Sir H. Davy and Professor Faraday urging the employment of corrosive sublimate as a means of preventing the ravages of the book-worm in Earl Spenser's library at Althorp. These apprehensions may have arisen from a recollection of the well-known circumstance of violent and even fatal salivation affecting the sailors on board H. M. S. Triumph in 1810, from the rupture of bladders of quicksilver, and the escape of it about the ship. But they may all be dissipated by the testimony of Captain Lisle of the Enderby, who declares no crew could have been more healthy than his was all the time she was at sea.

But the process has the power of preserving cordage and canvass as well as timber. Colonel Sir John May, Inspector of the Royal Carriage Department at Woolwich, subjected to the same trial pieces of prepared cordage of five inches, with a duplicate piece of white unprepared cordage, also of two and a-half inches, one and a quarter inch, and pieces of tent line. The prepared pieces were quite sound, the unprepared quite rotten. Cart ropes, reins, and sheep nets may thus be preserved in use a long time. Sir John also subjected four pieces of canvass prepared which were not at all affected with mildew, whereas those pieces unprepared were affected, and one became quite rotten. Captain Farquharson of the Lord Hungerford of London, on his return from a voyage to the East Indies in June 1836, found an awning of canvass which was unprepared quite mildewed, whereas one of the same kind of cloth prepared was perfectly sound and clean. Thus barn sheets, cart covers, sacks, and windmill sails may be preserved from destruction by this process.

What need of adducing more evidence on the efficacy of this process for preserving animal and vegetable fibre? Let us rather investigate the principle of the process and recommend the adoption of it to those who have hitherto neglected to take advantage of its utility. Dry-rot in timber is frequently distinguished by a sort of mildew which covers it, and the action of which in time causes decay, or it assumes a less organized appearance and crumbles down into powder. This mildew is not the dry-rot, nor the cause of it, but rather its effect. It may be distinctly seen by the microscope to be a fungus, and springing up where it does, it becomes a question whence its germs can have found access into the wood. To assist in answering this natural query, we may state that Mr. Bauer, when treating of the pepper-brand, *Uredo fœtida*, states that fungus to be of a globular form and of the size of only $\frac{1}{1600}$ part of an inch in diameter, and therefore no less than 2,560,000 would be required to cover a square inch. The germs of such plants must therefore be infinitely minute. Professor Ehrenberg, also, when treating of the Monas and others of the Infusoriæ, states, that in the twelfth part of an inch there are 28,000, and in a square inch not less than 500,000,000. It is, therefore, extremely probable minute vegetable germs may be introduced through the spongioles of the roots of plants. Indeed Unger detected the existence of such bodies in the stem of *Galium Mollugo*, which he has termed the *Protomyces endogenus*, developed in the coagulated juice of the intercellular spaces. All plants, as is known, are composed of cellular tissues, whether in the bark, albumen, or wood. The tissue consists of various shaped cells, and although no single cell may pass along the whole length of the plant, as M. de Candolle maintains, yet there is no doubt water, air, or even mercury, can be made to pass through those cells in the longitudinal direction of the fibres of wood. Experiments with the air-pump have proved this passage beyond doubt. These cells contain the sap of the plant, particularly those of the alburnum, and in the circulation of the sap through the tree its watery particles fly off by the leaves, and the albumen remains. Albumen is the nearest approach in vegetables to animal matter, and is therefore, when deprived of vitality, very liable to decomposition, particularly when in the alburnum or sap-wood. On minutely inspecting wood going to decay, Mr. Kyan was impressed with the conviction that decomposition of the sap in the alburnum gave rise either to the dry-rot, or, by the evolution of heat, vivified the germs of the fungi that may have been lying dormant in the cells of the alburnum. Now, as corrosive sublimate was known to preserve animal matter from decomposition, so might it preserve albumen. The experiments which he performed on albuminous and saccharine solutions with corrosive-sublimate, confirmed the correctness of his conjectures. But the prior experiments of Fourcroy, and especially of Berzelius, in 1813, had produced the same chemical results, although the latter had not discovered their practical applicability to preserving wood. Berzelius found the addition of *bi-chloride* of mercury to an albuminous solution to produce a *proto-chloride*, (calomel), and the proto-chloride combined with the albumen, and produced an insoluble precipitate. The insoluble precipitate hardens like a fibre, and fills up the open cells. This is the chemical principle of the process. The intention of seasoning timber by exposure to the air, is to dry up the albumen before it begins to decompose naturally; but that the seasoning is not always successful, may be ascertained from the defective state, already alluded to, of so large a proportion of the timber in the naval dock-yards. We may now see how green wood may be seasoned at once by the process, in that there is a larger proportion in it of albumen for the sublimate to act upon. The process is somewhat analogous to tanning leather, the tannin principle of the bark combining with the animal jelly of the skins, and forming an insoluble precipitate. Oak contains much of the tannin principle; and, as the sublimate does not act upon it, oak, of all woods, least changes the sublimate solution. The process thus resting on simple chemical bases, its efficacy can never be neutralized. Nor can deception be practised by those who intend to deceive the unwary. A chemical re-agent exists, by which the wood can be tested that has been properly steeped. A drop of hydrosulphuret of ammonia will make a black mark on wood steeped in corrosive sublimate, whereas it will produce no change on common timber.

We are glad to be informed that thirty-five tanks of Kyan's solution have been erected by noblemen and gentlemen in Scotland, upwards of sixty in England, and a few in Ireland, for the purpose of serving their own estates. Tanks are now to be found in all the principal maritime ports in the kingdom. Ship-wrights and joiners do not relish the process, in the apprehension their services may be less required, but owners of ships and proprietors of houses will, nevertheless, use it for their own sakes; and we have no doubt, ere long, shipwrights and builders will be unable to dispose of new ships and houses, unless they have been constructed of timber subjected to the process.

With regard to the expense of the process, which is a material consideration to those who use large quantities of timber, a builder, whether of ships or houses, pays for steeping *one pound* sterling per load of fifty cubic feet. Gentlemen taking out private licenses for their own estates, and not for the purposes of trade, pay *five shillings* per cubic foot of the internal area of the tank erected, for the use of the invention during the whole term of the patent. Licenses for trade are given on the principle of receiving a small *pro rata* proportion of the profits of the license. Exclusive licenses in towns are only granted to those who qualify as shareholders, in order to secure their zeal for promoting the interests of the company.

SASSAFRAS. RAT-PROOF MEAT-HOUSES. CLOSE-GRAZING. HILL-SIDE DITCHES.

To the Editor of the Farmers' Register.

Waterloo, N. C., March 26th, 1838.

In a former number of the Register, I suggested the idea of boring into sassafras trees, and pouring into the opening thus made, some liquid substances, which might, by being carried with the sap into every part of the tree and roots, destroy their vitality so as entirely to rid us of that most troublesome nuisance. By way of beginning the experiment in the latter part of the last summer, I bored into a sassafras tree of about five inches diameter with a half-inch auger, and poured in about a table-spoonful of sulphuric acid. Within two or three days, the leaves on about one-half of the tree began to turn of a reddish brown color, and by the fourth or fifth day, were black and dry. The body and branches likewise of about half the tree, put on the appearance of dead half-seasoned wood, as appeared from incisions made with a knife, whilst the remaining half of body, branches and leaves, preserved the appearance of other adjacent trees of the same sort. This state of things continued until frost, when the leaves on the living part of the tree faded and fell; those on the dead part, remained until lately. No farther examination was made until recently. The whole tree now appears to be dead. I will watch it, and inform you whether the tree dies or not, and whether any sprouts spring up from the roots. This may appear a small matter to be made the subject of a communication for the Farmers' Register; yet I am sure there are many, very many by whom any practicable and cheap means of destroying the sassafras, will be joyfully and thankfully received.

Having noticed several plans recommended in the Register for rendering meat-houses rat-proof, and believing one which I have adopted greatly preferable on the score of both economy and effect, I will in a very few words describe it, pledging myself that it will prove effectual, wherever properly executed. Have your house built in the ordinary way of framed buildings, leaving no opening large enough to admit rats through the body, roof or door. Fill up the floor to the depth of twelve inches or more with common quartz stone, or as it is called in our country dialect, white flint rock, and pound them with a stone-mason's hammer until they become of the proper degree of fineness, and lie close enough to prevent a mouse from finding an opening in them large enough to hide himself.

I was greatly surprised upon the receipt of the last No. of the Register, to find a highly intelligent correspondent of yours, maintaining the position, that "*constant, and even heavy grazing, does not of necessity impoverish land.*" I had previously thought, that if there was unanimity of opinion amongst farmers on any subject that admitted a variance, it was in relation to grazing. I think your correspondent has been as unfortunate in his arguments to sustain his position, as he has been in assuming the position itself. He says the commons in the vicinity of towns, &c. grow rich in consequence of heavy grazing. As well might he have said, that our summer cow-pens are enriched by close grazing, or that his taking money out his own chest, was the reason it was becoming daily fuller and fuller. In all three cases, the true cause of improvement may be found in the fact, that the *addita* greatly exceed the *abstracta*. I am theoretically and practically a grazier myself, and keep a large stock; but the idea of improving land by mere grazing, is one that I had never dreamed of. I am improving my own land, not *by* grazing, but *in spite of it*.

In relation to hill-side ditching, which I believe contributes more to the value of land than any other improvement which can possibly be made at the same expense, your correspondent alluded to above, is in my opinion much more fortunate. He thinks the ditches have not usually sufficient fall. I think the fall ought to be three times as much as it usually is. Those which I have made have at least double as much as any I have ever seen; yet I intend to give those I may make in future, still more. The more fall they have, the less is the necessity of having them wide or deep, and of course the less labor is required to make them. Should they exhibit a disposition to wash too deep, a few stones, blocks of wood, brush, or almost any thing not light enough to be carried off by the water thrown into the ditches, in heaps about a hundred yards apart, will effectually prevent farther washing. As far as my observation extends, I have seen many fill up, but not one wash into a gully. W. O. GREGORY.

ADVANTAGES OF PLANTING CORN EARLY, AND COVERING THE SEED DEEPLY.

To the Editor of the Farmers' Register.

Watkinsville, Clarke County, Ga.

Nearly a year ago, I received by mail a number of the Farmers' Register. An African king once inquired if his name made much noise in Europe. With something of this self-importance, I supposed you had somehow heard of my love for agriculture, and all things connected with it, and had done me the favor to put me down as a subscriber. I was much pleased with the number sent, and expected to continue to receive them; but as no more came, I read over the one I had the oftener. The cause of no more coming, I never knew till a few days ago. I was showing some of my little ones how to paint a copy of the farm-house on the first page of the cover, and happened to notice, for the first time, that you had written that this number was a present. For this civility receive my best Sunday thanks; but truly, I regret it was so nearly rubbed out that I never noticed it before; for I have lost many hours of pleasant amusement for want of the other numbers. I now send you ten dollars. I cannot consent to lose so much of a good thing; so I want you to send me the back numbers for the last volume, as well as the current volume. And now I will send you some lines to read; perhaps you may not think them of any value; if so, the fire will soon put them out of the way.

It is a very common opinion, that early planted corn should be covered very shallow. It would be difficult to calculate the annual loss that this error causes. In our state, very early corn will generally produce fully one-third more than late corn. Late corn is generally between two and three feet taller than very early corn; the ear is always higher on the stalk; and whoever will take the trouble to plant rows of corn, late and early, by side of each other, will find the late ears fully one-third smaller than the early. Again—late corn is always more injured by worms, moles, birds, &c.; it requires much more replanting; and the replanted corn makes very little, often nothing. Early planted corn always makes a better stand, and the replanted makes good corn. Early corn is made before the longest and hottest days come, and before the dry weather sets in; consequently, it will bear being much thicker, without firing (burning). In planting a crop, we can get such a forward start, that much more ground can be tended. Corn manured with unrotted manure, more especially, should be planted very forward; for, when planted late, if a drought comes on it, the manure often does more harm than good, as it is so apt to burn up the corn. The result of my experience, and I speak practically on it, amounts to about this: that corn planted the first of March, generally produces one-third more, and with one working less, than corn planted the first of May. Let whoever doubts this, take the trouble to plant a field in alternate rows, giving two months between the times of planting; or plant one acre very forward, and another acre, by the side of it, very late; and I am satisfied he will decide with me. In fact, by rough measurement, I have made the difference greater than what I have named. When I speak of forward corn, I want some data to go by, so that my meaning may be understood. I will try to explain myself, by stating that, in my neighborhood, corn planted the last week in March and first week in April, is considered forward; when I speak of planting forward, I mean the last week in February and first week in March.

And now with respect to the covering. Whoever plants corn very forward, and covers shallow, will regret it; for he will have a poor stand of weakly looking corn. The common opinion is, that shallow corn is acted upon and warmed by the sun, which causes it to sprout; will not a little reflection convince any person, that if the sun does cause it to sprout, that the ground when it freezes as deep as the corn, (which it will do every hard frost,) would kill the roots of the corn, and if not killed, be so much sickened, that its recovery would be slow? This will explain why early corn, covered shallow, is so apt to be killed by frost, if it does not sprout. But experience fully decides, that when shallow-covered, if the sun warms it in the day, the frost chills it at night; and most of it rots, without ever sprouting; but cover the corn deep, very deep, and it will come up prime. If the frost *does* bite, no injury is done; and we insure the best kind of a stand. This I know by experience to be correct. My corn has been several times covered deep with snow; and yet the more forward the corn, the better the stand, and the better the crop. But let us reason on it. Why is spring-water warm in the coldest weather, but because the earth is warmer as we go deeper, and colder as we approach its surface? This fact is fully established by making holes of different depths, and testing the temperature with a thermometer. In cold weather, make a hole in the ground, and put the hand in it, and it will be found warm. The fact that the earth is warmer in winter a foot deep, than it is an inch deep, every body knows; and it must follow, as a matter of course, the deeper we cover corn in reason, the warmer and more uniform its temperature would be. This I say; first cover with hoes, then list on it, covering it still deeper, and it will be so warm and kept of so uniform a temperature that it will not rot, and will sprout much sooner than shallow-covered corn. Again: forward corn is apt to be nipped by late frost. If the corn is covered deep, the frost only bites the top; and I have never been able to see that it injured it in the least; cover some plants so that the frost cannot bite them, and in a few days we will see no difference in what was bit by frost, and what was protected. But where the corn is planted shallow, the ground freezes to the root, and kills it. Whoever will examine, will find that late frost extends a very little way down. It is only a thin shell, as it were, that extends deep enough to kill shallow-covered corn, but does no injury to corn which is covered very deep.

Against this early planting, some argue that nature is a correct guide, if we would observe and follow her; and that corn should not be planted till the trees show young leaves, and weeds, grass, &c. begin to show themselves. When we see the young peaches killed by frosts more than one year in two, and often the leaves in the woods all killed by frost, it certainly gives reason to think that nature is not a sure guide as to the time of planting. But in reality, if we would follow nature close, she would give us much better directions. It should be considered that the trees are, as it were, planted all winter, and all the seeds of weeds, &c. have been planted all winter; and that we should not consider the time they begin to vegetate the proper time for planting. They required a time of preparation, and corn should be planted several weeks before, that the corn may also have this time of preparation in the ground.

All practical planters know that late corn should be covered deep. Every body knows that when covered shallow, if a dry spell happens, the ground becomes so dry that the seed is very long coming up, and then comes up very irregularly; that it is much more injured by birds, squirrels, worms, &c. than when covered deep. The result is a thin stand of irregular corn, and late corn replanted makes very little, every practical planter knows by experience; for the difference is very perceptible, that late corn should be planted deep to make good corn. This is a fact so plain, that it is a common maxim with practical planters; but the very common theory to explain the fact, is wild and altogether erroneous. They say, as the corn is late, plant it deep that the roots may be deep, to contend with the long dry hot days which are to come. When corn is planted, cover it deep or shallow, the seed sends out the sprout and its roots; the seed and these roots nourish the plant till it grows perhaps four inches high. It then sends out a circle of horizontal roots, just under the surface; and as soon as these roots are sufficiently extended to nourish the plant, all below them dies; so that whether the seed is one inch or six inches deep, by the time the plant is six inches high, the roots are of the same depth, and wholly unconnected with the seed, and all the first roots that came from it. I once pulled up some stalks of corn, and showed an old planter that all below these horizontal roots died as soon as they were extended a little in the ground; he said he was obliged to confess that he had always reasoned wrong respecting the roots of deep-covered corn being deeper than shallow-covered corn; but said he cared not for reasons; he knew the fact from the experience of a long life, that the later corn was planted, the deeper it should be covered. If this is fact, which all will admit, that late corn covered deep will produce much more corn than shallow-planted; and this is fact, which every one can satisfy himself of by pulling up a stalk of corn six inches high, that it does send out this circle of horizontal roots just under the surface, and all below them dies immediately. Why is deep-planted corn better for a large crop than shallow-planted, but because we thereby have a more forward start and a better stand?

ROBERT R. HARDEN.

April 13, 1838.

THE MARL DEPOSITE OF SOUTH CAROLINA.

To the Editor of the Farmers' Register.

Bristol, Pa. February 27th, 1838.

* * * * *

In your last number, I observed that until recently, you did not appear to have been well apprised of the existence of shell marls in South Carolina. The localities are very numerous; amongst the most noted, at the time I resided in that state, were Santee Canal, Eutaw Springs, Dr. Jamieson's, near Orangeburg court house, Mr. Darby's, St. Matthew's parish, Godfrey's ferry, on Pedee river, Givham's ferry, on the Edisto, &c. &c. They form a part of the great bed of tertiary deposits, which extends from New York through the whole of the Atlantic states, south Florida, Alabama, &c. on the Gulf—not always perceptible at the surface, from a covering of more recent products.

LARDNER VANUXEM.

[We were not unacquainted with the general geological fact, that the great deposite of fossil-shells, or marl, extends through South Carolina. But, until recently, we had been entirely uninformed as to the bed being visible, or easily accessible, in any particular localities, or of the facilities offered by its position and richness, for its being used profitably as manure. Judging from the contents of both the articles from which we derived such information, the existence of this richest treasure of South Carolina, is yet as little known in that state, as its value is appreciated. We earnestly hope that this strange degree of neglect and inertness will not long continue.

Mr. Vanuxem is one of those now charged with making the geological survey of New York.—ED. F. R.

From the New York Farmer.

MELONS GROWN OVER WATER.

At the last meeting of the Horticultural Society, amongst the fruit from the gardens were two melons, grown over water, into which the roots descend, a plan by which it was found that this fruit would arrive at earlier if not at better maturity.

ON THE BENEFIT OF USING STRAW AS TOP-DRESSING FOR YOUNG CLOVER.

To the Editor of the Farmers' Register.

Madison, April 14th, 1838.

As the time is near at which farmers generally haul out the straw which the farm produces, beyond what is requisite for the support of its stock, I take the liberty of recommending the appropriation of some of it to an object worthy of their attention, but which hitherto seems to have been entirely neglected; that is, as a top-dressing to wheat, for the purpose of ensuring clover on spots which otherwise would be entirely destitute of vegetation. The first numbers of the Register contained several articles on the subject of scattering straw, which attracted my attention, and for some years I followed the course there recommended; that is, to haul out the surplus straw as back loads, when bringing in the crop of wheat to the machine, and then at some convenient time to spread it. This method has its advantage, as it is hauled out with little or no loss of labor; but here it ends, and the disadvantages begin; for this was never as valuable as the one which I pursue, and for this simple reason, that the poor spots on which it had been spread, had failed to take in clover; and then, instead of the heavy growth of clover which it can produce, we had to depend on the modicum of straw which we had applied for the improvement. My course is now, to apply the straw immediately after sowing clover seed, and the result has exceeded my most sanguine expectations; for at this time, I have clover on poor spots thus treated, much better than on land much richer; and it is now better than it would have been for years to come, had it been left as such spots generally are. It may be said that fine manure would be better, as by that, not only the clover, but the wheat would be improved by it. I admit the truth of this, provided it could be done; but when we reflect on the labor requisite to accomplish top-dressing on as large a scale as the impoverished condition of Virginia requires, it seems out of the question even to hope that, as a general thing, it will ever be accomplished. In recommending the above course, I go upon the idea, that in agriculture, as in government, we should be content with the most practicable scheme, and leave to others the pursuit of theories as beautiful as they are difficult; and furthermore, I shall be content to have this tried as an auxiliary, for one trial will suffice to fix our attention to it; for when we take into consideration the facility with which straw is moved, and the surface over which a load will extend, I hazard little in saying, that there is no way in which as much improvement can be effected; and furthermore, I contend, that even admitting that our lands have strength enough to ensure clover, we should find our account in this application, as it is in the infancy of the clover that it gives an impulse which no application, made at a later period of its growth, can give.

AGRICOLA.

P. S. If farther proof of the excessive drought of 1837 is necessary, permit me to mention a fact which came under my observation about the middle of March. I had a ditch cut through a portion of my low grounds, and I found that the clay, at the distance of three or four feet under ground, was completely dry, so much so indeed, that as it was thrown out, it could be converted into dust without difficulty. What makes it more remarkable is, that an entire winter's snow and rain had not been adequate to its correction.

SOUTHERN COMMERCIAL CONVENTION.

[We request attention to the following able report upon a subject of vital importance to all the southern states. Having in the preceding volume, (p. 506,) when presenting the proceedings of the first meeting of the convention, expressed our sentiments fully and clearly in favor of the general objects in view, it is unnecessary to offer further comment on that score, at this time.

The wretched and deplorable state of the currency and of exchange, though one of the sorest evils ever inflicted on our country by mis-government, will be compensated to the suffering south, if this state of things should continue long enough to produce the effect to which it manifestly tends, of discouraging the continuance of the artificial system of the southern states trading with Europe through New-York, and paying to northern merchants, as agents and "middlemen," a profit on every sale and every purchase, made on account of southern producers and consumers. One of the advantages of a paper currency which is most frequently referred to by its most thorough-going advocates is its furnishing means for the easiest and cheapest possible transmission of funds between distant places. Now, it costs an addition of at least five per cent., for exchange, for a debtor in Virginia to pay his creditor in New-York, or for a cash purchaser to obtain goods there. In other words, it costs five dollars expense to convey from Virginia to New York 100 paper dollars; and from thrice to five times as much, from some other places. Yet there is no question, with any one, but that the bank notes of Virginia, on which 5 per cent. must be lost in New-York, are just as good as those of New-York, which command that premium in exchange; or *just as bad*—(to reverse the proposition—) the banks of both being alike able, and yet both alike refusing, to perform the false promises to pay, which are displayed on the face of every one of their notes.

If we had a currency as cumbrous and heavy as silver, it would cost but one half of one per cent. to convey it across the Atlantic; and even if it were in copper, it would not cost so much to transfer it to New York, as it now costs in the *lightest* currency in the world. But to return to our position. The effect of this enormous difference of exchange, is to compel the merchant from Virginia, or North Carolina, who now buys foreign goods (as heretofore) in New York, to pay 5 per cent. more than the price and all other previous charges; and of course so much more than he would have paid to the direct importing merchant at, or nearer home. This additional 5 per cent. is too heavy a deduction for ordinary profits to be long borne, and it operates as so much additional inducement to carry on a direct foreign trade between the reciprocal consumers and producers. Reason would sufficiently show this to be the tendency, and ultimate effect, of the higher price of the inconvertible bank notes of New-York over the inconvertible bank notes of the south; but facts also have proved that the effect is now in progress. The few importers of Virginia have sold out their stocks of newly imported goods, at good profit; and so rapidly, that some of the country merchants who stopped to buy, in preference to paying the additional northern tax in exchange, could not be supplied. Now is the time for Virginia and the more southern states to throw off the yoke of commercial bondage.—Ed. Far. Reg.

Report of the Committee of thirty-one to the Merchants' Convention, presented on Wednesday of the session of that body, by Gen. Robert Y. Hayne.

The committee of thirty-one, who were instructed "to consider and report on the measures proper to be adopted by this Convention," beg leave respectfully to report:

That they have bestowed upon the subject referred to them, the attention which its importance demands. Time does not permit, nor does the occasion perhaps require, an elaborate examination of the subject in all its bearings, and this is the less necessary, as the able documents recently published by the convention, have exhibited in the clearest light, and demonstrated in the most conclusive manner, every point which it could be important for us to establish. Indeed the whole question is embraced in the single proposition, that it is the interest and duty of the slave-holding states of this Union, to improve their natural advantages, by securing to themselves that portion of the commerce of the country which rightfully belongs to them; a proposition which, if it be not self-evident, cannot derive much support from argument or illustration. We rest our whole case upon the fact, which is beyond all dispute, that the southern and south-western states furnish three-fourths of the entire domestic exports of the whole Union, while they import but little more than one-tenth of the productions received from abroad in exchange for these exports. It has been shown in the documents published by the convention, that when the imports of the United States amounted to $190,000,000, those of all the Atlantic states south of the Potomac and the states on the Gulf of Mexico, amounted to only $20,000,000; and while the domestic exports of the Union amounted to $107,000,000, the states of the south and south-west exported $78,000,000.

South Carolina and Georgia, while furnishing exports to the extent of $24,000,000, actually imported less than three millions and a half. The amounts have varied in different years; but this may be taken as an exemplification of the condition of southern trade.

The mere statement of these facts, must surely convince any unprejudiced mind, that this unnatural state of affairs could only have been brought about, by the most powerful and extraordinary causes, and that from the very nature of things, the effect must have been highly injurious to the southern states. Without attempting to trace all the causes which have had an agency in producing this result, we will merely advert to one of the most obvious, and which is perhaps sufficient of itself to account for it; we allude to the UNEQUAL ACTION OF THE FEDERAL GOVERNMENT, especially in the mode of LEVYING and DISBURSING THE PUBLIC REVENUES. If, instead of throwing nearly the whole of the public burdens, in the shape of duties, upon those foreign goods which are received almost exclusively in exchange for the great staples of the south, the revenue had been levied in a direct tax (however largely exceeding the wants of the Government,) the burden would have fallen, at least, equally upon the different portions of the Union. But by the system which was adopted, while the labor and capital of the south was borne down by a weight of taxation, which in many instances, amounted to one half of the whole cost of the articles received in exchange for their productions, the labor and capital of other portions of the Union were substantially exempt from taxation, and even stimulated by enormous bounties. Nor did the evil stop here. Under the pretext of encouraging "domestic industry," duties on foreign goods were imposed to an amount *greatly exceeding the wants of the government*. The amounts thus brought into the treasury were *accumulated in the northern cities*, and especially in New York, from whence they were drawn only to be distributed among the military and naval establishments at the North; the surplus being finally divided among pensioners, and internal improvements in the same quarter, and in the west. Hundreds of millions of dollars were thus drawn from the south, and expended north of the Potomac; and our wealth was conveyed from us by a steady stream, constantly flowing northward, in a current as undeviating and irresistible as the Gulf stream itself, which "knows no reflux." With this system, other influences were combined, all having the same object in view, and tending to produce the same general result. On these, time does not permit us to dwell. It is sufficient for us merely to mention the long credits—the auction system—the centralization of the exchanges; and the concentration of the whole patronage, power, and influence of the Government in favor of the north, and especially of the city of New York—causes of themselves abundantly sufficient to secure them those advantages against which we so long struggled in vain. The calamities under which the south labored, under the operation of this system, belong to that class which one of the ablest writers on political economy has declared to be worse than "barrenness of the soil and the inclemency of the heavens;" for if our fields were fertile and the heavens propitious, the harvest was for those, "who reaped where they had not sown." Under these circumstances, so far from its being a matter of surprise, it was the result almost of an evincible necessity, that the commerce of the south and south-west should be thrown into the hands of the northern merchants: that the exchanges should be centralized at New York; and that we should be rendered TRIBUTARY TO OUR NORTHERN BRETHREN. To show that we have not mistaken the character, or natural effect of the causes which we have mentioned, we will advert to one among many facts illustrative of the truth of our position. Before the introduction of the protecting duties, a large and profitable direct trade *was actually carried on* between the cities of the south and the ports of Europe, by southern merchants, and in southern ships. For several years prior to 1807, for instance, our imports into the city of Charleston, amounted to several millions of dollars annually. From this period, under the operation of the "restrictive system," they gradually dwindled down to less than half a million. From the period, however, when the American system received a fatal blow, and the government commenced retracing its steps, back to the free trade system, our imports began to increase, and have been steadily increasing ever since; thus showing, conclusively, the true sources of southern depression on the one hand, and of southern prosperity on the other. FREEDOM is the very element of the south, in which "she lives, and moves, and has her being." Freedom in "all the pursuits of industry," is essential to our well-being. We look back with surprise to the fact, that a people possessed of such vast advantages should have so long and so patiently submitted to a state almost of "colonial vassalage;" and we hesitate not to say, that the page in our history, which records the rise and progress of the "American system," (so called,) will be regarded hereafter as disreputable to the intelligence of the age, and to the public spirit and virtue of the American people. But, happily for our prosperity, and we will add, for the peace and harmony of the Union, this system has been broken down—we trust and believe *for ever;* and we are coming back, by slow but sure steps, to the great principles of FREE TRADE and UNRESTRICTED INDUSTRY.

To avail ourselves, however, of all the advantages of this great and salutary change in our system, it is indispensably necessary, that we should free ourselves from the trammels of long-established habits, opinions, and prejudices. It is one of the greatest evils of misgovernment, that the effects continue long after the evil itself has been corrected, and in all commercial operations, the influence of established usages, is extremely difficult to overcome. To divert capital from its accustomed channels, to introduce new associations and habits of business among commercial men, is one of the most difficult tasks which any people can impose upon themselves; and if it were not for the high spirit and intelligence of our people, we might distrust our success. When we survey the actual condition of the southern and south-western states, however, who can fail to perceive that we possess IMMENSE ADVANTAGES in this contest, which properly improved, must, in the end, crown our efforts with triumphant success. It is true we have but few ships, but we have ship timber in abundance, of the choicest description; and surely no southern man can be insensible of the importance of securing a mercantile marine, which in the future changes and chances to which our country must sooner or later be exposed, may be essential not only to our prosperity, but to our very existence as a free people. We want, also, it is said, commercial capital and credit, and cannot, it is supposed, furnish an extensive market for foreign goods, as will enable us to enter into successful competition with the cities of the north. Now, we base all our calculations and rest all our hopes upon the fact, that it is the *natural course of trade,* to exchange *directly,* the productions of one country for those of another; and that all indirect and circuitous modes of intercourse must be attended by increased expense, and be therefore less advantageous to all parties than the direct trade. Trade, like water, always seeks its level, and unless when opposed by natural or artificial barriers, will run its course in the *shortest and most direct line.* It must be admitted, therefore, that but for opposing obstacles, which have been interposed, and which have forced the commerce of the south *out of its natural channels,* our cotton, rice, and tobacco would have found their markets in Europe, by the shortest and most direct route from southern sea-ports and in southern ships; and it is equally obvious, that the foreign goods received in exchange for these productions would have been returned to us through the same channels. Now, can any plausible reason be assigned, why, under *a system of free trade,* the exports of South Carolina and Georgia—amounting as has been shown to $24,000,000 annually, should not be sent directly to Europe from Charleston and Savannah? and why the foreign goods *for which they are exchanged,* should not be imported directly in return? Our harbors are safe and commodious, the voyage is shorter and safer, and the freight less. But what is of infinitely more importance, we actually PRODUCE THE VERY ARTICLES which are to be exported, and require FOR OUR OWN CONSUMPTION the very goods to be received in exchange for those exports. Now, can any thing be conceived more unnatural—more out of the usual and proper course of business; than that OUR COTTON, which is to be exchanged for the manufactures of England, should be first shipped to New York—there sold to the New York merchant—by him transhipped and sent to England—there again sold and converted into British goods—which goods are to be first imported into New York, and from thence forwarded to Charleston—thence to be sold to the Carolina merchant, and paid for in bills at 6 per cent. Count the number of agencies employed in this transaction; sum up the freight, insurance, commissions, profits, and other charges; consider the loss of time and the risks incident to such a course; and can any reasonable man entertain a doubt, that if *such a trade* can be carried on at all, a DIRECT IMPORT AND EXPORT TRADE, (if there be no obstacle interposed,) must be infinitely more profitable? Under similar circumstances, the capital required to carry on the indirect trade must be much greater than that which must be needed in the direct trade. Indeed, under a system of mutual exchanges of our productions for those of Europe, the capital required, under a well ordered system of commercial arrangement, would be comparatively small. Credit might, to a great extent, supply the place of capital, and such a trade might be conducted on principles, which might ensure to the planter the largest profits on his crops, and his supplies at the lowest rates; while the merchant, the ship-owner, and every other class in the community, would participate largely in the advantages of such a trade.

But let this direct intercourse be once established, and capital would *soon flow in from all quarters,* to supply any deficiency that might be found to exist. The great law of demand and supply, would not leave us long without a money capital, fully adequate to all the operations of trade. So with regard to the market for the foreign goods, which under this system would be received at our southern sea-ports. Obtaining them, as we should be able to do, at less cost than they could possibly be procured through New York, we would unquestionably be able to dispose of them on advantageous terms, at least to the extent of *our own demand* for those goods; and this alone would increase our direct importations to five or six times their present amount. If only the consumption of the south was supplied through her own ports, this of itself would create a revolution in our trade, which would change the entire face of the country, and pour a flood of wealth and prosperity through every part of our land. But it is one of the most important and interesting features of our system, that it is inseparably connected with the extension of our intercourse with the interior of our country, by means of rail roads, canals, and turnpikes. A connexion between the south and the west by the various schemes now in progress in Virginia, North and South Carolina, Georgia, and Alabama, will furnish an outlet for all the goods that can be received from abroad in exchange for our productions. And when the great west shall find a market and receive her supplies through the sea-ports of the south, a demand will be furnished, the extent and value of which *cannot* be too largely estimated. Let these various schemes, therefore, for the extension of our interior connexions, be prosecuted with a zeal and energy worthy of the object. Let no unworthy jealousies—no narrow or merely sectional views, disturb that harmony of feeling and concert of action, which are so essential to success.

There are some circumstances connected with the present condition of the country, which may serve to animate our zeal, encourage our efforts, and urge us to that prompt action on which our success may depend.

Our great staple has now become *"the common currency of the world."* It is the great *medium of exchange*, regulating and controlling, to a considerable extent, the commercial operations both of Europe and America. During the suspension of specie payments, it affords almost the only means of obtaining *those credits abroad*, on which northern commerce has heretofore mainly relied for its support. This great staple is our own.

The revolutions which have recently taken place in the commercial world—the failures and destruction of credit in New York, and the stoppage of the American houses in Great Britain, has brought about a crisis peculiarly favorable to our views. Here is our cotton lying at our very doors; the produce of our own fields, and furnishing at this time, the only medium of exchange for the manufactures of Europe. Why should our own merchants not *use it* for this purpose? The door is now open to us, and we have but to enter and take possession of that which belongs to us. If we improve the opportunity, the victory will be ours. The tide in our affairs is at the flood. Let us launch upon it bravely, and it will assuredly "lead us on to fortune." But should this glorious opportunity be *lost*, our gallant bark, instead of riding the waves in triumph, may be driven among the breakers or dashed upon the rocks, or at best be again involved in those "eddies and shallows" from which we may never more be able to escape. Even the "Pilot who weathers the storm" may be compelled to "give up the ship," when deserted by the crew and left in a condition so utterly hopeless.

The *measures* which are deemed by the committee proper to be adopted, in order to carry these views into effect, are embodied in distinct propositions, which are herewith submitted to the convention. They embrace a strong and emphatic declaration of the feelings and opinions of the convention, on the importance of a direct import and export trade, and the duty of adopting all proper means for the purpose of establishing and promoting it. They recommend, in the next place, strong, earnest, and reiterated appeals, to the understanding and feeling of all the people interested, with a view to enlist their sympathies, excite their patriotism, and to call into action *an enlightened public opinion* in furtherance of our views. An adjourned meeting of the convention to be held in this place, on the 3d Monday in October next; an *address* to the people of the slave-holding states, and the adoption of other suitable measures to secure a full representation, at that convention, from *all the states interested*, are among the measures recommended. In looking to the essential objects of providing *capital* and *credit*, as well as markets for our imports, and thus laying a sure foundation for the ultimate success of our schemes, a series of important practical measures have been recommended, which if carried into full effect, will, it is confidently believed, go very far to put our merchants on a footing with those at the north. An earnest call is made upon the *banks*, to which they can hardly fail to respond, to provide the required capital and credit, by arrangements perfectly safe as to themselves, and at the same time well calculated to furnish all the facilities which the direct trade will require. A plan for *equalizing our domestic exchanges*, and keeping up the credit of our banks during the suspension of specie payments, has also been devised, which it is most earnestly desired may be carried into effect by them. It is not to be concealed, that without the aid and support of the banks, the difficulties in our way will be greatly multiplied. It will depend upon them, in a great measure, to determine the fate of our great enterprise. In order to divert capital and credit from other pursuits into the channels of commerce, an appeal is also made to planters, capitalists and others, to avail themselves of the provisions of the acts of the legislatures of the several states, passed during the last winter, authorizing *limited partnerships;* and it is recommended that the youth of our country should be directed to commercial pursuits, and prepared by a suitable education to fill the responsible station, and elevate the high character of the *southern merchant*. These, and other suggestions embraced in the resolutions, constitute the measures recommended to the convention for their adoption. It will be seen, that they embrace a series of measures of a practical character, all believed to be well calculated to promote the objects for which they are designed. It is true, that we can do no more than to urge the adoption of these measures on the part of the banks, and others interested. But when it is recollected that this convention is composed of near two hundred delegates, representing five states and one territory, and when we consider the weight of character, influence, and acknowledged talents of those who compose it; and when, above all, we remember that they are engaged in a matter of *deep public concern, involving the welfare, prosperity, and honor of these states*, it can hardly be believed, that their deliberate opinions and earnest recommendations can be without effect. Our chief dependence after all, however, must be upon *public opinion;* but we have too much confidence in the truth and justice of our cause to entertain a doubt of our success, if every member of this assembly would regard it as his *own personal concern*; as well as a sacred duty which he owes to himself, his posterity and his country; to use his utmost efforts to advance the great work. Judging from the past, we have no cause to distrust the future. Six months ago the first meeting of the convention took place at Augusta. It was composed of 80 members representing two states and one territory. Now we have five states and one territory represented by 180 members. The proceedings of the assembly have gone abroad, and wherever they have been received, have produced a powerful influence on public opinion, of which we have the most gratifying evidence in the legislation of several states on one of their recommendations, and the increased interest every where felt in the subject of their deliberations.

Thus encouraged, we should go on in that confidence, which a good cause should never fail to inspire. But to secure success, we must be prepared to make the necessary efforts. Of one thing we may be assured, that this great victory cannot be easily achieved. It is the order of a wise and benificent providence, that nothing truly great or good, can be attained without pains and labor.

This is the price which must be paid to secure success; and if we are not prepared to make the necessary exertions, we must yield the prize. Nor can our mighty work be accomplished in *a day*. All essential changes in the condition of a country, must be worked out by slow degrees. We may be assured, that nothing short of a high resolve, which no opposition can move, a devoted zeal, proof against all discouragements, and an untiring perseverance, which shall rise superior to all difficulties, can enable us to work out our "political salvation." Let us not deceive ourselves then, with the vain belief, that our progress in this work will be every where cheered by the approving smiles of our country, and the cordial support of our fellow-citizens. Conscious that we are actuated by the purest motives, and that "all the ends we aim at are our country's," we must nevertheless be prepared for all manner of opposition. The measures we propose come into conflict with too many deeply-rooted prejudices, and too many adverse interests, to enable us to hope, that even our motives shall escape detraction, and our purposes misrepresentation. We have those around us, whose prospects in life, in a great measure, depend upon the defeat of our plans.

A large portion of the Union,—which always has exerted, and still exerts, almost a controlling influence upon public opinion, at home and abroad, will be roused into action, to deprive us of public confidence, and to drive us from our course. We shall be ridiculed, as the supporters of wild and Utopian theories;—as visionary enthusiasts, wasting their strength in the pursuit of impracticable schemes. We shall be charged with ungenerous prejudices, and unkind feelings towards our northern brethren, (feelings which are strangers to our bosoms,) and the *stale*, though *potent slander*, will be revived, of HOSTILITY TO THE UNION. Now, if in the consciousness of rectitude, we are not fully prepared to encounter ALL THIS, and MORE,—if we are not unalterably determined to go on in our course, "through good report, and through evil report,"—if we are not firmly and unchangeably resolved to trample down all opposition—it would be better that we should stop here, and attempt to advance no farther. These difficulties are thus fairly stated, not for your discouragement, but that we may be fully prepared to meet them. If we are true to ourselves, we shall most assuredly triumph over all obstacles. The high character, intelligence, and influence, which compose this Convention, properly and zealously exerted, CAN NEVER BE PUT DOWN. It is as certain as the rising of the morrow's sun, that we shall achieve the emancipation of the south and south-west, if we are only prepared to make the efforts necessary to the accomplishment of the good work. We shall live down the slanders of our enemies, and in the rich fruits of a noble and peaceful victory, will find our best reward. The peculiar institutions of the south, will be fortified and strengthened,—the streams of a rich and varied commerce will fertilize our soil, while diversified pursuits will stimulate the industry, add to our wealth, enlarge the minds, and improve the character of our people. Civilization and refinement,—the handmaids of virtue,—will adorn our land; and the GREAT TRUTH will be seen, and felt, and acknowledged, that of all the social conditions of man, the most favorable to the development of the cardinal virtues of the heart and the noblest faculties of the soul—to the promotion of private happiness and public prosperity, is that of SLAVE-HOLDING COMMUNITIES UNDER FREE POLITICAL INSTITUTIONS—a truth hardly yet understood among ourselves, but which the future history of these states is, we trust, destined to illustrate. Animated by these sentiments, and influenced by these views—and with a firm reliance upon Divine Providence—let the members of this Convention now PLEDGE THEMSELVES to each other, and to their country, to GO FORWARD—firmly resolved to leave nothing undone that may advance our great and patriotic objects. Let us be prepared to make every personal sacrifice, and to use all just and honorable means for the accomplishment of our great work—unalterably determined to PERSEVERE UNTO THE END.

LEAD MINE IN NORTH CAROLINA.

It affords us much pleasure to state that a valuable lead mine has been recently discovered in the lower part of Davidson county.

The ore is the *carbonate of lead* which unites the advantages of great yield and very easy reduction, and the vein is said to be very extensive. The carbonate of lead has never been found in considerable quantities in Europe, but exists in abundance at the celebrated *Lamotte Mine* in Missouri, where, owing to the ignorance of the miners, it was until recently considered as worthless; but that mine having been taken up by a company who have brought the lights of science to their assistance, the carbonate of lead is now preserved with great care, and considered the most valuable ore.

The mine in Davidson has been purchased by Mr. Roswell A. King, whose skill and persevering industry are well known, and insure success.

LATE WORKS OF MASSACHUSETTS IN AID OF AGRICULTURAL IMPROVEMENT.

We have received several valuable publications, which exhibit evidences of the recent progress made in Massachusetts in promoting agricultural interests, both by the action of the government and the people. In addition to the other and greater merits of these several publications, one, far from unimportant, is, that they are published in the uniform and handsome form of large octavo, and the paper and typography are such as to be worthy of the subjects, and to facilitate the use, as well as to induce the binding and preservation of these and similar publications. In this minor respect, of form and appearance, these publications are very greatly superior to the documents published by the legislature of Virginia; though even that great inferiority is as nothing when compared to the immeasurable inferiority of the substance—the acts and works —of the commonwealth of Virginia in support of agriculture, compared to those of Massachusetts.

Among the most important, and the first in order of these publications, is the 'Agricultural Report of the County of Essex, Mass.' This is the first part of the labors of the Rev. Henry Colman, commissioner of the agricultural survey of Massachusetts, ordered by the legislature of that state; and though the subject is a county which is one of the least agricultural of a state which, if compared to Virginia, is generally but little fitted to reward cultivation, or improvement, still, the report is an earnest of the value of such surveys to agriculture, and of the ability of the surveyor and reporter selected for this noble work. In the foregoing pages of this number, we have copied parts of this report, which our intelligent readers will doubtless find interesting, if not instructive, notwithstanding the great difference of the circumstances of Essex in Massachusetts, and every part of Virginia. There is not a county in all the wide extent of Virginia, and no matter whether it be the best or the worst cultivated at present, of which a similar minute and careful report would not be highly interesting, and highly instructive, to a large portion of the farmers of our state; and if a general agricultural survey of Virginia were ordered, and properly executed, such as is now in progress in Massachusetts, it would do more good to agriculture, and to the general interests of this commonwealth, than the worst and most stupid course of any recent legislature has done harm; and that is a very strong assertion. But it is in vain to expect any such things here; and useless to refer to them, except to denounce, in deserved terms of reprobation and contempt, the legislation of a great state, much wanting and highly susceptible of profiting by agricultural improvement, which has continually refused the smallest aid to such improvement, and lends all its energy, and gives nearly all its labors, and all the spare revenue of the state, to endless and useless *talking* about federal relations, sustaining the bank-ocracy in its every iniquity, helping demagognes to the offices they seek, and giving fat jobs and profits to numerous individuals, under the false pretence of aiding public improvements.

The other publications referred to, which are strictly agricultural, are the 'Transactions of the Essex Agricultural Society, for 1837,' and separate memoirs of the commissioner of the agricultural survey, 'On the cultivation of Spring Wheat,' and 'On Bone Manure.' Another, which is principally and most usefully, though not entirely directed to benefit agricultural improvement, is the 'Re-examination of the Economical Geology of Massachusetts,' by Prof. Edward Hitchcock; which, in its general features, seems to compare with the geological reports of Virginia, pretty much in the same manner as the business-like and matter-of-fact doings of the legislature of Massachusetts, with the eloquent declamation and endless and fruitless speech-making in that of Virginia. Some extracts from this excellent and practical report, and also some animadversions on particular portions of it, may be given in this journal at a future time.

NATURAL COKE FOUND IN VIRGINIA.

"There seems to be no end to the mineral treasures of Virginia. Yesterday we heard of another discovery, which, according to present appearance, is destined to prove of incalculable service. The reader will recollect, that during the last autumn we spoke of a rich vein of iron ore, which was in a course of exploration, on the south side of the James River, near the coal pits, and from two to three miles of the river. The ore has been further opened; and we are happy to learn, promises to be of great value. It is under the auspices of John Heth, Esq., and is immediately on the new rail road, which will soon be opened, from the coal pits to the river.

But the discovery embraces a new object—a large and rich bed of natural coke, which is just below the iron ore—and is suspected of being in a large field—and of being near 17 feet thick. The coke was first discovered by those who are engaged in laying down the rail road. They thought of burning it as fuel, and the experiment has answered. It is said that Professor Rogers has pronounced it to be a natural coke—and we understand, that Mr. Deane is about to try its virtues in his iron rolling mill. Should it correspond with the indications which have so far transpired, it will prove a source of great wealth to its worthy, liberal, and enterprising proprietor—as well as of advantages to the rising manufacturers of Richmond.—*Enquirer.*

We have seen experiments made in the foundry of this city, upon specimens of the coke, found in Chesterfield county. In the course of an hour and 30 minutes, near 1200 lbs. of iron, brought from the mine near Fredericksburg, were fused; and the castings were uncommonly smooth.

There seems to be no doubt, that it will answer admirably the purpose of smelting the iron from the ore.

The fire, which is made of it, is intensely hot. It much resembles the anthracite; but it has a little more flame.

It is considered a very valuable discovery—and it is unique in this country. Analysis gives more than 70 per cent. of carbon—small portions of iron, earth and volatile matter.—*Ib.*

From the Quarterly Journal of Agriculture.

ON REARING DOMESTIC POULTRY.

It has frequently occurred to us, that the management of a poultry-yard is not so rationally conducted as it ought to be. When we consider the rapid advances that have been made of late years among the industrious classes of the community in intellectual acquirements, more especially in the southern parts of the kingdom—Scotland having been for a series of years an educated country, while the same classes in England were yet in ignorance—we feel warranted in our objections, because we have practically proved the fallacy of the "auld warld" methods of treating that portion of our live-stock, and have established our right to make those objections, by the success which has attended our own plan. The best test of our ability in the office which we can offer to our readers is, that we pay nature the compliment to suffer her to dictate to us, and that, as far as possible, we attend to her wise and simple laws. If this candid acknowledgment be in our favor, we fear not to gain proselytes from the old to the new method, and proceed to the detail.

In large farms, and among the very poor, it would not be desirable to have a poultry-yard portioned off; in the former case, because that part of the live-stock is subsidiary, in the latter, because the outlay, though trifling, would be too considerable. A very numerous class of persons, however, remain, to whom the rearing of poultry might be an object of emolument; and others again, who seek for no remuneration beyond the pleasure which arises from possessing the means of consuming those animals which are the produce of their own estates. In all cases it is gratifying to know and to follow a plan which leads to the most satisfactory results; and *that* is presumed to be the best, which is founded upon the experience of years. We will begin with

The poultry-yard.—This ought, when practicable, to be separated from the other portions of the premises devoted to live-stock, and even subdivided when various kinds of fowls are kept which are inimical to each other, as is the case with the guinea-fowls (or Pintadas, or Gallinæ, as they are indiscriminately called), and the more familiar tribe of cocks and hens. The yard should be dry, as nothing is so injurious as damp; in order to effect this, the surface should be gravel, on a foundation of chalk, for the benefit of quick drainage. This preliminary we consider all but indispensable; the difference that would be experienced in the well-doing of poultry that is reared on a gravel or chalk-paved yard from those that *draggle* through their existence on wet clayey ground or grass is astonishing. The yard should have a full exposure to the south, and contain an open shelter from either sun or rain. Within it should be placed dry sand, ashes, small gravel, and chalk, for the use of the birds: the two first named materials they require for the purpose of dusting themselves, a process in which they not only delight, but which is essential for their health; the fine gravel is constantly picked up by them, and without it, their food would not undergo a healthful state of digestion. Although the space allotted to them is to be separated from the general farm, it should be contiguous to a meadow or a common, for grass is absolutely necessary for them; a small opening should, therefore, be made in the fence, through which they may gain access to it. Instinct will teach the old birds to remain no longer than is needful; of chickens we shall speak hereafter. We have had opportunities of comparing the state of poultry which had been prevented from ranging among grass with our own that had never been debarred from it, and the results were so satisfactory to us that we cannot do otherwise than recommend the plan. No animal thrives well upon one only species of food; of man himself it is asked "can he live by bread alone?" The craving which poultry evince for a change of food is evident to all who will take the trouble to watch them; after having eaten well of variety, with a profusion of the grain yet lying before them, they will eagerly run to a common and finish their meal, upon the various aliments that are presented to their choice, grubs, worms, insects, and even of the grass itself they will eat very considerable quantities, when left to their own freedom, and this not now and then only, but daily, for they live very regularly. Their habits appear to be as fixed as those of mankind; they like to be abroad early in the morning, before the slugs, &c., which are most alert during the hours of darkness, have retired to the earth; they then return to their corn, which they rarely finish until they have been abroad. After having drunk water and dusted themselves, the hens proceed to the nests for the purpose of laying. They afterwards lie lazily about, take their *siesta* towards noon, then look for their mid-day meal; again sally forth to the grass, and rove about at their ease, until it is time for them to receive a third feed, when they retire to roost, in summer about six, in winter towards four o'clock.

The most approved species of poultry.—In a former number of this periodical, all the kinds are enumerated, and their different qualities specified, so that choice may thus be made. (See No. xxxi. December, 1835, pp. 372, 390.) We have but to observe that *white* fowls with short legs, are those to which we give preference. There exists a prejudice against them, that they are more tender than those with dark plumage; we have not found this to be the case, though we are decidedly of opinion that the flesh of the former is more delicate than that of dark fowls with black legs.

Poultry-houses.—If the number of fowls to be kept, be very considerable, it would, perhaps, be right to have two or three dormitories, in the event of infectious disorders appearing among the stock; but we do not offer this opinion as our own, having never experienced any illness of a contagious kind, nor having indeed lost any of our numerous stock, except from casualties and accidents. One roomy—nay, lofty fowl-house, will be sufficient where judicious attention is paid to the following particulars. Ventilation is highly requisite, for where numerous creatures congregate and remain shut up for many hours, an unhealthy heat will be generated, and a bad effluvia from the manure will stagnate and create disorders which would never exist if free ventilation and cleanliness were attended to. We have seen in those anomalous spots peculiar to England, yet christened by a French name, and styled "*Fermes Ornées*," where every item was pretty, and expensive, and ornamental, and artificial, and, consequently, liable to failure; we say, in such places, we have seen fowl-houses, barely seven feet in height, with plastered walls and *ceiled* ceiling, with close-shutting door, and a glazed casement, not made to open! The inevitable consequences were most offensive odors, and a sickly stock, which of course consisted of the most expensive, because rare species, and were continually obliged to be renewed.

Fowl-houses, we repeat, should be lofty, and securely closed in the lower part, to prevent the ingress of vermin, not only foxes, but stoats, weasels, rats, &c. The upper portion may be very open, as much so indeed as is consistent with due shelter from rain. As it is the nature of warm air to ascend, it is evident that the atmosphere which is heated with, and contaminated by, the creatures and their odor, will ascend and prevent the descent of cold air. The floor of the dormitory ought to be formed of any convenient material which will be found to be most dry, even, and commodious, in order to allow of its being frequently washed. In laying the floor, a gradual slope should be made towards the middle, or to one side, where a drain might carry off the moisture, after it had been scrubbed with a birch-broom. All good farmers and gardeners are aware of the value to their land of every kind of manure, and need not our recommendation to save every portion; hence, the drain from the hen-house will of course be made to communicate with the general reservoir of liquid sullage, which *every country homestead* ought to possess in the most convenient corner of the premises, where it could be covered in and kept from evaporation, by a rough building or shed erected over it. The boxes for nests should be constructed of unplaned boards, and fastened to the walls about three feet from the ground, and by no means should they be placed in the fowl-house; an out-building ought to be devoted to the purpose, where the birds may fulfil their duties either of laying or sitting quite undisturbed; a fowl-house appears to be sedulously avoided by poultry, excepting at the hours of rest. Clean straw, not very long, must be coiled round in the nests, but hay should never be made use of; the scent is said to be too powerful for the birds, and to harbor insects. We do not assert this of our own knowledge, but had we not heard any objections made to the use of the latter, we should give the preference to straw.

The fowl-house should be lime-whited every spring. The perches for roosting should be of different heights, but wider apart than the length of the larger sized birds, to prevent the fowls which may roost on the lower poles from being inconvenienced by those above them. A sloping board with slips of deal nailed on to it, at distances of three inches, should be fixed from the floor to the lower range of perches, to facilitate the ascent of chickens when they have left their coops, and begin to assume the dignity of roosting fowls. The door of the house should be set open every morning when the birds are let out, to preserve the place healthful by constant ventilation; and where no objection exists to its being kept open all day, there need be no other place of ingress and egress; where, however, such objection does exist, an opening must be made in the door itself at the bottom, large enough to admit the birds, which (the opening) should have a sliding board made to run in grooves, that must be closed in the evening when the fowls are locked in, and this is a precaution which no one will neglect who values his poultry. It will be seen that by closing the little door, we prevent all egress in a morning, until some one of the family may be stirring. Long experience has taught us the value of the regulation; for not only are the fowls thus preserved from the attacks of early marauders of every kind (and many persons would not hesitate to run down and appropriate a wandering pullet who would fear to rob a hen-roost!), but the young chickens are thus prevented from strolling into the grass while yet it remains saturated with rain or heavy dew; nor will the creatures be debarred from their favorite and natural morning meal by this arrangement, since, where animals are kept in an establishment, persons must be abroad sufficiently early to allow of their finding worms, &c., before the sun shall have exerted so much power upon them, as to drive them into their holes, and remove the dew from the grass.

Treatment of the Poultry.—Having cared for their accommodation, we will proceed to the birds themselves. The stock being chosen—in which we would recommend that some of the "everlasting layers" be introduced—the proprietor will commence his observations. A poultry-yard is replete with interest, but, as every one may not feel equally impressed with a sense of it, and, moreover, possess neither time nor inclination to give the subject personal attention, and thus gain experience for himself, we will do our best to impart our own. We are convinced, however, that if the "master's eye" be not upon the creatures of his farm, they will fare the worse. Servants, however faithful and trust-worthy, *cannot* accomplish all that is wished of their vigilance, nor can they feel that degree of interest which is necessary in the creatures committed to their charge. Their minds are not of the same calibre, their education has not fitted them to comprehend the philosophic motives which their employers might bring to bear upon the subject; hence, to have proper attention paid, it is absolutely requisite that a master should not only say to his servant—"Do!" but see that "he doeth."

A stock of fowls should consist of pullets and hens of from one to four years of age; they usually are supposed to decline after the third year; but when any good quality is evinced, such as being good layers, close sitters, or careful mothers, it is obvious that, to deprive ourselves of valuable dependents, only because "it is said" that they are on the wane at a certain age, is sufficiently absurd. It is a fallacy to deem those hens inferior which happen to possess large combs; it is equally a mistake to consider that those which crow like a cock are worthless; and to attempt to refute the popular superstition that it is "unlucky" to keep a crowing hen would be idle; it is too ridiculous to be further alluded to. The number of laying fowls, will, of course, depend on the wish of the individual, and his facilities for their accommodation. A large number is quite as easily attended to as a scanty stock. If only four, five, or six hens be kept, one cock will be sufficient, and it will be better to increase the stock by degrees, for a year or two, by allowing a young cock to grow, rather than to introduce another from a foreign collection. Battles and persecution would be, in the latter case, endless. A change of breed can always be accomplished, by procuring eggs from an approved stock. Eggs that are intended for sitting, "it is said," should not exceed a month old; and as, in a state of nature, a hen would occupy nearly that period in laying the usual complement of eggs, the rule is a good one; but a simple process, which we shall hereafter describe, whereby they may be preserved fresh, eatable, and *sittable*, for many months, will render all precaution as to the length of the time they may have been laid unnecessary. Fifteen eggs will be generally sufficient for hens of the usual size, though the very finest, healthiest, and most successful breed we ever had, was the produce of a white hen which had "stolen a nest," had laid sixteen eggs, and brought forth the whole number of chickens, every one of which she reared. We would not recommend that hens be allowed to sit until after the turn of days. Early in January, if the weather be mild, they will sometimes indicate a wish to incubate which need not be thwarted, if conveniences can be commanded for the accommodation of the mother and her brood. Constant attention, however, is requisite, and, from being reared totally under shelter, the chickens, like hothouse plants, will be so tender, that there is small chance of ultimate success. The same objection exists against attempting to rear a brood late in the autumn; the first week in September is the latest period at which it ought to be hazarded. There is yet another time, during which it is absolutely indispensable that hens be prevented from sitting, and that is the month of June. Close observation (after having suffered at that season numerous failures most unaccountably) enabled us to discover the cause, and thereby verify the truth of an old saying which we have since met with—

"Between the sickle and the scythe,
What you rear will seldom thrive."

We had noticed that chickens which were hatched during the month of July were almost all attacked about the time of their first moulting (a period always attended with much suffering to them) with a fatal disorder, the symptoms of which were unvarying. The chickens appeared to collapse, and moved about with difficulty, as if their joints were stiffened, or rather as if the skin had become tight and tender; their feathers became rough and stood out; their wings drooped and dragged on the ground; they refused sustenance; and becoming more and more weak and torpid, they, in a day or two, died off in great numbers. Every rational means was resorted to, in order to arrest, or even account for, the disorder; at length it was discovered, that they were in a high state of fever, and that the extreme redness of the skin was caused by the irritation of hundreds of that minute pest the harvest bug. Some—very few—were recovered by anointing them all over with oil and vinegar;* but the recipe is too rough for little delicate creatures, already enduring the pain attendant on the season of moulting. It became obvious, that the period during which harvest bugs are most numerous and tormenting, must be inimical to the rearing of chickens; and that, if the hens were not allowed to sit in June, or rather, if the chicks were either strong enough to cope with the evil, or were not hatched until the season for the pest had passed by, that the destruction might be prevented, and so it has proved.

We do not suppose that we are addressing readers who are entirely ignorant on the subject of poultry, and therefore omit the more obvious and simple directions and information: such as the indications by which it may be known when a hen is inclined to sit; how long a time elapses before her chickens will be hatched, &c.; yet we would not that one reader should be disappointed by the incompleteness of the subject on which we are writing. It may be as well therefore to state, that when hens shall have laid from ten to twenty eggs, they generally, but not always, show the first symptom of a desire to incubate, which is remaining a long time upon the nest; they then begin to cluck, and their combs lose that bright red color (the infallible sign of good health, and disposition to lay) which they had shown. Very young hens sometimes deceive by evincing all these symptoms, and will even take to an empty nest, and remain close for a day or two, yet directly after they are put in possession of all they appear to require, will capriciously leave the eggs and resume their usual habits. It is customary to place an odd number of eggs under a hen, not "for luck," as the auld wives suppose, but because they lie more round and compact. A large sized hen will cover fifteen well; but if she find the number too many, she will reject one. Should an egg be broken it must be removed, and her feathers washed from the clammy substance. For the first few days, some hens will sit so steadily, that they will not leave the nest for food. Fears have been expressed for the lives of hens under these circumstances, but we incline to think they might be left to nature; however, no harm can accrue from lifting them off the nests and placing food and water ready for them in the open air. They are refreshed by the change, and resume their solitary duty in comfort. Food and water should always be provided for sitting hens once a-day, and that at a time when they cannot be persecuted and driven away from it by their congeners, namely, either before the fowls are let out in a morning, or after they have retired to roost. The plan of feeding them on the nest is perfectly erroneous, and contrary to nature. It is requisite, for the sake of cleanliness and health, that hens should leave it once in twenty-four hours. As an attention to cleanliness is indispensable in every department of a homestead, we need scarcely mention that clean short straw should be provided for every sitting hen, and the nests be thoroughly cleaned out when the brood is hatched.

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* It should be known, that this is the best, nay, the only remedy for the annoyance which human beings experience from the same cause.

It is much to be deplored that, in subjecting creatures to our use, we cannot make their comfort a greater object of attention. Granting that man has had control given him over the brute creation, it surely would prove his fitness for the gift that he should exercise his authority with kindness, and temper his power with mercy. If nature must be thwarted, it should be effected in the gentlest manner. It sometimes happens, for example, that it is desirable to prevent hens from sitting, when eggs are more in request than chickens: to obtain this end, we have known very cruel methods practised, such as plunging the poor birds into water, swinging them violently round. &c. The most effectual plan, and the one least objectionable, is to confine them under coops, in a dark place, with plenty of clean water, and a rather short allowance of food, for two or three days. If on restoring them their liberty they should return to the nests, a repetition of the discipline for another day or two will generally be found an effectual preventive. By watching the denizens of a poultry-yard, not only much amusement is afforded, but no little information of a practically useful nature may be obtained. It will be seen which of the hens evince a disposition to sit, which to lay eggs, &c., and we ourselves enjoy the comfort of gratifying rather than crossing their instincts, by attending to these indications. When a hen has sat three weeks (twenty-one days), arrangements should be made for the young brood, but no interference should be allowed. Man is so conceited, that *poor bungling nature* cannot be expected to proceed in any of her operations without his assistance! How could chickens break the shell if he were not kindly to aid them? When he or she has efficaciously taken this duty from nature, he carries the little fragile things in his rough awkward hands, pokes them into a basket with some hay, which he sets before the kitchen fire, having first pulled off the scale at the tip of their beaks, forced open their jaws and thrust a pepper-corn down their throats. Then enter "a whole tide of children" and maid-servants, all eager to look at and fondle the "pretty dears!" and, in the struggle for precedence, down goes the basket with its half-dead inmates, which is forthwith picked up, and the creatures thus stroked and pitied, and exposed to cold, and again attempts to feed and nurse them, survive their rough entrance into life by a miracle. We repeat—there is no occasion to intrude upon the hen while she is hatching her brood, nor ought we to do so. The chick that requires to be assisted from its shell will be too puny to be worth the rearing. The mother may be left with safety, nay with benefit, for even forty-eight hours from the time that the chickens begin to come forth. The fine instinct with which she is endued, will enable her to perfect the work of which she has been for three weeks the sole artificer. She will assist the little prisoners, and throw away the intruding shells; she will liberate their beaks from the scale, and "*cro-o-o*" to them, and dry their clammy down, and foster them in the genial warmth of her breast, and they will be strengthened and nourished by the yolk, which is said to form no part of the chickens, but to be retained in the intestines, for the purpose of affording their first aliment. However this may be, certain we are, that the brood thus left to the mother's care, will be stout and strong when (the whole being hatched except those eggs which may be addled) the two days are expired, and quite ready for the food which has been provided for them. A coop should be put in a sunny spot, but *not on grass*; under this the hen and her family must be placed, with groats, a little barley, and clean water, in a chicken pan or a garden-pot saucer. They should be fed little and often with groats, a few grains of barley being always thrown to the mother, which she will peck and split, and call her young ones to partake of. Every day the coop should be removed to a little distance, so that the creatures may be clean and dry; and each morning too, a fresh sod of grass turf ought to be placed inside the coop for them to scratch and demolish, to obtain any worms or insects that may be lurking among the roots of the grass. It is usual for hens to be detained in their coops for a month: we object to this decidedly. Indeed, where the range is small, and the situation inclosed, we prefer that nature should be seconded, and the maternal anxieties indulged, by setting them free after the first two or three days.

Food.—We have stated that groats are the best aliment for chickens, but they may be discontinued as soon as it is perceived that the young ones are able to eat whole barley. That food which is most nutritious is the most proper for every animal, and will be the cheapest in the end. While we were buying our experience, we made trial of all kinds that are usually given, tail-wheat, inferior barley, sunflower seeds (of which last we grew an immense quantity, on purpose to make a fair trial of the assertion, that this food would impart the color and flavor of game to the flesh of domestic fowls, and which we found to be a fallacy), maize or Indian corn, potatoes boiled, and barley of the best quality. It must be confessed, that Indian corn is the aliment they most preferred, but as it is now very little cultivated in this country, it is too expensive, unless within a short distance of London, Liverpool, &c., where it is imported from America. The best barley, therefore, and plenty of it, should be given with a few peas in the winter; occasionally some boiled potatoes, the latter merely to amuse them, with a few green leaves from the garden, such as cabbage, lettuce, &c., to supply the place of their favorite grass, when sultry weather may have deprived them of that daily treat. Clean fresh water, should be their only beverage.

We abjure the system of cooping previously to killing, on several accounts; it is not necessary, it is cruel, and it induces a state of disease, instead of health. That it is not necessary, is evident from this fact, that a "barn-door fowl" has always retained the supremacy over the more grossly fed poultry of the metropolis; that it is cruel, need scarcely be pointed out to the most unobservant; that it induces disease, is a fact which will not be doubted, when we consider that we alter the creatures' habits, debar them from exercise, and prevent them from having recourse to those instinctive enjoyments, which contribute to health. If poultry have been well fed always, they can require no fatting; if they are healthful, they are in the fittest state for the table. The longest period of confinement which we consider necessary, is three days; on the first two, we give them barley-meal instead of barley, because, being unable to procure small gravel to assist in digesting that hard food, it is better to substitute an aliment which is softer. On the third day, they should eat nothing, that is for twelve hours, before they are killed.

The horrid system of cramming, that disgrace to these enlightened times, we cannot too strongly reprobate! It is grievous to reflect upon the innate cruelty of nature which man possesses; we regret to think it innate, yet such it must be, for if it proceeded from ignorance, our educational systems ought to have instructed the community; if from the remnants of our barbaric origin, civilization and sociality should have shamed human beings into humanity! Cruelty and cowardice are inseparable; the more weak and unoffending the objects, the greater is his delight to torture them. How vitiated, too, must be the taste of those who can endeavor, and thereby encourage, this torture of creatures which are over fed, and consequently in a state of disease!

One of our best writers on domestic poultry, Bonnington Mowbray, Esq. (whose able work is nevertheless tinctured with irrationalities) thus speaks of this vile custom, in his "Practical Treatise on breeding, rearing, and fattening domestic poultry," page 69.

"The Workingham method of feeding, is to confine the fowls in a dark place, and cram them with a paste made of barley-meal, mutton-suet, treacle, or coarse brown sugar, and milk, and they are found completely ripe *(ripe!)* in a fortnight. If kept longer, the fever that is induced by this continued state of repletion, renders them red and unsaleable, and frequently kills them. I must presume to repeat, it appears to me utterly contrary to reason, that fowls fed upon such greasy and impure mixtures, can possibly produce flesh so fat, firm, so delicate, high flavored, or nourishing, as those fattened on more simple and substantial food, as for example, meal and milk; and I think lightly of either treacle or sugar. With respect to grease of any kind, its chief effect must be to render the flesh loose, and of indelicate flavor. * * * * * Real excellence cannot be obtained, but by waiting Nature's time, and using the best food. Besides all this, I have been very unsuccessful in any few attempts to fatten fowls by cramming, they seem to loathe the crams, to pine, and to lose the flesh they were put up with, instead of acquiring fat: and where crammed fowls do succeed, they must necessarily in the height of their fat be in a state of disease."

In and around London, the trade of fatting fowls is at once extensive and lucrative. The state of misery in which these poor victims to the cruelty and gluttony of the coarse-feeding citizens and their caterers, drag on their existence, is truly pitiable; shut in from pure air, and the enjoyments of liberty, cooped up and gorged against their will with food abhorrent to their taste; what well-regulated mind does not revolt from the contemplation, and who would not rather partake of even inferior flavored poultry, rather than encourage a trade so degrading to humanity!

But we maintain, that the rational plan which we have detailed, will ensure a supply of the finest poultry that can be reared; thus, in discountenancing the cramming system, "virtue would be its own reward."

Our remarks on this subject being the result of experience, and our plans therefore practical, we feel no hesitation in promising the same success to all who may adopt them, which has attended ourselves. We are fond of experimenting; and having tried every known method to preserve eggs, and found *all of them fallible:* we discovered a simple method, which we have proved to be unobjectionable. It is well known, that while the yolk of an egg remains surrounded by the white or albumen, the egg is good. Few of our readers can have been so fortunate as to have escaped that breakfast-table infliction—a stale egg; and they will not fail to have observed, that on one side of it there exists no white, but that the yolk is in close contact with the shell? This alteration in the position of the vitellus or yolk, is the cause of the annoyance; the shell is porous, and as soon as that portion of the egg, which is intended to constitute the food of the chicken, and is consequently liable to corrupt on being exposed to the influence of the atmosphere, sinks through the surrounding medium, which contains (and perhaps partakes of) the vital principle, and touches the shell, the process of decomposition commences.

To retain the yolk, then, in the middle of the white, is the desideratum, and this we have succeeded in achieving for many months. We had failed to preserve them in bran, sand, ashes, salt, lime-water, hanging them up in nets, and scalding them; the last-named plan, however, though objectionable, is the best, excepting our own, which consists merely in turning them every day, and is thus contrived: A frame of wood, two feet long by one wide, and two inches in height, has strong copper-wire strained across from end to end and side to side, to form squares large enough to allow eggs that are of a medium size being placed in every alternate space; the wire to be twisted at each corner of the reticulation or intersection. In private families, the number of eggs will rarely exceed those of the square receptacles contained in one square frame, and can therefore be with ease turned every day, (forty or fifty being reversed in one minute); but when eggs are kept for sale, or on a large scale, hundreds could be managed in the same short time, by having several of these frames made to fit on to one another with handles, so that the whole stock might be turned at once. The plan is excellent, yet susceptible of much improvement. In the event of packing eggs for sea voyages, it would be invaluable, if the slight attention they require could be commanded.

Diseases.—Of the disorders to which poultry are liable, we really are practically ignorant, having for many years been so fortunate as to experience few or no instances of disease among our stock; and we attribute the health of our various animals in the farm-yard, entirely to strict attention to cleanliness, diet, and rational treatment. Those who listen to the advice of the ignorant and prejudiced, nay, they who seek from books remedies for disorders which may appear among their live-stock, will have to contend with monstrous absurdities, excessive ignorance, and barbarous cruelty, in the quackeries recommended. Nature will generally effect a cure, if her efforts are seconded by simple means on our own part. Calomel, sulphur, rue, pepper, and gin, are all absurdities, though all recommended for the ailments of poultry.

Ducks.—Large-bodied and dark-feathered ducks, are generally finer flavored than those with white plumage. It is not usual for these birds to lay more eggs than they can hatch, though occasionally, a valuable individual may be found in a district, whose wonderful achievements in laying, as well as hatching, two and three broods in a year, are recorded.

Their indications of a wish to incubate, though not so obvious as those of hens, are nevertheless sufficiently marked; and no one who is not very unobservant, can be deceived. We are averse from the plan, of placing duck eggs under a hen to be hatched. It is not only cruel, to keep the poor bird a whole week longer in her office, (for they require that extra period), but nature is thwarted in those fine instincts of that proud and happy period of her life, by the untoward habits of her nurslings. A pond is not essential for the well-doing of these fowls. If a large shallow tub be sunk in a convenient spot of the premises, to which the old birds can have access, in order to dip and wash themselves daily, it is all that will be required; and indeed, young ducklings ought not to be permitted to go to any water for the first six weeks, excepting that contained in wide shallow pans, in which they will dabble occasionally without injuring themselves; whereas, if they were allowed to follow their mother to a pond, they would remain too long, and be liable to become cramped.

The same objection exists with respect to cooping ducks upon grass, which attends that locality for chickens, namely, danger from damp. We cannot too strenuously impress the necessity to guard poultry from exposure to moisture; dry cold, however severe, is seldom inimical to them. If the coops be placed on grass, even in hot and arid weather, there are heavy dews in the early morning, into which these little creatures will *wander*, *draggling* their downy covering, and ensuring an almost certain death from cramp, or, if ducks, from that complaint locally and vulgarly called "the sprawls." It is very desirable, however, that they should be admitted into a field for a few hours every day, when the weather is dry. Barley-meal is the best food for ducklings. It should be frequently renewed, as well as fresh water in their pans, as often as they shall be emptied by the splashings and dabblings of the little brood. Straw should be placed in a coop with a duck, but not with a hen, as the young ones of the former being constantly wet, require to be dried as well as warmed, when they retire to the shelter of their mother's breast for occasional repose. As the ducks approach to full growth, one of their three daily meals should consist of whole oats, which must be thrown into a pan of water, for this food they will seek with avidity and delight; their natural manner of feeding will be thus imitated, which is effected by *sifting*, as it is called. The fine network at the edges of their bills suffers the water to pass through, but retains whatever particles of sustenance may be floating in the fluid.

Ducks are more easily and pleasantly reared than chickens; for unless the fences round the gardens and pleasure-grounds are close and high, the latter will infallibly effect an entrance, and distort the gravel-walks by their vigorous scratchings, much to the discomfiture of a gardener's equanimity.

We repeat, that good, nay, *high feeding from the first*, is the best way to obtain fine, firm, full-flavored birds; to say nothing of the comfort that a proprietor must derive, from the certainty that those creatures over which he has control, are in the enjoyment of the few requisites which constitute their happiness.

Geese.—What is more delicate than a young well-fed goose, from September till January; what more rank and detestable than an old, tough bird, quickly fatted on the greasy abominations that constitute the food of those which are too frequently to be met with at a poulterer's. It is quite a mistake to suppose that a Christmas goose *must* be coarse and strong: those who depend upon a purveyor will rarely find it otherwise, we admit; but they who have reared these birds, and attended to their regular feeding, can refute the assertion. If it be desirable to fat two or three, with the intention of enjoying the treat at that festive season, without the trouble of hatching a brood, we would advise that the number be purchased from a flock half grown, at the beginning of autumn. It is not necessary for them to have access to a pond, a deep pan or trough, constantly, that is daily, supplied with fresh water, will be sufficient. Three feeds, one of barley-meal, one of dry barley, and the third of oats, every day, and water only to drink, should be their sole aliment for the last fortnight of their existence; before that time, they should have the run of a common or some waste piece of grass, for of this green food they eat largely; but they make a pasture unbearable to animals, therefore should never be admitted where cattle are grazing. During the last week or two, they may be confined during the day within four hurdles, (which ought, for the sake of cleanliness, to be removed every alternate day,) and driven under shelter at night. As they are social birds, they will not thrive alone, two or more must be fatted together, or they will pine and lose flesh rapidly. *A lag*, as it is locally termed, consists of a gander and five geese. If the spring be mild, the latter will evince indications of wishing to sit, in the open weather of February, when a bundle of clean straw should be placed in an open shed, of which they will proceed to construct their nests, side by side, without requiring any assistance or attendance. It is surprising that any mystery should be made, or difficulties thrown in the way, of so simple a matter as rearing poultry; nothing can be *more simple*, or certain to succeed, where a few rational rules are kept in view, and attended to. Cleanliness, dryness, kindness, and full feeding, are the secrets of success. Geese grow with great rapidity, and require a large quantity of food, and at frequent intervals; indeed, what young creature is an exception? Children ought to be allowed as much nutritious simple food as they desire; adults require less in quantity and at longer intervals. The treatment of a goose with her young brood ought to be the same as that which we have detailed, for the duck, substituting (for a coop) a crate, such as glass and china are packed in, with a sack or mat thrown over the top, to protect them from rain. Barley-meal to be the first food.

Plucking.—Suffering of all kinds, especially unmerited suffering, among those unoffending creatures, which we make subservient to our wants, is always distressing to an unvitiated nature; it behoves every one, therefore, to discountenance the tendency to inflict pain, in which hard natures and mercenary beings are apt to indulge.

We cannot place the cause of the unfortunate geese in better hands than those of the humane writer whom we have before quoted; he thus speaks of the wicked practice of plucking them:—"The goose is a considerable object of rural economy, and kept in large flocks, in the eastern and fen counties of England. In some of those parts, their geese are exposed to the cruel operation of being annually stript of their feathers; and it has been said, that fowls plucked alive have been sold in the markets at Edinburgh. Indeed, the interested feelings of man know no scruple, and the cruelties practised upon the poor sea-fowl, which have their down and feathers torn from them, and are then cast into the sea to perish, are enormous, and yet it would seem irremediable. Not so the disgusting barbarity, under the insane idea of sport, formerly, perhaps even now, practised in Scotland. These harmless fowls are hung up alive by the legs, and savages, men and boys, ride at them full speed, catching them as they can by the neck; and there can be no doubt that the horribly pleasing process of roasting a goose alive, as detailed by Dr. Kitchener in his "Cook's Oracle," a book invaluable equally to the gourmand and the economist, was actually practised in former days; indeed, we have proofs innumerable, and utterly disgraceful to this enlightened nation, of the absolute necessity of amending the enthusiastic and indefatigable Martin's bill, and rendering it completely comprehensive. It would have the effect of teaching men to think and feel, and to be convinced of the horrible and unnatural error of deriving pleasure from the racked and tortured feelings of other animals endowed with feelings similar to their own. A writer in the Monthly Magazine, December 1823, remarks humanely on the cruelty of plucking living geese, proposing a remedy which I should rejoice exceedingly to find practicable and effective. He remarks on the the additional torture experienced by the poor fowls, from the too frequent unskillfulness and want of dexterity of the operator—generally a woman. The skin and flesh are sometimes so torn as to occasion the death of the victim; and even when the fowls are plucked in the most careful manner, they lose their flesh and appetite, their eyes become dull, and they languish in a most pitiable state, during a longer or a shorter period. Mortality also has been periodically very extensive in the flocks of geese, from sudden and imprudent exposure of them to cold after being stripped, and more especially during severe seasons and sudden atmospheric vicissitudes. The remedy proposed on the above authority, is as follows:—feathers are best of a year's growth, and in the moulting season they spontaneously fall off, and are supplied by a fresh plumage. When, therefore, the geese are in full feather, let the plumage be removed close to the skin by sharp scissors, the produce would not be much reduced in quantity, while the quality would be greatly improved, and an indemnification be experienced in the uninjured health of the fowls, and the benefit obtained to the succeeding crop; labor also would be saved in dressing, since the quilly portion of the feathers, when forcibly detached from the skin, is generally in such a state as, after all, to require the employment of scissors."

The Pintada, or Guinea-fowl.—This bird is much esteemed for the fine flavor of its flesh, which more nearly resembles that of the pheasant than any other, and is in season when the latter is out of request. *It is said* to be reared and domesticated with greater difficulty than the usual inmates of the poultry-yard. This is not the case; nor is it "delicate when first hatched," as writers assert. It, however, is more wild in its nature than other fowls, straying to a distance, and depositing its eggs under hedges, among furze, or even in the most exposed spots, where every chance passenger may more readily obtain possession of them than can their owner.

We prefer to intrust a brood of pintadas to the care of a common hen, rather than to that of its own species. Their habits are not dissimilar,—as is the case with the duck,—and her nature will not be outraged in bringing them up. A hen will, with ease, cover seventeen or eighteen pintada eggs, as they are smaller than those of the common fowl.

We repeat, they are not difficult to rear; we have never lost a chick, except by accident. In consequence of their small size and minute beaks, it is requisite that their first food (groats) should be broken for them. They are exceedingly fond of, and thrive rapidly on ants' eggs,—whole nests of which should be sought for, and brought to them with a shovelful of the mould in which they are found. This, if thrown partly within the coop, the mother will amuse herself with scratching, while she at the same time instructs her chicks to seek for their own sustenance.

We have been surprised to find, that in books professing to give the natural history of this bird, its disposition should be courageous: it is the most remote from courageous; it is cowardly, fierce, and tyrannical in the extreme. These birds persecute all other inmates of the poultry-yard, with relentless perseverance, *but always in a body*. We were, on one occasion, witness to an assault upon a solitary pullet, by eleven pintadas. They surrounded their victim, pecking it with violence, and whenever one of the inner range of assailants received a blow from the poor bird, it retired to the outer circle. A very few minutes would have sufficed to destroy the pullet, but fortunately, the dastardly creatures were driven away. Their beaks are remarkably strong and sharp when they are full grown.

Their cruelty to all other poultry passes imagination. While among themselves, they are placid and affectionate; hence they ought either to be kept in a separate yard, or, if that arrangement be inconvenient, the stock of poultry ought to be confined to these birds, or they should be rejected.

The treatment of pintadas differs so little from that of other fowls, that, with the foregoing remarks, we close the subject.

Turkeys.—The following observations and method of rearing turkeys are not the results of our own experience; but are from the pen of the gentleman above quoted. We have refrained from keeping them, being deterred by fear of the trouble and difficulty which writers have thrown in the way; though, in consequence of the gratifying success which has attended us in our other feathered stock, we have no doubt our attempts would have been equally satisfactory, as we have always *of late years* taken nature for our guide, and endeavored to treat them rationally. For example, although we have Mowbray's authority for the practice, we would not "withdraw the chicks from the nest, and keep them very warm." Turkeys are amenable to the same wise laws, that the common hen obeys; hence we should leave them to the more congenial warmth of the mother's breast. Indeed, we are no sooner instructed by this author to remove the chicks, than he renders the advice nugatory by saying, "The turkey, from sitting so close and steadily, hatches more regularly and quickly than the common hen." (!)

Who removes the chicks to a warm situation when the mother steals a nest, or is in a state of nature?

In the article of food, we have equal contradiction, as well as absurd directions; the chicks are to have curd, eggs boiled hard and chopped fine, oat or barley meal kneaded with *milk;* yet immediately afterwards adds—"milk is apt to scour them;" then why give it? Water is their natural beverage, and will *not scour them.* Then, in case of cold weather ruffling their feathers, they are to have half-ground malt with their meal, "and, by way of medicine, caraway, or coriander seeds." (!) Nor must we omit "artificial worms, or boiled meat, pulled into strings, in running after which, the chicks have a salutary exercise." (!!) He justly observes afterwards, that "superfluous moisture, whether external or internal, is death to the chickens, therefore all slop victuals should be rigorously avoided;" and in this remark we cordially agree.

Pea-fowls, tame pheasants, partridges, &c. we candidly own, we know nothing of practically, and, as they are only kept for amusement, abstain from introducing any observations on their treatment from the same work.

EXTRACTS OF PRIVATE CORRESPONDENCE, AND EDITORIAL COMMENTS.

The new French discovery in making manure. Le Couteur on the varieties of wheat.

Philadelphia, 22d *March*, 1838.

Dear Sir—I have directed a copy of the National Gazette of the 20th inst. to you, so that you may see in it a notice of the process of obtaining manure without the aid of cattle, invented by a Mon. Jauffret, of Aix, in France. What think you of it?

As usual, in communications on agricultural subjects, the notice is not satisfactory in its details. I am under the impression that it has reference to some nostrum such as the world has often been beguiled with, before now, for the cure of other evils besides poverty of soil, and that its value will prove as great as many of the infallibles which have had their day of popularity, and have passed away. I am strengthened in this impression, because of the difficulty of reconciling the facts stated with the law of subsistence being in accordance with the laws of the production of food, as is urged by my friend G. H. Walker.

There is a late production of a very different character, to which I beg to urge your attention: I mean Col. Le Couteur's work on the varieties, classification, &c. of wheat. It is a work of great merit, and I think its publication in this country would be a means of doing much good. The exposition which he makes of the relative value of different varieties of wheat, is very instructive, and enforces the necessity of attention to a choice of seed and purity of stock in a manner that ought to carry conviction to the mind of every thinking farmer.

The means of keeping a stock of wheat pure, by attention to the time of flowering of the different varieties, is also worthy of notice in this country, where the well-meant efforts of those who have been at much pains and expense to procure select and valuable varieties, are often rendered of little avail, for want of attention to this amongst other points of great importance.

The influence of different manures, as stated, ought to have a tendency to correct a bad practice which is almost universal in this country. I allude to that of applying stable and yard manures to the wheat crop. This error has often been remarked upon by the most intelligent of our writers on agriculture; but very little impression has as yet been made on the public mind. The statements of an author of the character and experience of Col. Le Couteur may perhaps do more to correct this evil practice than all the arguments that have been urged heretofore.

Without further comment on the work, I will state that Mr. Walker has a copy of it, which is now in my hands, and that he has kindly consented that I should offer it to you if you desire to republish it. I am aware that it has been noticed in the Farmers' Register; but supposing it possible you may not have seen more than the extracts republished, I desire to know if it would be useful to you.

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[The account of the French discovery in manure-making, which was sent with this letter, had before been selected for publication. It stands at the beginning of this number. We think, with our correspondent, that the plan is likely, in performance, to fall far short of its promise; and to form a new item in the long list of agricultural humbugs. Nevertheless, whether merely as agricultural news, or as information of higher order, it deserves notice and attention; and also fair trial from those who are able to make a trial. What we doubt, is the economy, or small cost of such speedy conversion of insoluble and inert matters, to soluble and active manure; for there is no doubt but that, by some means, every vegetable substance is thus convertible, and that, with the aid of time, natural causes are continually, and generally with effect, operating to produce such a conversion. The hardest wood—the driest broom-sedge, reeds, or pine leaves—in short, vegetable substances considered the most useless, or perhaps injurious to soil and growing plants, on account of their insolubility, are entirely composed of, and convertible to, the same chemical ingredients (hydrogen, oxygen and carbon,) as the richest and most succulent, and putrescent vegetable manures; and they vary but slightly in ingredients even from dung; the latter only having something, and that a very little, in addition to the three principal elements just named. Therefore, there is nothing incredible in the supposition that art may produce a chemical change, in a short time, which nature alone produces by slower action. The great objection to the usual and long continued processes of this natural conversion, is, that the larger part of the soluble products (especially on bad soils) are wasted, as produced; and this loss is still greater, usually, when man's ignorant labors, or practices of cultivation, are mingled with, and serve to impede the improving processes of nature. Even if this new French process of rapid fermentation is effectual, it will require to be seen whether it wastes more of the products than would natural causes and time, if permitted judiciously to operate, before the discovery can be deemed as adding to the farmer's means of obtaining and furnishing manure to his lands.

We have already given some account (from European journals) of Le Couteur's opinions; but would be still pleased to see his entire work, and to publish further extracts, or even the whole, if its length does not forbid. It is a curious and interesting subject, and one on which every farmer has much to learn.]

The law of primogeniture and English agriculture. Turnips and manure.

Holmesburg, Pa., March 22, 1838.

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I saw little change in the agricultural districts, after an absence of seventeen years. How should there be? How can there be? Whilst that most iniquitous and most pernicious of all systems—the law of primogeniture exists? In the manufacturing districts, (the source of all the agriculture such as it is,) the change and improvement are wonderful. I *will* give you some account of both. I shall now have more leisure than I have had.

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I have kept 9 cows and fattened 47 sheep *upon turnips* this winter; the latter with part grain. This is the true system—variety of food is every thing—because so obviously the law of nature; it is by far the best mutton I have eaten in the United States; and if you were to see the quantity of manure I have, you would be astonished. My farm is barely 100 acres. I manure from 35 to 40 odd acres annually, and sell all my hay and straw!!! It is a fact; I *eat* no straw, cornstalks, chaff, &c.; these things are not natural food—they are for litter, to keep the stock dry, clean, and warm, as blankets are for our use, and to keep, preserve, and increase the manure. When will farmers and planters learn and understand all this? To eat *straw* I hold to be the very worst and most costly and destructive of all agricultural improvement and economy.

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Draining in Scotland. Law of primogeniture as affecting agricultural improvements.

[The following extract is from the letter of a subscriber, who, as his words convey, was engaged, not very long since, in agricultural labors and improvements in Scotland.]

April 17th, 1838.

I have read with much interest and pleasure, the reprint of Johnstone's 'Treatise on Draining, &c.' The importance of this valuable addition to the pages of the Register, cannot fail to be appreciated by many of your readers. From having seen many of the improvements described in the treatise, I can fully attest to the practical value of the directions therein given, for the performance of such improvements; particularly those relating to embankments. Most of the extensive improvements of this nature, which the author has described, I have had an opportunity of seeing; and in one instance to which he refers, I believe, from his not very distinct reference, the embankments were constructed under my own immediate direction, from plans furnished by Mr. Stevens, of Edinburgh. These were on the banks of the Isla and Tay, (in Scotland,) extending to upwards of five miles in length, and of a height of from three to nine feet, on one of the estates of Countess Flahault. The modes of embankment, which Mr. Johnstone has so well described, I should suppose would be as available in many sections of this country, as in Scotland. I suspect, however, that the reclaiming of the tide-marshes in this latitude would be a much more difficult operation than in that of Scotland. Tides there rise to a great height; but at low water there is generally a sufficient fall to admit of the enclosed lands being completely drained of surface-water. The high lands being also immediately on the sea-board, admit of the alluvion brought from them being lodged or deposited at the confluence of the rivers to the sea, forming a soil of a fine permanent nature, and not liable, on being dried and cultivated, to sink or become lower, as your experience has proved to be the case in at least some instances here. The lands enclosed by some of these sea embankments are, for miles, many feet lower than high-water mark; and a breach would be attended with disastrous results. This, however, rarely occurs. The conflicting interests of proprietors of land have much retarded these and other improvements; such as straightening and embanking river-courses, &c. in Scotland; and I suspect the same obstacle would be met with in this country, in an increased degree. Landed estates here are smaller, consequently more numerous, and more frequently change owners; and the constantly increasing division of lands must increase and perpetuate the evil. This constant division of property in this country is, in my humble opinion, not the least obstacle in the way of real and extensive agricultural improvement; and nothwithstanding Mr. Walker's remarks on the laws of primogeniture and entail, (in your last No.) and whatever evils may attend the existence of these laws, that of being inimical to agricultural improvement, I think cannot practically be laid to their charge. I believe that eight-tenths of the lands in Scotland are under entail; and I presume that no country can present more spirited, extensive, and rapidly increasing agricultural improvements, in the same space of time, than have taken place in Scotland in the last half century. The proprietor there has the strongest inducements to improve his property, under these very laws, though he may also abuse them. Some may be "compelled to be lords, who ought to be draymen," or "clergymen, who ought to be butchers;" but it is now, happily for Scotland, at least becoming fashionable in high life to be acquainted with rural affairs; and many of the Scotch nobles would put many of the Virginia farming fox-hunters to the blush, were they to compare their agricultural knowledge. Every person of experience must know how much more profitably improvements can be carried on, on a large scale, than on a small one.

MONTHLY COMMERCIAL REPORT.

While great inertness in the spring trade has prevailed in New York, a fair portion has been transacted in the smaller marts south of it. Purchasers of dry goods and groceries, who usually resorted to New York, have been induced by the great difficulties attendant on inland exchanges, to obtain their supplies in Philadelphia, Baltimore, Richmond and Petersburg. Importations from Europe have been on a very small scale, and the demand for our products there will be reduced, as a natural consequence. The increased consumption of other countries, and the new markets for cotton goods which commercial enterprise, stimulated by the low price of such fabrics, is constantly developing, compensates in part for the deficiency of export to the United States; but the rapidly increasing product of cotton, renders a corresponding increase of consumption necessary; otherwise, the price of the raw material must decline so low as to check the cultivation.

The quantity already brought to market this year reaches about 1,450,000 bales, being 300,000 more than was received at the same period of 1837, and exceeding the total receipts of that year. Prices have consequently declined in European markets, and in all others where the currency is sound. In the south-western states, the currency and not the commodity depreciates. Prices are therefore higher in Alabama and Mississippi, where bank notes are at 20 to 30 per cent. discount, than in New York or Liverpool, where they are at par with specie.

The "experiment" which, contrary to the expectations of its projectors, drove specie from the country and from circulation, having almost ceased to operate, a reflux has taken place; and importations of the precious metals to an immense amount have recently been made, by the very parties who were accused by the 'experimenters' of creating the dearth.

The New York banks have already resumed specie payments; those of Boston partially, and the decision of the convention recently held on the subject is, that in all the Atlantic states, and some of the western, a general resumption shall take place in January, 1839. It is to be hoped that trade will then resume its regular channels; that banks will cease to be dealers in produce; and that something approaching to equality will exist betwixt the currencies of different states.

The demand for tobacco continues animated here, though not so in the English markets, where prices are supposed to have reached their extreme point. What course they will take, must depend mainly on the extent of the crop in the United States, the estimates of which differ very widely, especially as regards that of the western states.

The growing crop of wheat is very promising, and as the import has been much smaller than was expected, and the stock of flour in July will be moderate, there is a prospect that the farmers will be well remunerated. The quotations of last month may be repeated for all articles of produce in Virginia. Tobacco, $3,50 to $12. Cotton, 8 to 9½ cents. Flour, $7,25. Corn, 70 cents. Wheat, none.

There continues to be considerable pressure for money, and stocks of most descriptions are depressed. New manufacturing establishments are going into operation at Petersburg and elsewhere; and our neighbors in North Carolina are following the example. Several cotton mills, some of them extensive, are about to be added to those previously established.*

The opening of a regular communication betwixt this country and Europe by steam vessels, may probably be dated from this time. New York was enlivened last week by two such arrivals; one of them, in fifteen days from Bristol. Thus we have intelligence from Europe almost as speedily as from New Orleans by the regular mail. X.

April 28, 1838.

For the Farmers' Register.

USES OF SOAP-SUDS.

Let all your soap-suds be taken care of; it is good, or said to be good, by those who have tried it, who are older and more experienced than myself, to wash down young apple trees with. It is done by taking of a shuck and dipping in the suds, then rub the tree up and down pretty hard, and it will cause the trees to have a fine sleek appearance, and be clear of the old scaly-looking bark that we too frequently behold when we view an orchard. The oftener they are rubbed down the better. It requires but a small portion of one's time, and causes the trees both to thrive and look well. It is manure for the roots, &c. Soap-suds are very good for hogs which have been put up for fattening, and of course for those that run at large. It is said that it will clean them of worms, and make them hearty, and cause them to thrive faster. Soap-suds is also good to put on cabbages that are set out in our gardens. Pour it on them plentifully and frequently, and there will not be half so many lice, and it will cause them to grow very luxuriantly. I have an old neighbor, who has been the most successful man in raising and killing fine hogs, raising fine cabbage and fine fruit trees, that I have been acquainted with. He tells me that he is very particular in having all his suds taken care of; and by-the-by, he is famous for having good and choice fruit, as well as other things, at almost every season of the year.

GRANVILLE.

SUSPENSION OF COLLECTING AGENCIES IN VIRGINIA.

After April 1st, 1838, there will be a cessation of all collecting agencies for the Farmers' Register, within the limits of Virginia. Lest the motives of this measure should be misconstrued, we will say that we have every reason to be satisfied with our late general

* We would be obliged, by a correct statement on this subject from one of our Carolina friends, detailing the several establishments, number of spindles, looms, and annual consumption of cotton.

agents, and their deputies, in all their transactions of receiving and paying over subscription money. Nevertheless, the system works injuriously, to this journal at least; and we shall rely on the subscribers to the Farmers' Register to attend to the remission of their dues, by mail at our risk of loss; or by any other and cheaper or safer means of conveyance, which they may choose in preference.

The effect of employing collectors regularly, is to induce the greater number of subscribers to wait for their application. This can rarely be made to nine-tenths of our widely dispersed subscribers oftener than once a year, if so often; and even when the tardy application is made, those debtors only pay who would have paid earlier, through some other channel, if no collector's visit had been expected by them. In this way, the general effect is this; that we pay 12 per cent. for collecting a large proportion of the dues from the most responsible and punctual subscribers—and lose (whether aided by collectors or not) nearly all the debts of subscribers of character entirely different.

The suspension of collecting agencies is limited to Virginia, because, even without using the mail, every subscriber in Virginia, can send his dues to Richmond, if not to Petersburg, once a year. The agencies heretofore existing for other states, will continue, as republished on the cover of this number.

ERASURES OF SUBSCRIPTIONS.

Just before sending out No. 1 of this volume, the names of 128 subscribers to the Farmer's Register were erased, (in obedience to the rule of the Editorial Convention,) as indebted for two years and upwards, and whose arrears due for subscription amount to $1845. These are in addition to all the many previous erasures for the like cause. After the lapse of time enough for all such stoppages of the delivery to be observed by the least observant—and for payment to be made by all who have permitted themselves to fall so much in arrear merely through inattention and negligence—we shall send out notices to the remaining debtors in a different form, and more likely to have effect, than these sent heretofore. So far as we can know the facts, we shall never annoy, even by sending a bill, any subscriber whose recent losses or misfortune have rendered him *unable* to comply with obligations previously incurred. In any such known case, the charge of the *debt* itself is erased forthwith from our accounts. But a very different course is called for in numerous other cases, of persons who are not only able to pay, but who claim and hold respectable positions in society—and for some who are very wealthy, or stand exalted in office, or in public character, and who have received the fruits of our labor for 3, 4, and even 5 years, without paying any thing, and who may permit their names to remain, as now, erased, and the arrears unpaid. We have no legal remedy against remote delinquent debtors; their debts are *debts of honor*—or, if they will so have it, of *dishonor*, if they continue to disregard every notification of them, and will *compel* the public exposure of such long continued delinquencies.

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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

THE ADVANTAGE OF OBTAINING SEED WHEAT FROM COLDER REGIONS. BENEFIT OF MARL AND GYPSUM ON SWEET POTATOES.

To the Editor of the Farmers' Register.

Berkeley, Charles City, April 5th, 1838.

I have thought some facts, resulting from my experience as a cultivator of the earth, might be acceptable to you, and therefore take the liberty of communicating them. The first in importance, is the success which I have uniformly met with in the culture of wheat, when good seed was procured from the north, or the mountains of this state. When the Lawler wheat was much approved in the county of Frederick, although never *very* productive, I procured two bushels, which were sown late in the season, and on a very poor piece of ground--all of my good land having been previously sown. The produce of the Lawler, however, was 43 bushels of as beautiful wheat as I ever saw. This was used as seed, and produced a crop of about 800 bushels, weighing 61 lbs. 12 oz. per bushel, as reported by my friend Mr. Nat. Nelson, who kindly delivered it for me during my absence from home. The 3d crop from the same seed was an indifferent one; and the 4th utterly worthless--having been destroyed by rust. A year or two afterwards, I obtained from the same county of Frederick, a white plump wheat, known there as the "skip-back;" 5 bushels of this were sown on as many acres of good land, being the lot below my garden. Its yield was 35 bushels per acre. The subsequent crop, from this as seed, was an immense one. I cannot determine exactly its amount, but it was nearly all of a crop of 3600 bushels. The third crop from the same wheat was an average one, but the 4th disappointed my expectations. I have obtained other seed since, and the results correspond with this statement, that northern or western seed, when good, was to be relied on with confidence for two seasons; afterwards, I think it rapidly deteriorates.

The first Baltimore or golden-chaff wheat I ever saw, brought into this neighborhood by Williams Carter, Esq., consisted of one quart obtained in Pennsylvania; the produce of which was, according to my recollection, not less than three bushels. This, for several years, was preferred to all other wheats, as decidedly the most productive. The same gentleman was the first in this county to cultivate the purple straw; and for two or three years with great success. I am satisfied, from these facts, and others within my knowledge, that our crops of wheat would be much more certain if we were to rely on the north or west for as much seed wheat of which the second year's produce would furnish a sufficiency of seed for a full crop. For instance, I have never made less than 20 bushels per acre from such seed the first year, and generally quite as much the second. Every farmer may determine for himself what quantity is therefore necessary to obtain in the first instance, to furnish himself with a sufficiency of seed for a crop.

Another fact which I deem worthy of record is, my success last year in the sweet potato crop. I have for many years attempted sweet potatoes, to oblige my little ones, but there was really no crop, a few scurvy roots were all we could boast; and having no idea of the product, I directed, in the absence of my family, 20 hills to be dug in October for my own use. I chanced to be present when the digging commenced, and really was astonished at the yield; the first hill producing one peck, the largest of which weighed 5 pounds; and I have no doubt the product, although not measured, was not less than 200 or 300 bushels per acre. This excellent crop was owing entirely to an abundant use of marl and plaster of Paris, and certainly yielded the best and largest potatoes I ever saw; many, very many of them, weighing from 5 to 7 lbs. each. The soil in which they grew was quite light, and inclining to sandy. The seed was procured from Mr. Isaac White of Richmond. Very respectfully, &c.

BENJ. HARRISON.

[The opinions expressed in the foregoing communication, are altogether in opposition to the theory of Dr. Bronn, which we published in the first volume of this work, and to which we have several times referred with approbation. The rules deducible from that theory would require, that crops cultivated and mostly valued for their seeds, (as all grain crops,) are improved, or preserved in greatest perfection, by being raised from seeds grown in warmer climates, or on warmer and drier soils; while crops valued not for the quantity of seed, but for the whole bulk of the plants, in stalk and leaf, (as grass crops) are improved in bulk, though at the expense of the quantity or perfect formation of the seed, by being raised from seeds brought from colder and moister climates, or soils. From the confidence we had placed in these views, we should have considered Mr. Harrison as mistaken, if he had merely judged the product of the new wheats to be the greatest by the visible superior growth of the stalks, or greater bulk of straw; which might well be the case (according to Dr. Bronn's theory,) though accompanied by a reduction in the quantity of grain. But the products were ascertained, in these cases, by actual measurement; and there can be no higher authority for facts, or correct deductions from known facts, than our correspondent; and theoretical reasoning, however plausible, must yield to facts, correctly understood. At any rate, the information is interesting, and the results well worthy of being tested by the equally careful experiments of other farmers.]

PHOSPHORESCENT PLANTS.

M. De St. Hilaire says that the *agaricus (Olivier)* gives out a yellowish phosphorescent light in the dark; and it is supposed by M. Vallot that the notices of phosphorescent plants in ancient writers refer to that of the agaricus. There are, however, flowering plants which also emit phosphorescent light; such as the *Euphorbia phosphorea L.*, the milky juice of which possesses this quality. *(L'Echo du Monde Savant.)*

For the Farmers' Register.

PERPETUAL FERTILITY OF CERTAIN SOILS.

The following extract is taken from an interesting and scientific work, entitled "Travels through the Western Country, in the summer of 1816, by David Thomas."

"The fertility of the sandy prairies near the [Wabash] river is very remarkable. If lime is a constituent of this soil, the portion must be inconsiderable, as acids produce no effervescence. Neither is the vegetable matter in much quantity. The finer parts diminish but little in the fire, and are changed from a black to a reddish-brown. Hence the fertilizing principle is a mineral earth.

"The idea of soils *perpetually fertile* was not original with H. Davy, though to him we owe the first scientific view of the subject. Vegetable matter soon dissipates; but the primitive earths are imperishable; and if my conjecture is correct, these prairies will be sources of abundance through distant ages. A field was pointed out to me, which had recently been enclosed from the commons of Vincennes, and which produced corn of extraordinary luxuriance. From the nakedness of this ground it is evident, that a vegetable soil would soon become steril.

"One of my correspondents remarks, 'we have a prairie below this place, which has been in cultivation for seventy or eighty years, and now produces well.'

"Lord Kaims mentions a field near the Clyde, in Scotland, which had annually produced a crop for 101 years, and still retained its fertility. The subjoined extract is from the 'Edinburgh Encyclopædia.' 'The lands of St. Iago, (Chili) though constantly cultivated for two centuries and a half, without receiving any artificial manure, have suffered no diminution in their amazing produce.'

"Some of the great bottom of the Mississippi, between Kaskaskia and Illinois 'has been in cultivation 120 years, and still no deterioration has yet manifested itself.'"

I have made the above quotation for the purpose of adducing a few instances of almost equal fertility, presented by some of the soils of Eastern Virginia, apparently of very diverse constitutions. In none of them, as far as I am aware, has any portion of lime been detected. That the presence of lime gives fertility and durability to soils is fully demonstrated by all practical and scientific writers on agriculture; but that equal durability should characterize other soils, of which lime [in its usual state of *carbonate*] forms no constituent portion, can only be accounted for on the supposition of the existence of neutral soils, as promulgated by the author of the "Essay on Calcareous Manures."

There is probably no soil in Eastern Virginia, nor indeed in any part of the state, which is superior to the best of the ferruginous lands in the vicinity of Beaverdam, Goochland. It is an aluminous mould, in which the clay forms so great a proportion, that in times of rain it is as adhesive as mortar; though in a dry state, the surface is light and puffy. It is so red, that the line between the soil and subsoil is not always obvious. The neighborhood was settled about the year 1712; consequently much of the land has been in cultivation upwards of a century. When it is considered that the system of agriculture, which has prevailed, has been one of continual cropping—that heavy drafts have been yearly made upon the soil without its having received any aid from ameliorating crops, or artificial manures—and when it is moreover known that these lands remain to this day highly productive, it must be admitted that they merit the title of being almost "perpetually fertile." The farm of the late Geo. Pleasants may be cited to illustrate the truth of what I have stated. In the worst seasons, it never fails to produce a fair crop; and in years of plenty, it is now capable of yielding twenty bushels of wheat to the acre. Under an improved system, and possessing, as has been evidenced by the effects of one or two partial crops of clover, the greatest recuperative powers, it is expected that the present proprietor, who has inherited this valuable patrimony, will soon advance its condition to that state of productiveness of which it is so susceptible.

There are some portions, however, of the Beaverdam lands, that are rendered almost steril by a superabundance of isinglass or micaceous earth. This ingredient not only destroys their adhesion, but prevents any permanent improvement from being effected, even by the most liberal use of manures. In twelve months, they become again as barren as they were at first.

A short distance above Richmond are to be seen some specimens of fine granite soils, on the boundaries of the bituminous coal field. On the farms of Thos. M. Randolph and John Wickham, near Tuckahoe creek, where the granite rock, which forms the bed of the coal measures, appears in large quantities, the soil is much more fertile and durable than it is either to the east or west of the granite line. Many years' cultivation, under the usual system, has not impaired its original freshness and vigor. I can only ascribe its superiority over the contiguous cold and heavy lands, to the gradual addition of granite by disintegration; thus constituting a soil in which silicious matter was originally deficient. How far this modification of its texture has been beneficial in other portions of the same range, I have not had the means of judging.

The granite soils which constitute the dividing line between the tertiary and secondary formations of the state, have been represented, and very truly, as being exceedingly barren. If there be no exception to their general character in Virginia, there is, however, a most conspicuous one in the neighboring state of Maryland. The tract of country known by the name of *Elk Ridge*, on the Patapsco river near Baltimore, and which exhibits a soil composed in a great measure of disintegrated granite, is the admiration of all travellers who have seen it. There is perhaps no district east of the mountains which possesses greater natural fertility; nor is there any, where the effects of judicious cultivation are more agreeably exemplified. In approaching tide-water, the character of the soil undergoes a gradual change in proportion to the quantity of decomposed granite.

The low grounds lying on the margin of James River, which are too well known to require any description, may be adduced as an instance of the extreme durability of soils, scarcely less imperishable than the black prairies of Indiana. Though they now exhibit the benefits of good culture in a remarkable degree, even under the severe pressure of the four-shift system; yet the most exhausting tillage to which they were formerly subjected, had effected but little deterioration in their fertility; and indeed some portions of them have never been sufficiently reduced by a long course of corn and tobacco, to yield a crop of wheat that will not lodge before harvest. Their extraordinary productiveness is no doubt chiefly to be ascribed to their alluvial formation, combined with the accumulation of mineral earths which they have received from the mountains through a long course of ages.

The whole of these flats is believed to be now under culture for a considerable distance above Richmond. If there be any remains of the original forest, it is not within my knowledge; but I have a distinct recollection of some portions of it, before it had been despoiled of its glory. Such sylvan magnificence is perhaps no where to be seen in Eastern Virginia at this day; and even the bottoms of the Missouri have seldom exhibited specimens of more towering height and gigantic proportions.

T. S. P.

From Blackwood's "World we Live in."

RAILROADS AND STEAMBOATS.

It might be a serious speculation to inquire into the probable effects of the railroad system on mankind. Certainly no system ever became so popular, and so suddenly and so widely popular. France has begun to fling out those gigantic arms of communication over her noble country. Belgium exults in the commencement of a web of railroad in which it expects to catch all the stray dollars and centimes of the continent. The transit from Ostend to the Rhine will, in the course of a year or two, be an affair of a couple hours. Germany is shaking off the sleep, her blacksmiths are lighting their Hercynian forges, and from the mountains of the Hartz to the Tyrol, huge men with antediluvian visages and Cyclopean arms are hammering at iron wedges, rail, and gear, for "fire horses." Prussia is laying down railroads from her capital to France, to Poland, and to Austria. The puzzling question of her politicians being, whether she thus invites invasion, or proposes defence. But politicians are blockheads on matters of common sense, and of all blockheads the German politician is the most profound, headstrong and hopeless. The merchant, the traveller, and the tinker know better things. They could tell them, that the roughest of royal roughriders, was never able to whip and spur either Frenchman, Belgian, Prussian, or Austrian into belligerency, more than fifty years out of every hundred. But, thanks to the growing common sense of mankind, they never will be able to do this again, now that the world are beginning to discover that fifty years of victory are not worth one year of peace. In short, the world is evidently become a buying and selling world, a vast spinning and weaving community, a vast aggregate of hands and heads, busy about the main chance, and much more inclined to eat, drink, and be happy, than to burn each other's warehouses, or blow out each other's brains. That war will never cease out of the world, is a theorem founded on the fact, that the countless majority of mankind have a strong tendency to be fools; but we may establish another theorem, that the more difficult it is to make war, the less likely it is to be made. The more mechanical dexterity, personal ingenuity, and natural expense that is required to make war, the more will success be out of the power of brute force, and the more in the power of intellectual superiority.

Let war come to a conflict of steam engines and all the barbarian rabble of the world, Turks and Tartars, Arabs and Indians, Africans and Chinese, must obviously be out of the question at once. They may massacre each other, but they must fly from the master of the mechanics. All the half barbarians, Russian, Greek, Pole, Swede and Austrian, must make the attempt only to be shattered, and Field Marshal Stephenson, with his squadron of fire horses, galloping at a rate of eighty miles an hour, must consume their battalia with the breath of his nostrils. Thus England, instead of feeling alarmed at the sudden passion of foreigners for mechanicism, should rejoice to see the passion spreading, should encourage them to throw all their powers into mechanical rivalry, and exult in every railroad that shoots its serpent line among the hills and valleys of the continent, and hail the smoke of every steam engine that trails its murky line along the sky, as not merely an emblem, but an instrument of their own superiority. Mechanicism, the great power of art, is as exhaustless as any of the great powers of nature, for it is only the exhaustless vigor of intellect combining with and commanding the secrets of nature.

Ten thousand years might roll on, and every year see a new advance of every kingdom of Europe in invention, and England keeping ahead of them all, and like one of her own engines, showing her speed by the sparks that lighten the road behind. The steam engine in its effective state, is but little more than half a century old, for its invention, in the time of Charles II., left it upwards of a century, little more than a toy. In half a century more, its present perfection may be looked upon as little else than that of an ingenious plaything. It is scarcely ten years since the steamboat first ventured to sea. Thirty years ago, the late Lord Stanhope, was laughed at by all London, for his attempt to swim the steamboat from London Bridge to Greenwich. It now dashes from the tower to Constantinople; or shoots down the Red Sea, fights the moonshine on its own ground; sweeps to Bombay, Ceylon, and Bengal, and astonishes the Mogul and the Emperor of China, the same morning, with the month's newspapers from London. The railway, in its present power, is not ten years old, yet is already spreading, not merely over Europe, but over the vast savannahs of the New World. What will all this come to in the next fifty years. What must be the effect of this gigantic stride over the ways of this world? What the mighty influence of that mighty communication which, even in its feeblest state, has been in every age, the grand instrument of civilization?

Throw down the smallest barrier to become more civilized. Open the close shut coast of China or Japan to mankind, and from that hour the condition of the people will be in progress of improvement. The barbarian and the despot hate the stranger. Yet for the fullest civilization, freedom, and enjoyment of which earth is capable, the one thing needful is the fullest intercourse of nation with nation, and of man with man.

The European passion for the railroad is certainly one of the most singular, as it is one of the most cheering characteristics of the age. Like all instruments of national power, it may be made an instrument of evil. It may give additional strength to the tyrannical, and accumulate force against the weak, pour resistless invasion against the unprepared, and smite the helpless with unexampled rapidity of ruin. But its faculties are made for peace, its tendency is to make nations feel the value of peace; and unless some other magnificent intention shall come to supersede its use, and obliterate the memory of its services, we cannot suffer ourselves to doubt that the whole system which is now in the course of adoption, with such ardor throughout Europe, will yet be acknowledged as having given the mightiest propulsion to the general improvement of mankind.

From the London Mechanics' Magazine.

EAST INDIA CAOUTCHOUC.

It is well known that a large supply of this valuable substance might be procured from India, if the same care were to be taken in gathering it as in South America. "The London Caoutchouc Company," impressed with this idea, accordingly sent to India an offer of a premium of fifty pounds for the first hundred weight of East India caoutchouc which should be shipped for England. When the offer arrived, however, it was somewhat of the latest, the great demand existing at home for the article had been previously heard of, and large quantities were already on shipboard; compared to which the "hundred weight" stipulated for was but a molehill to a mountain! The whole affair forms an apt illustration of the doctrine that, in commerce, the force of self-interest is far superior to that of artificial bounties.

ORIGIN OF COAL.

Coal is supposed by some writers to be the remains of antediluvian timber which floated in the waters of the deluge until several mineral strata had been formed; others conceive it to be antediluvian peat bog. It was used in England anterior to the reign of Henry III; for that monarch, in 1234, renewed a charter granted by his father to the inhabitants of Newcastle, by which they were permitted to dig coal on the payment of £100 per annum. Coals had been introduced into London before 1306, for in that year the use of them as fuel had been prohibited, from the supposed tendency of their smoke to corrupt the air. About the beginning of the sixteenth century the best coals were sold in London at the rate of 4*s.* 1*d.* per chaldron, and at Newcastle no more than 2*s.* 6*d.* for the same. During the ensuing century, however, they were received into such general use, that in 1648, on the scarcity of coal in London, many of the poor were said to have died from the want of fuel. The whole quantity of coal sent into London on an average of four years, has been estimated at 1,170,000 chaldrons per annum. There has been much dispute on the origin of coal, but Brogniart has given the following as the general conclusions of naturalists:—1. That coal was formed at the same time as, or after the existence of, organized bodies. 2. That this mineral when first formed was liquid, and in a great degree of purity. 3. That the same cause which produces this substance is several times renewed in the same places and under the same circumstances. 4. That the cause, whatever it may be, is nearly the same over all the earth, since the beds of coal always exhibit nearly the same phenomena in their structure and accidental circumstances. 5. That these beds have not been deposited by any violent revolution, but, on the contrary, in the most tranquil manner; since the organized bodies that are found in them are often found entire, and the leaves of vegetables impressed in the slate which covers the coals are hardly ever bruised or otherwise deranged.—*Merthyr Chronicle.*

From the proceedings of the seventh meeting of the British Association, for the advancement of Science.

REMARKABLE CLEARNESS OF THE AIR A PRECURSOR OF RAIN.

Professor Lloyd said that the distinctness and vividness with which distant objects were seen in some states of the atmosphere was quite astonishing: on one occasion he had seen from the neighborhood of Dublin the Welsh hills from their very bases, and brought so near, apparently, that he could absolutely see the larger inequalities of the surface upon sides of the mountains. That the atmosphere was at the time very much loaded with vapor in a highly transparent state, was obvious from the fact, that immediately after a very heavy fall of rain took place, and continued for a considerable time. Professor Stevelly wished to confirm what had fallen from Professor Lloyd and M. de la Rive by stating that whenever the Scotch hills appeared with peculiar vividness and distinctness, from the Lough of Belfast, the fishermen always looked upon it as a sure precursor of heavy rain and wind. A friend had informed him that on one occasion he had noticed this appearance while standing on the beach at Hollywood, and pointed it out to an old fisherman; the old man immediately gave notice to all his friends to whom he had access, who instantly set about drawing up their boats and placing their small craft in more secure places; early the next morning a violent storm came on, which did much damage upon the coast, to those who had not been similarly forewarned. It might, perhaps, be accounted for by supposing that on these occasions the intervening air became actually converted into a large magnifying lens.

From the same.

BEER.

Mr. Black communicated a paper "On the influence of Electricity on the processes of Brewing." According to his statements a thunderstorm not only checks the fermentation of worts, but even raises the gravity of the saccharine fluid, and developes in it an acid. This effect is witnessed principally when the fermenting tun is sunk in moist earth, and may be obviated by placing it upon baked wooden bearers, resting upon dry bricks or wooden piers, so as to effect its insulation. Mr. Black also stated, that during the prevalence of highly electrified clouds, the fabrication of cast iron does not succeed so well as in other states of the atmosphere.

From the Quarterly Journal of Agriculture.

ENAMELLED HARDWARE.

This admirable substance is of German invention, and has only of late years been introduced into the southern part of this country, where it is still but partially known. The art of enamelling on iron, *it is said*, cannot be accomplished by our manufacturers; and we are in a degree disposed to give credence to the assertion; for we know two instances in which potters have given their opinions of the impracticability of its accomplishment. During a visit to London three or four years since, our attention was attracted by some iron saucepans and frying pans, as we passed the shop of an ironmonger at the corner of the Old Bailey, on Ludgate Hill, which appeared as if they were lined with white paper, instead of being tinned in the usual way. On investigation, we found them to be enamelled; and, by inquiry, learnt the following particulars:—That they are imported, a ship-load at a time, from Germany; that the manufacture is unknown in England; that they are durable, and not liable to injure.

We immediately purchased one; and, subsequently, several others of different sizes, as well as a frying pan, and are *entirely satisfied with them all.* We will enumerate their advantages, and our readers will thus judge for themselves, whether or not our panegyric is too highly colored, when we pronounce them to be the *ne plus ultra* of cooking utensils,—without a fault! They are kept clean with the least possible trouble; they never crack or craze, and they perfectly retain the color and the flavor of every product of the culinary art; so many sad accidents have resulted, and are still occurring, from the use of copper saucepans, stew-pans, &c., that it becomes a duty, with every writer of influence, to dissuade the public from the use of them, by urging the deleterious nature of copper on their attention. To our readers, we are well aware, this information will be superfluous; but they must know, as well as ourselves, that errors remain unrectified,—abuses exist unabated—faults rest unreproved—dangers lurk and threaten uncared for, until our natural supineness is roused by an actual evil overtaking us, which might and ought to have been prevented from existing. When too late to avert a calamity, we wonder at our apathy, and bewail our culpable remissness. Gentlemen are out of the sphere of copper stew-pans, and provided they find their dinners well appointed, care nought for the kind of metal in which they are cooked; domestic matters being very properly consigned to the lady of the establishment. But it unfortunately happens, that ladies dislike to interfere, and rely upon the sagacity of their housekeepers, who also depend upon the cleanliness of their subordinate kitchen-maids; and thus may the lives of a whole household be periled by the ignorance or idleness of this denizen of the scullery, as yet unvisited by "divine philosophy." We can well imagine, that on reaching this period of our subject, some "lord of a wide domain" looking off from his "Quarterly Journal," will address his lady with this startling question, "Are there any copper stew-pans or sauce-pans in the kitchens, my love?" To which she will, with unfeigned surprise, reply, "Really, my dear, I not know, but I dare say Harris can inform you;" and the affair of poison in a ragôut being momentous, the housekeeper would be summoned, and be in turn astonished with a similar query. Her reply of "Yes, at least a dozen," would complete the incipient dismay; and an order to have the dangerous utensils abolished, with the reason assigned, would infallibly elicit a decided assurance on the part of the confidential servant, that "all stews *must* be made in copper, for iron, tinned, would impart a flavor; that preserves and pickles *must* be boiled in copper, because they would lose all color, and not be fit to be placed on table, if iron was to be substituted."

This imperative "*must*" would, alas! in too many cases, decide the matter, and that vile pernicious copper still bear sway in the kitchens. In these admirable German stew-pans, however, we have a succedaneum of unquestionable capabilities, to supersede the necessity of pleasing our eye at the risk of our lives. Every species of cooking has been performed in our own utensils for several years, and to far greater perfection than we ever experienced, previously to the introduction of the enamelled hardware. Independently of its salubrity, we should give it the preference over every other; for, in consequence of the delicate and innocent nature of the glaze, which resembles that of china, all color and flavor are preserved in their utmost purity; and all housewives are aware, that these are desiderata in pickling and preserving.

We have stated that this ware is not liable to injure; but we ought to have placed this essential advantage in much more forcible language. The union of the enamel with the iron is so intimate, they are so entirely amalgamated, that it is utterly impossible to effect a separation; and we have known, that in the attempt several iron tools have been broken.

If we knew of a fault in them we would gladly name it, not only as a guide to ourselves in our future purchases, but because our readers would, perhaps, trust rather to qualified than unqualified praise. The only drawback which we ever found, was in their weight, which was greater than those made in England of the same size, and perhaps a dissightliness in the forms compared with those of our own manufacture; but both of these trifling objections have recently been removed. We confess that we had migivings when we made up our mind to order a frying-pan, that the enamel would not endure the very great heat to which that kind of cooking necessarily subjects the vehicle in which it is performed; but we are gratified in being able to assert, that we have had one in frequent use for some months past, and it is as white and uninjured as when we received it first.

We should rejoice to hear that our manufacturers intend to give their attention to this useful and beautiful art; and what can they not achieve with that industry, perseverance, science, wealth, and emulation, for which they are, above those of all other nations, celebrated?

From the Gardeners' Magazine.

CONJECTURES RESPECTING THE CAUSES WHICH PRODUCE DOUBLE FLOWERS IN PLANTS; TOGETHER WITH THE RESULTS OF SOME EXPERIMENTS MADE WITH A VIEW TO THE SAME OBJECT.

By James Munro, Forester to the Marquess of Northampton, at Castle Ashby, Northamptonshire.

Of the various phenomena which nature exhibits in her economy of the vegetable kingdom, the cause which produces double flowers, and other singular varieties of plants, is, perhaps, least understood by horticulturists. Different reasons have been assigned for the presence of this *lusus naturæ* among vegetables; but, when even these theories have been subjected to a practical test, disappointment has followed.

The prevailing opinion, in earlier times, rested on the theory of contact; in other words, that double-flowering plants were a result from single and double plants of the same kind growing near to each other; an erroneous assumption, that double flowers possess impregnative qualities. Any person, possessing the slightest knowledge of the sexual system of plants, knows that double flowers are destitute of the productive organs; consequently, no seed can be obtained from plants of this description: they are anti-natural, and are occasioned by some infringement of the laws which regulate the vegetable economy. How, then, is it possible that plants thus physically incapacitated for self-reproduction, by seminal process, can influence the character of their neighbors by the mere circumstance of proximity? Besides, the unalterable relation of the order of cause and effect is fatal to this theory; for, if the agency of double flowers is required to alter the quality of single-flowering plants of any kind, the question arises, By what means did such flowers come to exist at first?

Of late years, it has been stated that Dr. Graham of Edinburgh gave it as his opinion, that, in order to have double stocks, it is only necessary to sow and rear the plants upon an exceedingly rich soil, such as the pulverised material of old hotbeds, &c. By this mode of treatment, I suppose it is presumed that the plants shall receive such a surfeit of alimentary matter as will cause a departure from the natural way by which their various organs are formed, and their functions regulated. The high authority whence this theory was said to emanate secured it from me a fair trial; but the experiment failed completely. My after experience points out a cause of treatment the opposite to that of Dr. Graham. I have found that, the more plants intended to save seed from are checked in their luxuriance, the greater is the chance of success. Every florist must have observed that all the stunted-growing kinds of annual stock are more productive of double flowers than are the rambling-growing sorts; and that, in both cases, the proportion of doubles is greater from seed that is saved in an exceedingly dry season, when the growth is less luxuriant. From this and other circumstances which have come under my notice, I think there are grounds for questioning whether the agency of any of the afore-mentioned theories is in the remotest degree connected with the producing of double blossoms.

The longer I consider this subject, the less I feel disposed to trust in the efficacy either of the theory of contact or of alimentary surfeit; the true cause, I think, is more likely to be detected by properly tracing that striking analogy which subsists between vegetable and animal creation. This analogy is stronger than is generally supposed; and, therefore, if we would arrive at correct conclusions regarding vegetable physiology, we would do well to keep constantly in view the relative position which the subjects under consideration may occupy in the scale of creation. Plants are dependent on air and nutriment as well as animals: they are furnished with numerous organs, suited almost to an animated existence; these are skin, pores, glands, hairs, bristles, flesh, or fibre: they have organs for respiration, with veins and arteries, and a circulating fluid traverses the whole. This fluid is at times held in excess by some trees; when bleeding, or an operation equivalent thereto, may be practised with propriety. Ringing the bark of fruit trees, and shortening their roots to bring them into bearing, are here alluded to; by which process, if a copious discharge is not effected visibly, still a determination of sap to the head is prevented: this fluid adds annually to the bulk and strength of the vegetable structure; which, as with animals, the better it is fed, the better it flourishes. Nor does the analogy stop here: mutilations may be healed or replaced; wounds and bruises may be cured by applications similar to those remedies resorted to in cases of fractures of the animal frame. Cancerous substances and tumorous excrescences may be excavated from trees as from animals; and counter-irritations are successfully employed by gardeners, many of whom well know the advantage of this process on trees technically termed hide-bound. Slitting open the bark, in such cases, produces effects on trees similar to that of the blister on animals. It has likewise been affirmed that excrementitious matter is emitted from the roots; and scrofulous-looking tumors, on some trees at least, are common.

If due consideration be allowed to all these close resemblances which the vegetable creation bears to the animal, I trust I shall not be thought extravagant in my ideas, if I endeavor to account for the phenomena of vegetable variation by tracing that analogy a step farther, and assign to plants, as in animals, a plurality of fluidal systems. In animals, the different fluids and humors originate in one common source, the blood; in plants, each system seems to have a direct communication with the elements, and in their operations are independent of each other. It is evident, from the manner in which its operations are conducted, that there is one grand system employed in forming the bark, leaves, and woody fibre; viz., the albuminous current: it is also apparent that a separate system exists in plants for the perfecting of the fruit, which may be denominated the seminal fluid; and it is highly probable that these systems are of a compound nature, each, perhaps, furnished with organs for producing the properties of color, taste, and smell, peculiar to each division. If the progress of vegetation is watched closely, we find that every tree, according to its kind, if raised in the natural way (that is, from the seed), has its whole powers directed to the accumulation of wood, bark, and leaves, for a series of years. Twelve years commonly elapse before the fruit-buds appear on the apple. In form and size, these buds differ so widely in appearance from the buds which produce the annual spray, that the most partial observer must conclude that they cannot be the work of one and the same agent: if it were so, the fruit-buds, of course, would be contemporary with those that produce wood; this is sometimes the case with grafted trees, but never with such as are raised from the seed. If one universal system of fluid in plants (a servant of all-work) is contended for, viz. the albuminous current, how are we to account for its extremely eccentric nature? To suppose that it possesses the faculty of communicating color, taste, and smell to the wood, bark, and leaves, of a peculiar description, whilst it supplies the flower and fruit with these properties of a totally different description, is preposterous. In its journey through the leaves, the alburnous fluid must, doubtless, all undergo the same process of elaboration; consequently, must possess a unity of character: the whole mass must be applicable to one purpose only, either for the creation of bark, wood and leaves, or of flowers and fruit. It cannot be credited, that the same agent that gives to the capsicum stem and leaves the green color and insipid taste, is capable of communicating the inveterate acrimony of taste to the seed, and high color to the capsule. For my own part, I can see no way of overcoming the difficulty of accounting for the difference of color, taste, and smell, held respectively by what I shall here designate as the two grand divisions of the vegetable structure, except a plurality of fluidal systems be admitted. In short, the fact that these properties can be affected by the manner in which a plant is treated, is conclusive: color, in particular, may be altered by treatment, without interfering with any of the other properties; a fact clearly demonstrative of the independent action of the different systems.

There are many other facts which might be brought to bear upon this interesting subject; and I may particularise the dahlia as constituting a lucid example. Strictly speaking, the dahlia is not a double-flowering plant; still, I affirm that no plant ever introduced into our British gardens has been so rapidly improved. Great are the changes that have been effected in the color, size, and form of its flowers; still the stem and leaves have kept a uniform similarity, differing but little in appearance since the day of its introduction; a fact clearly proving that one of the grand divisions of the fluidal systems in plants may be affected by foreign influence, without detriment to the others. The improved condition of the dahlia, in regard to its flowers, I do not consider to be a consequence either of contact or of alimentary surfeit; but that it owes its origin to treatment in accordance with the theory herein contended for. Competitors at dahlia exhibitions, from observation, have learned the propriety of preventing an excessive bloom on their best sorts, seldom permitting more than three or four of the flowers to expand. By this means the sphere of the seminal fluid is curtailed, and the excess thus produced, acting upon a concentrated field of operation, undoubtedly causes the departure of the progeny from the habit of the parent: whereas, if the whole of the flowers which appear upon a plant were permitted to expand successively, the seminal fluid would then be equally distributed, in such proportion to each seed as would accomplish the intentions of nature; namely, consentient reproduction. The following experiment, performed by me some years since, is so strongly corroborative of what is here advanced, that I cannot resist giving it in brief detail.

At that period, I had a quantity of single scarlet ten-week stocks. Impressed with the belief that my theory was worth a trial, I selected a number of the plants; and, as soon as I observed five or six seed-pods fairly formed on the flower spike, every succeeding flower was pinched off. From the seed saved in this manner I had more than four hundred doubles on one small bed. Whether this success was in consequence of my mode of treatment, remains to be proved by future experiments; yet I cannot help thinking that it was; and that, if I had left fewer seed-pods on the spikes, the proportion of double plants would have been still greater.

In conclusion, I shall instance one or two more facts in favor of this theory, which are acted on almost every day: I allude to thinning of grapes, peaches, and other fruits; a process whereby the quality of fruit is much improved, while the woody part of the plant is not visibly affected. If the albuminous current were alike the source of woody fibre and fruit, any operation tending to produce immediate improvement on the one would, as a matter of course, be observable on the other: this, however, is not the case. Again, when a tree shows any decided determination to fruit bearing, little or no spray-wood is made; on the contrary, when an inclination to wood is exhibited, fruit is less plentiful: circumstances clearly proving that in vegetables there do exist two principles, and, to a certain extent, opposed to each other. It is in consequence of the contention of these principles, that practical men resort to ringing of the bark, shortening of the roots, &c., as remedies bearing the sanction of experience, for counteracting any ascendency which the one may have obtained over the other. I shall only add, that the experience which I have had of the working of this theory has determined me to resume my experiments on the first opportunity, the results of which shall be faithfully communicated.

Castle Ashby, Dec. 1837.

From the Franklin Farmer.

HARVESTING OF CORN.

To the Editor.—As the season is approaching in which the farmers will commence the securing the abundant crop of corn with which a bountiful Providence has blessed our country, it may be pertinent to the occasion to offer a few remarks upon the best mode of harvesting the crop.

Our Virginia ancestors and those who think it wise to plant and cultivate and gather as our fathers have done, pursue the old method; about this time they gather the blades below the ears of corn—after they consider the corn to be ripe, they top the stalks and secure all of the fodder in stacks for winter use. In November they pull the corn and remove it to cribs, where it is husked out at leisure. This mode is rapidly yielding in the stock districts to that first introduced among the graziers on the south branch of the Potomac. The farmers in the northern and middle districts of Kentucky, and in the Scioto valley of Ohio, have generally adopted this latter mode; which is to cut the stalks, corn, fodder and all, and place them in shocks commonly embracing sixteen hills square.

I have seen the richest crops of many climates gathered, and there is no operation in husbandry so animating as that of cutting corn in the mode just mentioned. It is a most cheering prospect to see twenty acres of corn pass in one or two days to a condition in which it is prepared to keep in the field throughout the winter. This remark is predicated particularly upon the plan of riddling the squares, instead of cutting the whole square at once. It will readily occur to any observing mind, that as corn does not ripen with precise regularity, if the entire square is cut out at once, some of the corn will mould and sometimes even the fodder will be affected, if the cutting shall be followed by warm or wet weather. To avoid this contingency, some graziers commence with the process of riddling, that is, they select only such part of the sixteen hills square as may be ripe—go through the field in this way, and in ten days complete the cutting of the square. By this process several important advantages are obtained—the greatest amount of fodder is secured, consistantly with the paramount object of saving the corn, and a nucleus for the shock being formed by the first cutting in the square, the shock becomes settled and stands better during the winter. In the rich counties of Clarke and Bourbon, they sometimes cut half of the square on one side and then in ten days finish it. Whilst many graziers in Fayette, Lincoln and Shelby, prefer the process of riddling.

In the course of October and November, these shocks are shucked out, the corn placed in cribs and two of the shocks placed together, or one placed upon the ground and two others put around it.

It is the opinion of practical farmers, that the practice of cutting corn in this mode secures the greatest amount of corn and fodder with the least expense, and is decidedly an improvement on the old Virginia plan, more especially when applied to the feeding of cattle or mules. T.

From the Quarterly Journal of Agriculture.

ORGANIZATION AND FUNCTIONS OF ANIMALS AND VEGETABLES COMPARED.

It is a very important preliminary to the study for which I would gain the attention of practical men, that they understand the nature of plants; of those organic creatures whose diseases they would obviate; for an ignorance of, or an inattention to this, is one of the causes that so little progress has been made in this branch of natural philosophy. It is absolutely necessary and important for them to understand fully that this part of the creation, the very grass they trample upon, is so highly organized, so exhibiting intimations of the functions more highly developed in the superior animals, that it is not possible to point out where animal life terminates, and where vegetable life begins: the zoophyte connects the two kingdoms. It is absolutely necessary, I think, for this to be understood and felt by those who enter upon the investigation of vegetable diseases, because I have a strong opinion that these in many, very many instances, are caused by the plants which they infect being treated as if they were totally insensible, inorganic matters, scarcely more susceptible of injury at some periods of their growth than the soil from whence they partly derive their sustenance.

To determine the question whether plants possess a degree of sensation, is not so easy as many persons may believe. "It is as difficult," says Mr. Tupper, who has written ably upon the subject, "to ascertain the nature of vegetable existence, as to determine what constitutes the living principle in animals." Darwin, by the aid of imaginary beings similar to the Dryads and Harmadryads of the classic mythology, has raised plants to a position in the order of nature superior to that to which animals are entitled. Other philosophers, taking a totally antagonist opinion, estimate vegetables as bodies, only somewhat more organized than crystals, but like these entirely and exclusively subject to chemical and mechanical changes.

The above opinions are equally erroneous, as will appear from the facts arranged in the following pages. It might easily be made to appear that the gradation from reason to instinct, from instinct to inanimation, is as gradual as the transitions of light from the noon-tide to the midnight of a summer's day; but this essay must be confined to that section of creation that commences from the close of the animal classes in the zoophyte, and terminates where inorganic matter commences in the crystal; and its details must be specially directed to demonstrate how closely it approaches, how indistinctly it is divided from the former.

Let us first consider the comparative composition of animals and plants demonstrated by the researches of chemists. Their constituents are identical: carbon, hydrogen, oxygen, nitrogen, sulphur, phosphorus; acids, alkalies, earths, and metals, are the common components of both. Nitrogen has been considered by some chemists as the constituent, marking by its presence animal from vegetable matters, but the distinction fails in as much as that from some animal matters it is absent; whilst in the gluten of plants, a chief constituent of wheat, and in the whole frame of the tobacco, it is present.

If we follow the above chemical bodies through their combinations, we shall find that these in animals and plants are closely similar; and in both are equally numerous and intricate.

Of the acids there are contained in

Animals.	*Vegetables.*
1. Sulphuric,	1. Sulphuric,
2. Phosphoric,	2. Phosphoric,
3. Muriatic,	3. Muriatic,
4. Carbonic,	4. Carbonic,
5. Benzoic,	5. Benzoic,
6. Oxalic,	6. Oxalic,
7. Acetic,	7. Acetic,
8. Malic,	8. Malic,

and others equally numerous in each, but not common to both. Of the earths and alkalies, lime, magnesia, silica, soda, and potass, are found in each class. Of the metals, iron and manganese are their conjoint constituents.

If we follow the two classes through their more compound constituents, we will find the analogy still holds: they contain common sugar, mucus, jelly, coloring, and other principles, gluten,* fibrin, oils, resins, and extractives. The functions of animals and plants are similarly closely analogous.

Animals take in their food by the agency of the mouth, and prepare it for digestion by various degrees of mastication, or attrition, as in the gizzard of birds. In this they differ from plants, but these have this compensation, they imbibe their food in a liquid form, and consequently in a state of the finest possible division. Animal and vegetable remains are their common food, plants having this superiority over animals, that, as they only absorb the soluble and finer parts, they are not obliged to throw off the grosser constituents which appear in the excrement of animals.† In the animal stomach the food undergoes an extensive change, being reduced to a pulp of greater specific gravity, and being altered entirely both in taste and smell. In the lymphatics of plants, which may be considered their primary organ of digestion, their food, or lymph, undergoes a change precisely similar; its color and flavor are altered, and its specific gravity increased.

From the stomach, the animal's food passes into the intestines, is there subjected to the action of the bile, and converted into chyle, the nutritive part, and excrementitious matter. In their passage through the intestines, the chyle is absorbed by the lacteal vessels, and is conveyed into the blood; by the heart, the mingled fluids are propelled into the lungs, to be there exposed to the action of the air. The vital fluid there changes its purple hue for a florid red, loses a portion of its watery particles and carbon; the latter combining with the oxygen of the atmospheric air in the lungs, and being breathed forth in the form of carbonic acid gas. As plants in their food take in no gross, unnecessary ingredients, it is obvious that no process like the biliary operation of digestion is required. The lymph, or sap, proceeding at once along the branches, is poured into the leaves, the very lungs of plants. There, as in the blood, its color is changed, oxygen is emitted from it during the light hours of the day; but carbonic acid gas is thrown off during the night, and at all periods a considerable quantity of water.

From the lungs, by the agency of the heart, the blood is propelled through the arteries over the whole animal system, supplying nourishment and warmth to all the parts, and where, by these abstractions, it is again converted into purple or venous blood, it is returned by the veins to undergo the changes that were described as being effected by the lungs.

The sap, after exposure to the action of the air in the leaves, is returned by another set of vessels situated in the bark, ministering to the growth and support of the whole plant.

Such is the close assimilarity in the digestive and circulatory processes of the two classes; an assimilarity which obtains in all the other functions enjoyed by them in common. In respiration, the air inhaled through the mouth and nostrils proceeds immediately to the lungs and acts upon the blood; in plants, when it is inhaled by their leaves, it operates instantaneously upon the sap. The changes that take place have just been imperfectly noticed; but it is necessary to add, that the oxygen of the atmosphere, is the gas essential to the existence of animals; but it is its carbonic acid that is nearly as important to vegetables. They may be considered the vital airs of the two classes. If animals are placed in a situation where they inhale pure oxygen, their functions are highly and rapidly increased; but it is an exhilaration which would soon terminate in exhaustion and death, if breathed by them for any extended period. So plants will flourish in an atmosphere containing $\frac{1}{12}$th of carbonic acid, but if it much exceeds this proportion, they are rapidly destroyed. During sleep, animals expire less carbonic acid than during their waking hours; so plants emit little or no oxygen during the night.

After an animal has enjoyed the regular course of its functions for a period varying in its duration, the time at length arrives when decay commences. The wasted, enfeebled, and relaxed form gradually declines, until death finally closes all activity. The body then becomes contracted and rigid; the skin exchanges the ruddy tinge of health for death's pallid hue. Decomposition speedily ensues, with all its offensive phenomena; and finally the only permanent remains are the skeleton and a small amount of earthy matter. The same characteristics attend the last period of vegetable existence. Plants may flourish only for one season, or their lives may be extended through centuries of years, yet decay eventually comes over them; becoming more and more stunted, weak, pallid, and ragged, they eventually cease to live, become contracted and rigid, and pass through the same phases of putrefaction that are exhibited by the animal carcass. In both there was a time when warmth and exposure to the atmosphere were the sources of vigor, they now become the agents of destruction; they were once able to resist and to overcome the laws of chemical affinity, they now are destroyed by their attacks. What causes this most striking change? What antiseptic agent have they lost? There can be but one reply. It was their vitality. Now, let us examine how the vitality of plants in other respects resembles the vitality of animals, and I will confine this examination to two or three points.

Plants are *excitable.* Light acts upon them as a stimulus. Every body must have observed that plants bend towards the direction from whence its brightest influence proceeds. M. Bonnet, the French botanist, demonstrated this in some very satisfactory experiments, by which he showed that plants grown in a dark cellar, all extended themselves towards a small orifice admitting a few rays of light. Every flower almost has a particular degree of light requisite for its full expansion. The blossoms of the pea, and of other papilionaceous plants, spread out their wings in fine weather, to admit the solar rays, and again close them at the approach of night. Plants requiring a powerful stimulus, do not expand their flowers until noon, whilst some would be destroyed if compelled to open in the meridian sun,—the night-blooming *Cereus* unfolds its flowers only at night. Heat also acts as a stimulus upon plants.

* The gluten of plants is the albumen of animals.

† Is not the excretion from the roots of plants, as proved to exist by M. De Candolle, somewhat analogous to the excrementitious matter of animals?—EDITOR.

M. Duhamel observed, that during moderately fine weather the footstalk of a leaf of the sensitive plant *(mimosa pudica)* stood in the morning at an angle with the lower part of the stem of 100°; at noon the angle had increased to 112°, but at night had fallen to 90°. If a leaflet of this plant be but slightly touched, it immediately shrinks away; and the impulse being communicated, each pair of leaflets on the branch collapse in succession; and if the impulse be strong, the very branch itself will sink down by the side of the stem. If an insect alight upon the upper surface of the Venus's fly-trap, *(dionæamuscipula,)* its sides spasmodically approach each other, and crush to death the intruder. If the inner side, near the base, of any one of the anthers of the barberry, *(berberis vulgaris)* be gently touched, as with a bristle or feather, it instantly springs forward and strikes against the stigma. But the strongest indication, says Mr. Keith, of the existence of a species of sensitive principle in a plant, is, perhaps, that which is exhibited by the *hedysarum gyrans*. It is a native of India, growing on the banks of the Ganges. Its leaves are ternate, the middle leaflet being larger than the lateral ones. All of them are in constant vibratory motion; sometimes equably, at other times abruptly, but without any unison in the movements. If their motion be prevented, by grasping them in the hand, they renew it more vigorously when the confinement is removed, but by degrees subside to their natural rapidity of motion. This motion does not depend upon the application of any external stimulus, for it continues throughout the night as well as the day. It is most active during a warm fine day, the leaves then having an additional tremulous motion. *(Keith's System of Physiological Botany*, ii. 464.)

Instinct seems to be a characteristic of plants, from the following phenomena. Some of them close their flowers invariably when rain is approaching. Others have an unalterable direction assumed by them when climbing. No force can make one twist round a pole from left to right, if its natural direction be from right to left. If a garden pot be divided by a vertical partition, and one-half filled with a poor steril earth, and the other moiety filled with a rich fertile soil, a geranium or other plant placed in this pot, with some of its roots over the steril soil, and the rest of the roots over the fertile soil, those over the first named portion will gradually change their direction until they can also get into the richer pasturage. Instances have been known of the roots of trees piercing and destroying walls in their efforts to attain a more preferable soil than that in which they were planted. M. Saussure relates, that he placed some plants of *polygonum persicaria* and *bidens cannabina*, in water containing acetate of lime in solution. These plants then imbibed with the water a portion of this salt; but when they had the opportunity of selection given them, by dissolving in the water some common salt, glauber salt, and acetate of lime, they absorbed the two first named, but rejected the latter entirely. *(Saussure's Recherches*, 247-261.)

From the foregoing facts, without arguing that they demonstrate sensation to exist in plants as acute as that possessed by the higher or more perfect classes of animals, yet they certainly are satisfactory evidence that plants probably are nearly as sentient as the zoophyte, or even as the polypus and the hirudo,—animals that may be cut into pieces, and each section become a perfect individual,—animals whose heads may be taken off and grafted upon other bodies,—animals that may be turned with their outsides inwards, and yet without any apparent inconvenience. If plants be endowed with sensation of the most limited degree, it explains the cause, throws light upon the prevention of many diseases that affect those which are the object of cultivation, warns the tiller of the soils from the late performance of many of his operations, and teaches him generally to be less violent in his field practice. If a grape vine be pruned too late in the spring, the bleeding, or effusion of sap, has been known to be so violent, that the tree has died from absolute exhaustion. Stone fruits, if severely wounded, are frequently destroyed by the inroads of a disease resembling in all its characteristics the cancerous affections of animals; and I have known a whole crop of wheat affected with a swelling of the stem or culm, evidently caused by an extravasation of the sap from its ruptured internal vessels, owing to the roller being passed over the crop when of a growth somewhat too forward.

From the proceedings of the seventh meeting of the British Association, for the advancement of Science.

CATASTROPHE IN A MINE.

Mr. Sedgwick requested the attention of the meeting to an account, which he was about to submit, of the late unfortunate accident at the Workington Colleries. He pointed out, on the geological map, the rocks which occur in that neighborhood, and stated some of the phenomena of the stratification of the coal measures, which are there very much disturbed. There is an anticlinal line, on the opposite sides of which the strata dip differently, so that, in one place, very important beds of coal crop out under the sea. Workings, quite submarine, have accordingly been carried on for some time: in the Isabella pit, a depth of one hundred and thirty-five fathoms under high water has been reached. A culpable want of caution has been shown by the managers of late, as they have caused the workings to reach too near the sea—even within fourteen fathoms of it; and the pillars and roof of the older works had been taken away, by which the danger was greatly increased. There had been repeated warning from the shrinking of the ground, and from an old work having become filled with water; also in the new workings—although the pumping brought up one thousand gallons per minute, the miners were in such danger of being drowned, that several left the employment. In the latter end of July, the sea at length broke in, filling the mine in all its parts, in little more than two hours, and destroying twenty miles of railway. On one side of the Camperdown Dike, which ranges through the mine, not a soul was saved; but several escaped from other parts, and one individual, an Irishman, called Brennagh, had not only a remarkable escape himself, but saved three others by his intrepidity. Professor Sedgwick related to the Section this man's story, which was so singular and told with such a mixture of the serious and ludicrous—often in the language of the man himself—that it is impossible to convey to the reader an idea of the effect produced on the audience. A remarkable fact in the escape of one of the individuals rescued by Brennagh was, that he was actually *blown up* the last open shaft of the mine by the enormous force of the air, the noise of which was heard at a considerable distance in the country. The first notice to Brennagh of the accident, was an unusual undulation of air in the galleries, which made him suspect that all was not right, and he took the precaution of moving near to an air passage in the dike, which he had been permitted to use: he was thus enabled to save himself and his companions. At the suggestion of the professor, a subscription was made in the Section for Brennagh, which amounted to £34.

From the same.

PLANTS GROWING UNDER GLASS.

In April last, Dr. Daubeny introduced into globular glass vessels, their aperture being covered with bladders, three several sets of plants. In the first were *sedum, lobelia, &c.*; in the second, *primula, alchemilla, &c.*; in the third, *armeria, sempervivum, &c.* At the end of ten days the plants were healthy, and had grown. The air in the jars was examined, when it was found that the first had four per cent. more oxygen than the atmosphere. the second also four per cent. more, and the third one per cent. more. This was the result of examination during the day, but at night the excess of oxygen had disappeared. On the eleventh day, the first jar contained two per cent., the second and third, one per cent. excess of oxygen. At night there was less oxygen than in the atmosphere. On the 20th of June, the following results were obtained: in the first jar, two and a half per cent., in the second jar, three and a quarter per cent., and in the third jar, four per cent. less oxygen than in atmospheric air. Some experiments were then made to determine the rate of success of air to the plants through the bladder, and it was found that when the jars were filled with oxygen, the average rate at which it escaped till the internal air was like that of the atmosphere, was eleven per cent. daily.

Professor Lindley then read a paper by Mr. Ward on the same subject. The professor observed, that Mr. Ward, of Wellclose Square, London, had made many experiments on the subject of keeping plants in unventilated vessels, and was the original proposer of the plan for preserving plants in this manner. The discovery of their being able to be thus preserved, was of great practical importance, as it enabled us to bring plants from foreign climates, that could in no other way be introduced into this country. The paper commenced "consider the lilies *how* they grow." The attention of the author was first directed to this point by accident. He had placed under an inverted jar, a chrysalis, and on looking at it some time after, he found a fern and a blade or two of grass had grown under the jar, the sides of which appeared to be covered with moisture. Taking the hint, he introduced some plants of hymenophyllum under a jar, which grew and flourished in this situation. The Messrs. Loddige then enabled him to perform some experiments on a larger scale. The plants were enclosed in glass cases, or small green-houses, made tight with paint and putty, but, of course, not hermetically sealed, and were watered once in five or six weeks. From his experiments, the author came to the following conclusions: First, that confining the air secured a more equable temperature for plants, as its expansion and contraction by change of external temperature, by its relation to heat in those states, prevented any great or sudden change. This was remarkably exemplified in some plants that were brought from India, which were in the course of three months successively exposed to 20°, 120°, and 40° of Fahrenheit. The enclosed plants were very frequently found surrounded by a temperature higher than the external atmosphere. Secondly, that vascular plants required to be grown in a greater quantity of air than cellular. Thirdly, that the light must be freely admitted. Fourthly, that the enclosed air must be kept humid. This can be done by occasional watering, provided any means of escape for the water is allowed, but is not necessary where the water has no means of escape. Besides the advantage of enabling us to bring plants from abroad, it would also furnish to the physiological botanist the means of observing those operations of nature in his study, for which, before, he had been obliged to resort to the forest and the plain. As an instance, the author had been enabled to observe the rapid growth of a *phallus fœtidus*, by merely devoting to it a few hours of the night. The writer concluded by suggesting that this mode of preserving tropical productions might be extended from the vegetable to the animal kingdom.

Professor Lindley also read a letter from the Messrs. Loddige to Mr. Ward, stating that in every case in which his instructions had been attended to, foreign plants had arrived in a state of safety.

The Rev. J. Yates read a paper on the same subject. Wishing, he observed, to make an experiment, on a large scale, which might be exhibited at the meeting of the British Association in Liverpool, a green-house, nine feet by eighteen in dimensions, and with a southern aspect, had been erected in the yard of the Mechanics' Institute, in Mount-Street. It was stocked with foreign plants, of all kinds, to the number of about eighty species. A list of the plants, and observations on their condition and progress, accompanied the report. The general result of the experiment was, that the plants had flourished perfectly well, being in a vigorous and healthy state, without any extraordinary growth. Many of them had flowered, and canna and some ferns had ripened seed. The green-house had no flue, and no provision for any artificial heat. It was judged best to construct it without a flue, both as least expensive, and for the purpose of trying, by a fair experiment, to what extent plants might in this state be kept alive, even during the severity of winter, which would certainly die if fresh air were more freely admitted. It was also to be observed, that nothing had been done to prevent the water from escaping through the yellow sandstone rock, on which the green-house was erected, and hence it had been necessary to give the plants occasionally a fresh supply of water. Mr. Yates further stated, that he had also grown plants under glass in London, where no plant could be made to flourish without such a protection. Nearly a year ago he planted *lycopodium denticulatum* in a chemical preparation glass, with a ground stopper. During that time the bottle has never been opened; yet the lycopodium continues perfectly healthy, and has grown very much, although, for want of space, the form of the plant is distorted. Seeds which happened to be in the soil have germinated, and marchantia has grown of itself within the glass. He also obtained a a hollow glass globe of eighteen inches diameter, and with an aperture sufficient to admit the hand for planting the specimens. A variety of ferns and lycopodiums were then set in the soil, which was properly moistened with water. This having been done, the aperture was covered with sheet India-rubber, its attachment to the glass being made perfectly air-tight. No change of air could take place, except by percolation through the India-rubber, which was every day forced either outwards, as the air within the glass was heated and expanded, or inwards in the reverse circumstance; these ferns grew probably as well as they would have done in a green-house, or hot-house. They were all foreign, and some of them requiring great heat. Several had ripened seed.

Mr. Gray stated, that he had grown droseras under glass jars; one circumstance with regard to them he thought worthy of remark, their leaves did not turn red, as is usual when exposed to the atmosphere. Professor Graham observed, that although in Mr. Ward's experiments atmospheric air had been admitted, he did not think it essential to the welfare of the plant. Plants grown in this manner only required a glass large enough to contain a sufficient quantity of air, to permit of the absorption of oxygen without deteriorating the air of the vessel to such an extent as to injure the plant. The want of red in the leaves of drosera, he thought, depended on the presence of moisture. A singular point was, that plants growing naturally in arid soils and climates, flourished in the humid and confined atmosphere of the closed jars. He had placed under jars completely closed some plants of cacti, which had flourished more than those not so situated. He did not think that animals could be sustained in the same manner, as they consumed all the oxygen which they inspired. Dr. Travers remarked, that he had seen common mould, which was a species of fungus, in a tube which had been heated and hermetically sealed for two years. Mr. Bowman had observed at the Duke of Devonshire's, Chatsworth, that droseras did not, under the jars, change the color of their leaves as in open air. He wished to know of Dr. Graham, how long his cacti had lived in a moist atmosphere; they were naturally, at certain seasons of the year, exposed to heavy rains. He thought it was very possible for plants and animals to live together. Mr. Duncan inquired if plants were healthy, and fit to be transplanted to the open air, when treated in this manner. Professor Graham stated, that the cacti had lived without access to air eighteen months. He believed that plants and animals might live together, provided the vessel in which they were inclosed was sufficiently large to enable the plants to absorb the carbonic acid gas, expired by the animals. This would be a representation in miniature of what takes place in our own world. Professor Lindley, in reply to Mr. Bowman's question, stated, that plants suffered little when confined in carefully closed vessels. From improper treatment they may become debilitated, but he had seen them arrive from foreign countries, when treated in this manner, in the most perfect state of health. Want of skill in the management of those brought from abroad was the most frequent cause of injury. Too much water was frequently given to plants when just packed. They had better be placed in too dry, than in too moist an atmosphere. He had seen this illustrated in plants from India; plants exposed to too much moisture rotted very soon. He thought the change of color in the leaves of plants depended on their free exposure to light; the droseras mentioned, had not been exposed to the free access of light; this was certainly the case with the droseras at Chatsworth and of Mr. Gray. The discovery of Mr. Ward was not only important in enabling us to import foreign plants, but it also rendered the ventilation of green-houses less necessary, and would enable gardeners to manage the artificial climate of their hot-houses with less difficulty. The fact that cellular plants grow best under this mode of treatment, was well established. In answer to a question from Professor Lindley, Mr. Gray and Mr. Yates stated, that plants had both flowered and fruited under this plan of treatment. Professor Graham stated that the order in which he had found plants to grow best, was: 1. Lycopodiums; 2. Grasses; and 3. Begonias.

LIME AS MANURE.

We are pleased in laying before our readers the following valuable communication of Judge Hayes, as he is considered one of the best farmers in the country, and his experience will be valuable to others. His beautiful and productive farm gives evidence that the hand of industry is directed by intelligence. Other communications from the same source will be very acceptable.—*Yankee Farmer.*

South Berwick, March 29, 1838.

Mr. S. W. Cole:—Your letter of the 22d inst. requesting information in relation to the use of lime as a manure, has been received. My professional engagements have engrossed all my time till the present moment. I have no very particular knowledge on the subject, but will with pleasure state to you in what way I have successfully used lime as a manure, and how I have known it used by my neighbors.

I have used on my farm from ten to thirty casks of lime every year for the last twenty years; and have found it beneficial. Although a portion of my farm and buildings are on high ground, still between that and an adjoining swell of land there is a muck swamp, which formerly must have been a deep pond, and has been gradually filled up with vegetable matter, till the surface has become level with the adjoining land. This swamp is on higher ground than my barn-yard, and about twenty rods therefrom. The muck is inexhaustible, and is very easily hauled to the barn-yard. Immediately after haying, when the ground is very dry, I cart out about sixty or seventy loads of this muck, which is very sour when taken from the swamp; and I endeavor to manage it in such a way, as will correct its acidity, and make it food for plants. I have yards for my stock all around my barn. On the eastern side and southern end are yards for sheep, and on the western side and northern end are yards for neat cattle, surrounded partly by a high wall and sheds, under which there is a well of never-failing water. When the muck is taken from the swamp, about forty loads of it are dropped in the sheep-yards. Here the muck is spread and the sheep lie on it during the ensuing winter. The next spring immediately after planting, this muck, together with the sheep manure as well that in their yards, as that in the sheep-houses, is hauled round to the yards used by the neat stock on the farm. Here it is spread over the yards and intermixed with unslacked lime. The cattle tread over and lie on it during the summer, when in the yards. These yards are ploughed and harrowed, and more lime applied several times during the summer. The manure made in the barn during the winter is thrown into these yards, and the cattle during the whole foddering season, when not in the barn, lie there. As the yard is well supplied with water raised by a pump, no portion of the stock, except the working oxen, go out of the yard from fall till the next spring, when they go to pasture. The muck, lime, litter, manure and urine from the stock being well intermixed form a valuable compost, which in the spring is all applied to ground newly broken up, except that portion which is applied to root culture, other than potatoes.

My buildings are situated on the side of a high swell of land inclining to the west. The stable is connected with the house by a large shed, and on the further side of the stable is a hogs' yard, in which the manure from the horse stable is thrown. On the backside of the shed is a drain made of pine plank, free from sap, ten inches wide and four inches deep, covered with plank and dirt in those places where an open drain would be unsightly or inconvenient. This drain has been in use twenty years, has been renewed but once, and is now in good repair. The ground inclining, favors this arrangement. By means of this drain all the soap-suds from the kitchen, water from the sink, &c. must pass through the necessary vault, by which it is kept clean, to the hog-yard. A portion of the hogs on the farm are kept in this yard, and a dry and warm apartment is provided for them under a part of the stable. As soon as the yard is cleared of the manure in the spring, we begin again to fill it with muck taken from the swamp the year before, putting in at first five or six loads, and one or two casks of lime, and so on, muck and lime every few weeks during the summer. The manure of one horse in the summer and generally of two in the winter is thrown into this yard, and is often spread over the yard. During the warm season more lime is used in the yard, and scattered in the drain, whence it is washed into the yard, and thereby every unpleasant smell is prevented. All the leaves and dry litter which can be procured are placed in the apartment under cover for the hogs to lie on; and all the green weeds and wet litter which can be obtained are thrown into the hog-yard. The muck being formed of vegetable matter which has been decomposed without fermentation, is very bulky in proportion to its value as a manure—but is of some value in itself, and serves as a sponge to take up and preserve the juices and gases of the putrescent manure, which might otherwise be lost. Turf from a good soil, if it could be obtained without injury to the farm, could be used in the same way to equal advantage. By means of the muck, lime, horse-dung, litter, leaves, weeds, soap-suds, wash from the sink, necessary, &c. we make in this yard about fifty loads of the very best manure. Formerly in the spring we were accustomed to shovel this compost out of the yard, and suffer it to lie in a heap a few weeks till wanted to be spread on the corn ground. While it thus laid in a heap, it would become very much heated by fermentation, so that it one year killed a large elm-tree, about which it was thrown. For several years last past we have not thrown it from the yard till it has been shovelled into the cart to be conveyed to the ground where it is to be used. I have not observed but what the compost is equally efficient, when used without the fermentation produced by throwing it out of the yard. We generally keep a cask of unslaked lime in the cellar under the house, and another in the cellar under the barn, and scatter unslaked lime on that which is partially air-slaked, on the bottom of the cellars and in the pens from which the vegetables are removed. This lime is occasionally swept up, and carried to the manure-yard, and fresh lime again applied. In this connexion permit me to recommend the yearly use of whitewash in dwelling houses and cellars. With great gratitude I can say, that I have one of the largest, and most healthy families in the county, and I have no doubt but the liberal use of lime about my dwelling houses and appurtenances has contributed more than any other cause to preserve their health. I cannot accurately state the value of lime on the farm when used in this way, but am confident that it is much cheaper than to purchase manure at the usual price.

Until within a few years very little lime has been employed by my neighbors as manure, and the method in which they apply it, is that which is best adapted to general use, and is as follows:

Select a spot of ground near the place where the lime is to be applied to the soil by the side of the highway or in the pasture, where turf or rich vegetable mould can be obtained without injury to the farm. Spread a cask of unslaked lime on such a spot, then cover it with turf or vegetable mould, and so on alternate layers of turf and lime till the heap is raised three or four feet, or until the turf or good vegetable mould within reach has been used up. Then select the next best spot for the same operation, and so on till the lime is used up. This is suffered to lie in a heap till the next spring, when the heap is cut down perpendicularly, shovelled into a cart, hauled on to the ground where it is to be applied, dropped in very small heaps, and spread *suantly* (a Yankee word) over the ground which has before been ploughed and harrowed. The precise quantity which good economy would require should be applied to the land has not been ascertained, but I can safely say that from ten to fifteen casks per acre, at from one dollar to one dollar twenty-five cents per cask, prepared and applied as above-stated, would on scarcely any land be an injudicious appropriation of money. The use of lime in this vicinity has been extended yearly, as its good effects have been ascertained. It is believed that lime renders putrescent manure more efficient, when both are applied to the same land.

I have thus hastily answered your inquiries. If you think these remarks of no value, throw them aside, but if you think they will assist any one in the management of his farm you will make such use of them as you think proper.

Yours, &c.

WILLIAM A. HAYES.

P. S. I would remark, that very little wheat is raised in the lower part of the county of York. It is generally destroyed by rust. In the few instances in which I have raised a good crop, the wheat has been sown on very high land. The publication of this fact may induce others to observe whether wheat is generally more likely to escape rust on high ground.

W. A. H.

The two following communications were among those elicited by the queries on marling, stated in the 8th number (page 510) of last volume. The shape in which these are presented, is not that of special and particular answers to the queries, and, in addition, the limited range taken by each correspondent, (and permitted by his limited though valuable experience of results,) forbids the change of form required by the plan of digested information proposed in connexion with the queries; and therefore they cannot be advantageously used in aid of that plan. Nevertheless, the facts furnished are interesting and instructive, and as independent communications, the pieces are of a value of which we would be unwilling to deprive the readers of this journal.

Should any other correspondents than those to whom we are already indebted, attend to our former request on this head, we beg to remind them that unless they give special answers to the queries, (or to such as their experience permits, passing over the others,) their communications cannot be used as part of that plan of furnishing information on this important subject. But any other form of communication, however limited in range, or different in plan, and more agreeable to the writers, will be gladly received and published, as these are, as independent articles.—ED. FAR. REG.

LIMING AND MARLING IN MATHEWS COUNTY.

To the Editor of the Farmers' Register.

Mathews, Virginia, December, 1837.

Your circular letter of last month was received by mail, but it has not been convenient to make a reply until now. You request that the answers may be made in the order of the queries. As the use of marl has been very limited in extent and recent in this county, it may be more desirable to state what little information I have been able to obtain, from experience or observation, in an embodied shape.

I infer from the object of your undertaking, you wish to ascertain the effects of the carbonate of lime, in whatever mode it may be applied to the soil—whether in the form of shell lime, stone lime, or marl. I will therefore proceed to state my experience in the use of lime and marl.

I was, so far as my information extends, the first person who commenced the systematic application of lime to the soil in this county. Some had applied lime carelessly, without knowing its mode of application or its effects, and the consequence invariably was, a too heavy dressing, and the consequent injury sustained therefrom. It had been applied in small quantities from shell kilns or old mortar, and put on the land in the same manner rich earth or dunghill manure would have been applied. Hence, invariably, the spots where the lime had been thus applied, were rendered for some years unproductive, if not absolutely steril. Hence followed the condemnation of lime as a manure. When I commenced the use of it in 1833, I was told by many I should utterly ruin the land wherever I put lime. Marl has not been used by me until the present year. There is no marl in this county, which is accessible for agricultural purposes, except a small part of the county bordering on the Piankatank river. Those who use marl, are consequently under the necessity of transporting it by water from some of the river marl banks. I have this year brought from York river in a vessel between 3,000 and 4,000 bushels of marl, at an expense of 6 cents per bushel when on my landing, which I and two or three of my neighbors contracted with a gentleman on York river to deliver on board vessels at 2 cents per bushel. The freight cost $3\frac{1}{2}$ cents, and the expense of landing half a cent; which will make six cents per bushel. The expense of carting and spreading you have estimated, I think, at about half a cent per bushel. It costs me more than double that sum, as I am careful to have it measured in bushel boxes at measured distances, and spread with great care, so that I do not imagine the expense of applying would fall much short of two cents per bushel. Thus my marl, when put on the soil, stands me near eight cents per bushel. I put on from 100 to 150 bushels per acre. It contains by analysis 67 per cent. of carbonate of lime. One hundred bushels of marl would therefore be equal to sixty-seven of shell lime and 150 bushels to 100 of lime. I cannot state the effects of marl on the soil, as it has not had an opportunity of exhibiting its powers. One of my neighbors, year before last, (1835,) had a load brought from some of the river banks, and applied it to a wheat fallow with good effect. Certainly, his wheat was better than his neighbors', although it was a most unfortunate year to all wheat-growers. As we have so recently begun the use of marl, I cannot say any thing farther of its effects, but may do so at a future time, when they shall be perceived. I suppose there have been about 15,000 or 20,000 bushels of marl brought to this county by water, at an expense according with the foregoing estimate. There have been about 400 acres marled or limed in this county.

Having related all I know of the use of marl in this county, I will proceed to detail my experience in the use of shell lime. I have applied it in various quantities, from 25 to 100 bushels, and from observation, I think on land of common quality, containing some vegetable matter, that 70 bushels is about the proper quantity, although I have perceived as good effects from half the quantity.

My first application of shell lime, was on a fallowed lot of about 10 acres. This lot was very poor. It had been completely exhausted by a wretched cultivation without ditches. It would not have produced a barrel of corn to the acre. To a moiety of this lot, I applied lime at the rate of 100 bushels per acre on the ploughed surface without any other manure, harrowed and sowed rye over the whole lot. As far as the lime extended, the rye was killed as fast as it vegetated. The quantity was too great for the poverty of the land, and for a top-dressing. I saw my error; but my neighbors who had predicted a failure, smiled and said, "I told you so." The next spring I ploughed the land as far as the lime had killed the rye, and sowed oats. It produced a good crop. The rye was scanty. The next year I ploughed the same lot and planted corn. As far as limed, it produced by estimate three barrels of corn, the unlimed moiety not more than a barrel to the acre. After corn, the limed portion was sown in wheat. A little farm-pen manure was scattered lightly as a top-dressing on part of it, the remainder had none. Clover was sown on the wheat in the spring and harrowed in. The wheat was tolerable; about 8 bushels per acre. The clover which followed took well, and produced a pretty good crop. A part of it was cut for food. My neighbors were a little astonished, nay, they were convinced, and from that time has lime been looked upon favorably, and some exertions made to obtain it for manure. This lot laid two years in clover not grazed, was fallowed this fall; the unlimed moiety was marled on the surface (150 bushels per acre,) and manured with stable and farm-pen manure, and the whole lot sown in wheat. It is up, and now looks well. The portion marled did not destroy the wheat as the lime did the rye in the first instance, although the proportion of carbonate of lime was about the same in both cases. It is true the marl had manure with it, which no doubt prevented any injury from that mode of applying it. The lime had no manure to prevent injury from its causticity.

On another lot containing about 15 acres, which had been also reduced to as low a degree as that just described, I applied lime in the following manner. This lot had been permitted to lie two years without cultivation or grazing, and a heavy coat of coarse water-grass had grown up on it. It had been subjected to water, and was much water-sobbed, and very close. It is what is called a 'crawfish soil.' I had the whole lot ploughed up in the latter part of the summer, when the grass on it was yet green, and after being ploughed, I put on about one-fourth of the lot lime at the rate of 70 bushels, on another fourth at the rate of 35 bushels, and on the remainder no lime. The whole lot was planted in corn. As far as the lime went, there was no visible difference in the corn. The land containing 70 bushels produced no better than that which had only 35 bushels of lime. But up to the line where the lime ceased, the difference could be seen in the corn. That limed was estimated to produce three barrels, that not limed one barrel and a half of corn. Let us now see how the cost would stand. I purchased this lime from persons whom I employed to collect shells, burn them into lime, and deliver it at my landing at 10 cents per bushel; the cost therefore per acre would be as follows:

70 bushels lime at 10 cts. per bushel,	\$7,00
Carting and spreading, say 2 cts.,	1,40
Whole expense per acre,	\$8,40
Difference of product between the limed and unlimed:	
$1\frac{1}{2}$ barrels corn at \$4,50,	\$6,75
Balance of cost for the first year,	\$1,65

The next year the same lot was put in oats—the limed was doubly as good as the unlimed, and more than paid the balance due from the expense of liming. If the calculation be made at 35 bushels of lime per acre, a profit would accrue the first year as follows:

35 bushels lime at 10 cts.,	\$3,50
Carting and spreading, 2 cts.,	70
Expense per acre,	\$4,20
Difference of product between the limed and unlimed:	
$1\frac{1}{2}$ barrels corn at \$4.50 per barrel,	\$6,75
Profit per acre,	\$2,55

From this statement, the conclusion may be drawn, that the smaller quantity is as beneficial to the first crop as a greater; but it would require a speedier repetition of the lime, and I do not doubt the larger dressing will effect a greater ultimate improvement of the soil.

My observation of the effects of carbonate of lime, has in no instance discovered any thing contradictory of the positions laid down in your 'Essay on Calcareous Manures;' on the contrary, so far as they have extended, have been confirmatory. It has confirmed the facts: 1st, That where lime is applied sorrel will disappear. My land, where lime was put, had been very subject to the growth of sorrel. It was a cold, compact, sour soil, but becomes more open, puts up a different growth of grass; and I noticed on a lot partly limed and partly not, that the cows, when permitted to graze it, would invariably go to that part which had been limed; thus showing that a sweeter and more nutritious grass grew on it. 2d, That lime renders land fit for wheat which had not been before adapted to that grain. I have cultivated wheat with success upon land which had never been considered adapted to wheat, and had never produced that grain until lime was applied. 3d, That it causes clover to grow luxuriantly on land that would not previously produce it. Here I would remark, that I have been strongly impressed with the conviction, that your views of the action of gypsum on land after liming, are correct. I never could believe the old opinion, that the sea air operated to prevent the action of this powerful manure. Your view is more reasonable and philosophical. I had used gypsum on some of the same land now limed, before it had been limed, without perceiving the least benefit. It is my intention next spring to try it again on the same land. The results I may perhaps communicate, as I look upon it as a matter of great importance to all who design to lime or marl their lands.

WM. SHULTICE.

MARLING IN QUEEN ANNE COUNTY, MD.

To the Editor of the Farmers' Register.

Wye, Queen Anne County, Md.,
10th December, 1837.

I observe your queries in the last number of the Register, and wish I could answer them, or some of them, with accuracy to satisfy myself. I commenced the application of marl in 1824, with but little knowledge of its action, and have kept no memoranda. About the same time, I began the use of marsh mud, and found its immediate effects so much more productive, that the marl was neglected. In the year 1833, your book on Calcareous Manures was recommended to me by the late Col. Edward Floyd of Talbot. Your views on the subject have induced me to turn my attention principally to marl, for improvement of my lands. From two fields of about 45 acres each, marled for the most part since that time, and an intervening crop of clover, I gathered this year six hundred barrels of corn, and it is not in my recollection that they ever before produced more than four hundred; a small quantity of putrescent manure being carried out as usual. My marl is blue, mixed with sand, and our geologist, Dr. Ducatel, states it at 45 and 50 parts of shell. I applied 500 bushels to the acre.

WM. CARMICHAEL.

FARM REPORTS:

III.—*Netherby, Cumberland, (England.)*

MANAGEMENT OF THE HOME FARM.

The management of the Park of Netherby, the extent of which is upwards of twelve hundred and ninety statute acres, (independent of the woods surrounding and interspersed through the grounds,) comprehends the practical detail of a large grass and arable farm, managed on principles suited to the climate and local situation of the country, and occupied by the proprietor, not only with a view to the permanent improvement of the lands, but also to securing the largest return possible from them.

The detail is conducted by an active overseer or bailiff from one of the best-managed agricultural districts of Scotland.

The establishment consists of four regular ploughmen, each having the charge of a pair of horses; a steady elderly person, who has the charge of the granaries, and who superintends the field operations of hand-hoeing, reaping, &c.; and a park-keeper, who acts in the double capacity of superintendent of the whole grazing stock of cattle and sheep, and as butcher to the family. There is, besides, a person whose sole business it is to attend to the open and close draining of the lands about to be described, and whose services are of much consequence towards their good management. All these under servants have been very carefully selected. The female part of the establishment consists of a dairy-maid and an assistant in the cow-house. The establishment is so arranged that all hands are fully employed. All extra labor required at hay and corn harvest, and in hand-hoeing the various crops, &c. is very readily commanded from the adjoining market town of Longtown. Every account and payment incident to this establishment is kept by the overseer, and is regularly audited and settled by the agent once a month; and a copy of the monthly account is duly put into the proprietor's hands, who is thus enabled to have the real situation of his farming matters constantly under his eye.

Extra work, such as mowing, draining &c. is let by contract to laborers.

Description.—The management about to be described extends, as already mentioned, over about twelve hundred and ninety acres. The soils are of various descriptions, and consist of the following general divisions:

1st. On the banks of the river Esk, which cuts the grounds into two portions, the soil is a loamy clay on a porous bottom, and very various in point of quality, as is generally the case with all lands whose formation is the deposite or washings down of lands situated at a higher level. These lands are under permanent pasture.

2d. A mossy soil of no great extent, but of considerable depth, incumbent on clay, now irrigated meadow land.

3d. Gravelly soil, on an open bottom of gravel, technically called a rusty gravel, held in pasture or alternate husbandry; and,

4th. A clay soil of various qualities on a close till or stubborn clay subsoil, unsuited to constant pasturage, and therefore kept in alternate husbandry.

The lands consist of about 480 acres loamy clay, $28\frac{1}{2}$ acres meadow, 320 acres gravel, and 462 acres clay soils.

The aspect is generally flat, but with a gentle undulating surface, and with a moderate inclination from the river which runs through the lands in a direction from N. E. to S. W. The whole lands lie compact and in a ring fence, and form together a very beautiful park, equal to any in the north of England, not only in point of appearance, but in real value, while these lands do not lie at more than from 70 to 120 feet above the level of the Solway Frith. The management of each kind of soil being different, requires a distinct and particular description, as will be found in the following account.

The farm buildings at Crofthead stand very nearly in the centre of the grounds, which has been found of great advantage in their management.

Longtown.—A considerable market town, containing from 1800 to 2000 souls, through which the great road from Edinburgh to London by Carlisle passes, is situated at the S. W. angle of these lands.

No manure can be procured here except what is produced on the farm, in the farm-yards at Crofthead, and what is purchased at Longtown. Of the last—as the farmers in the neighborhood procure all they can—no great quantity of manure can be obtained. There is abundance of lime, however, to be got within four miles, at a price averaging about 3*s.* per single cart-load at the lime-kilns, or 4*d.* per imperial bushel. No chalk, clay, or shell marl is found in the neighborhood, and the chief dependence is on dung and compost made on the lands, and lime as already stated.

Turnips are indeed consumed on the lands, where the soil is dry, by sheep.

A trial is just now in progress of using bone dust, as a manure for the production of turnips; and if it succeeds, as is expected, this assistant will be much used here in future.

Draining.—The first operation of management has been *in every case* to ensure a complete under-drainage, to relieve the lands from the springs by which they were surcharged, as well as attending closely to open draining. The improvement of close draining has been most effectually done by tiles manufactured on the estate, at a distance of about three miles, and in the same manner as is practised in Staffordshire and Warwickshire. Many hundred roods of drains have been executed in this way, and with complete success. The open draining has also been a point of paramount consideration. The ditches, or main drains, have always invariably been cut out to the proper level, so as readily and freely to discharge the water delivered into them. The sides are carefully sloped back by the spade, so as to discharge the water from the ridges; and the earth so cut away, as well as all high head-ridges have been in every case most carefully mixed up with lime, repeatedly turned over at proper intervals, and, lastly, applied as a rich compost in top-dressing the adjoining lands, after being depastured for the first two or three years. It is very surprising that sloping in the sides of main drains, and open ditches, which is a means of providing an ample supply of rich manure in thousands of cases, is almost invariably neglected by the practical farmer; and that he should equally neglect to remove the high head-ridges existing in almost every field (occasioned by the repeated use of the plough), which would be the means of enriching the adjoining lands at an inconsiderable expense. This, with ditch and road scrapings, and every possible means of increasing the quantity of putrescent manure, have been closely and successfully attended to here, and with great success; and as the application of compost so collected has been almost in all cases to pasture lands, the effect has been excellent; while the grounds, when broken up for white crops, after being so manured, have —even on very inferior soils—yielded full and fair crops. Indeed the system pursued for a number of years, of turning every particle of soil not required for the production of useful crops, into compost to be applied as a top-dressing to the grass lands has been found very beneficial.

Management of Pasture Lands.—The climate here, in common with the whole west coast of Britain, is rather wet; and considerable quantities of rain fall in Cumberland, in consequence of its proximity to the Atlantic. Dry soils therefore are of the greatest value here, and grass husbandry on many accounts is the most proper and natural for the district.

When lands are well and judiciously laid down to permanent pasture, the expense of their management is at once reduced. The local situation of this part of Cumberland, bordering on Scotland, renders it in a great measure a grazing or cattle-dealing country, and pasture land, of a good quality, is constantly in request, and yields full and fair rents, when let from year to year; or, when farmed in a run of seasons, it produces, either by cattle or sheep, a fair return to the grazier. The greatest part of the cattle and sheep sold in the great Scotch markets, in Galloway, and the north of Ireland, pass through this country to Carlisle, the great point where they change hands.

Old Grass Lands.—Around the house of Netherby a very considerable extent of old grass land exists. This has been completely under-drained; and as it was disposed to produce moss—so as to render the pasturage late in coming to maturity—a very heavy dose of *hot lime* was applied about ten years ago to the whole, with remarkably good effect; for after the first year's application, the moss was eradicated, and the pasture is now unrivalled in the country. The soil alluded to is generally good clay loam on an open bottom.

New Grass Lands.—Whether on light or heavy soils, it has been the constant custom here, in the first place, to lay the lands completely dry by under-draining; then to clean and pulverise the lands completely by summer fallow or green crops; to apply all the putrescent manure that could possibly be produced or purchased at a fair price. On light soils, turnips are consumed, by sheep folded on the grounds; and on clay soils, the turnips, if any are produced, have been regularly consumed in the farm-yards, and the manure so produced has been applied to the ensuing white crop. In all cases, supposing the lands (of whatever description of soil they may consist) to be thoroughly cleaned, the course here has been to sow out to permanent pasture with the *first* white crop, and with the following variety of pasture seeds, *viz.*

If Clay Lands,

Timothy Grass - - -	Pleum pratense.
Pacey's Ryegrass - -	Solium perenne.
Red Clover - - - -	Trifolium pratense.
White Clover - - -	Trifolium repens.

If Light Dry Soils,

Pacey's Ryegrass - -	Solium perenne.
Red Clover - - - -	Trifolium pratense.
White Clover - - -	Trifolium repens.
Cocksfoot - - - - -	Dactylis glomerata.
Rib Grass - - - -	Plantago lanceolata.

Hay *is never* taken from lands intended to remain in permanent pasture. These lands, whether heavy or light soils, are constantly depastured with sheep for the first season. If clay lands, the grass is depastured from 1st May to 11th November, and if light soil, from 1st May to 1st March yearly; and no stock of any kind is admitted on either description of soil between the terms mentioned. The second year any ordinary description of stock is admitted. In the course of years it has been found necessary to break up some part of these lands, and to lay them down anew to permanent pasture: the following varieties of pasture seed are now sown and approved of here.

Clay Lands,

Timothy Grass - - -	Pleum pratense.
Cocksfoot - - - - -	Dactylis glomerata.
Meadow Fescue - - -	Festuca pratensis.
Dog's-tail - - - - -	Cynosurus cristatus.
Meadow Cat's-tail - -	Pleum pratense.
Pacey's Perl. Ryegrass	Solium perenne.
Red Clover - - - -	Trifolium pratense
White Clover - - - -	Trifolium repens.

Light Lands,

Timothy Grass - - -	Pleum pratense.
Pacey's Perl. Ryegrass	Solium perenne.
Cocksfoot - - - - -	Dactylis glomerata.
Rib grass - - - - -	Plantago lanceolata.
Dog's-tail - - - - -	Cynosurus cristatus.
Mixed Fescues - - -	Festuca duriuscula, Festuca, pratensis, &c.
Mixed Poas - - - -	Poa pratensis, Poa cerulea, &c.
Red Clover - - - -	Trifolium pratense.
White Clover - - - -	Trifolium repens.

The inferior description of clay lands in particular have been much improved by opening the furrow every autumn, about the month of November, by means of the furrow draining plough—an implement of simple construction, but one that cannot be too well known by the agriculturist. Its object is to cut a furrow slice out of the already existing furrow, 6 or 7 inches deeper, while its mould board, formed of wood, throws this slice 8 or 9 inches clear out on the right-hand side of the plough—thus forming a complete (we may say almost invisible) drain—which lays the land dry, and which discharges all superfluous water through the ensuing winter, while the furrow slice so removed is an addition to the compost heap. This simple implement has been of the greatest use here, and is strongly recommended to all farmers of wet clay lands.

Double Digging or Trenching.—Last year, during the distress of the hand-loom weavers, a large extent of ground of a very stiff clayey nature was trenched by those out of employment, in order to employ them. The deepness trenched was eighteen inches, and the inequalities of the surface were regularly reduced and attended to, and the grounds planted with potato and mangel wurzel, properly drilled and manured. Next year wheat will be sown, and the ground laid down again to permanent pasture.

Irrigated Meadows.—Here there are 18½ acres of water meadow on the ridge or bed system, and about 10½ on what is termed catch-work. It happens unfortunately that the water collected in a brook, descending through the lands to the Esk, is hardly sufficient, except in floods, for the purpose of complete irrigation. But the heavy crops produced even under imperfect watering, leave no doubt, however, of the utility of this branch of agriculture.

There are no other meadows here, and indeed the want of meadow ground is seriously felt over this district. In the general management of the pastures, care is taken to eradiate docks, thistles, &c., from the surface; and moles are destroyed whenever their workings appear.

ROTATION OF CROPS.

The plough rotation followed on these lands has been as follows—on

Gravelly soils.—1. *Turnips.*—Generally Swedes or Aberdeen yellows, consumed on the ground by sheep.
2. *Barley.*—Sown about the middle of April with seeds for pasture: the lands laid generally quite *flat* in the surface.
3. Young grass seeds depastured by sheep; generally ewes and lambs, from 1st May to 1st March.
4. Pasture.
5. Ditto.—Top-dressed this season with compost.
6. Pasture.
7. Pasture.
8. Pasture.
9. Oats out of ley.

Clay lands of the best description.—1. *Summer fallow*, or, if the season is suitable, globe turnips. In either case, the land thoroughly cleaned and manured. Turnips pulled and consumed in the yards by cattle.
2. *Wheat*, sown in autumn; and grass seeds for pasture sown in the succeeding spring: no stock of any kind allowed to depasture these seeds in the ensuing winter.
3. *Young pasture seeds*, depastured by sheep from 1st May to 11th November; but unless the ensuing winter should happen to be particularly dry, no stock admitted after that period.
4. Pasture for the same period.
5. Ditto, ditto.—Top-dressed with lime or compost.
6. Ditto, ditto.
7. Ditto, ditto.

If the lands now begin to show moss, so as to hurt the pastures, and render the grass later in coming to a full bite, they are generally ploughed for oats in the eighth year, about the middle of winter, so as to derive advantage from atmospherical influence, and are ploughed with a strong furrow.

Clays of the second-rate description.—1. *Bare fallow.*—Thoroughly cleaned, limed, and manured; the greatest pains being taken in all cases of clay land in the ploughing, so as to give the ridges a proper shape, to discharge all surface-water from the centre to the furrow.
2. *Wheat*, of the red kind, or oats, sown out with seeds for pasture.
3. *Seeds*, depastured by sheep from 1st May to 11th November.
4. Depastured by any kind of stock from ditto to ditto.
5. Depastured by any kind of stock from 1st May to 11th November. Top-dressed with lime or compost.
6. Ditto, ditto.
7. Ditto, ditto.
8. Oats out of ley.

These various courses of cropping have been found to suit the lands extremely well. The application of lime or compost to the third year's pasture, is a point never overlooked; for it is found to renovate the pasture grasses, and the grounds, after an interval of two or three years, break up in capital condition for oats.

Wheat.—The wheat sown on the best descriptions of soil is invariably the white kind. That most in request for seed is understood to be what is called, in East Lothian, "Hunter's wheat." Wheat, after summer fallow, has always been found of the best quality and greatest weight to the acre; on inferior clays, red wheat is often sown. This variety is certainly well suited to such soils, and often fair average crops are obtained; but it is thicker in the husk, and therefore not so much in request with the corn-factors. The price in the market is generally one shilling per Carlisle bushel under the price of white wheat.*

*A Carlisle bushel is equal to 3 A imperial measure.

Sowing.—The quantity of seed wheat to a statute acre sown broad cast, is from two and a half to three imperial bushels. The usual return, in favorable seasons, may be about from thirty-four to thirty-eight imperial bushels per acre.

Period of sowing.—On summer fallows, wheat is sown about the second week of September; and if wheat is tried after turnips, fed off on the lands by sheep, which is sometimes the case on lighter soils, the sowing being performed during the winter months in proportion as the turnips are consumed.

Tares or vetches—Are seldom or never sown in this district. They answer, however, admirably in this district on fresh soils: they have invariably yielded a very large return of green food for soiling, and have been sown on purpose to be ready to be cut as green food, between the first and second crops of clover. Tares are never made into hay in this district; and indeed from the great quantity of succulent matter they produce, in a variable climate, the process of making them into hay would be attended with much risk and probably little advantage. They are very useful when consumed in summer, in soiling by cattle or horses, and thereby adding greatly to the dunghill—a point of paramount importance, but in no other light is their culture recommended.

Rape.—Rape succeeds here very well on lands in fair condition. An experiment on rather a large scale, was tried about eight years ago, of sowing in the month of July, no less a quantity than 120 acres of land of the first-rate quality—of loam intended for permanent pasture—with rape alone. The ground was previously thoroughly cleaned and limed, the rape and grass seeds sown, and the rape, immediately on arriving at maturity, eat off by sheep. The effect has answered, and the lands in question are the best pasture in the country at this moment.

Turnips.—The turnips sown here are the globe, the Aberdeen yellow, and the Swedish; all these varieties, when the seed is good and fresh, and the proper culture followed, have invariably succeeded here. The globe is consumed first, then the Aberdeen yellow, and lastly the Swedes. A number of other turnip seeds have been tried, such as the tankard, the green round, &c.; but from experience, the three kinds first named are decidedly preferred.

Drill husbandry.—Turnips are always drilled here, and without a single case of failure. The turnip husbandry of East Lothian and Berwickshire is followed from first to last. The crops produced are generally heavy, sound, and good, even on the stiffest description of clays. These crops are either consumed in the farm-yards by cattle, or on the ground by sheep. In eating off turnips by sheep, the practice here has always been at first to confine the flock on an extent calculated to support them fully for one week, and to give them a fresh break once a week afterwards, allowing the flock the range over the first portions of ground allotted to them. Hay, in sheep-haicks or cribs, is given along with turnips; Swedes are undoubtedly a most valuable crop to the farmer, and are the favorite food of all sorts of cattle and sheep. It is the custom in this establishment also to give the working horses, in the winter and spring months, a considerable proportion of Swedes daily; and the effect is to make the animals eat their oats with more avidity, and to render them more fresh, and their coats more glossy. No other crops (potatoes, beans, and mangel wurzel, excepted,) are drilled here. On the light soils, however, there is not the least doubt that all the white crops may be drilled and hand-hoed with the greatest advantage; and it is in contemplation to resort to this mode of culture in future, as the most garden-like management, and as yielding a heavier and better description of grain, while at the same time all annual and other weeds are destroyed. Swedish turnips are sown in the latter end of April or beginning of May; globe and Aberdeen yellows during the first and second weeks of June. It is proper to mention, that the sheep generally fed off by turnips, are the best description of Cheviot wedders from Sutherland, Roxburgh, and Dumfrieshire. Ewes and lambs on turnip, are seldom or ever attempted here. It would be reckoned very slovenly management to allow turnips to sprout in spring; they are always consumed when perfectly sound in the bulb, whether in the yards or in the fields.

Barley.—Barley succeeds turnips which were consumed on the ground by sheep: of course these crops can only follow with advantage in rotation on turnip soils. If the turnips have been properly managed, as already described by the eating them on the ground, the lightest soils will be compactly beat together by the treading of the flock. One furrow on such soils is considered in general sufficient, and the proper time of sowing is from 1st April to 20th May. It is here proper to state, that barley after turnip should be sown *hot furrow*, that is to say, the sower should immediately follow the plough, and the harrow the sower; and probably, if the weather appears to set in droughty, the grass seeds and roller should close the scene behind the harrows. When the process of barley-sowing is conducted in this way, a failure of crops has never taken place here. Pure barley alone is sown; and the old variety, called rough beer or big, seems, with much propriety, to be quite out of fashion in the district. These grounds seldom fail to produce barley of an excellent malting quality; indeed, the vale of the Esk is celebrated for the good quality of its barley crops.

Grass.—Grass never fails to succeed here after barley. If it is intended to cut the grass crop green for soiling, ryegrass, with a large proportion of red clover, and a small proportion of white, are sown. The soils here, from the management described, are generally fresh; and not one single case is remembered where the clover crops have failed altogether on any of these soils.

Ryegrass—As a hay grass, is a very valuable variety; but when land is intended for permanent pasture, or for lying a number of years, ryegrass does not appear to be so well adapted as many other varieties for grazing purposes, and hitherto too much seed of this kind has been sown here on permanent pasture lands.

Fiorin Grass has never been cultivated here. It is probable, however, that practical agriculturists may, in many cases, entertain unfounded prejudices against this grass. A small fiorin meadow, as a trial, is in the progress of being laid out at present.

Sainfoin is never sown in this district, and clover is seldom or never sown without a mixture of grass seeds along with it. One experiment, on good land, of sowing red clover only, succeeded admirably.

Potatoes, under good management by the drill system, never fail here, even on the clay soils. No great quantity, however, is ever grown on this farm, except for the use of the family.

Mangel Wurzel has been cultivated for two or three years. The growing of this esculent is, however, quite new in the district, and is therefore only cautiously attempted at first. The result, hitherto, is favorable, although the Swedish turnip is supposed to be a crop of equal value.

STOCK.

As feeding cattle for the butcher has always formed a principal point in the management of these lands, it is considered a matter of importance to select the breeds likely to arrive soonest at maturity. The pure short-horned breed, selected with care and expense from the stocks of the Messrs. Collins and other celebrated breeders, have long been used here, and on the best description of soils, with success. Various crosses have also been often tried between the short-horned and other breeds, and the result in general has been favorable for the first cross. The second cross produces here by no means so good an animal as the first. The cross between the short-horned and highland breeds produces a very good animal, with every tendency to feed, but of a nature almost as wild and untameable (and sometimes more so) as its highland progenitors. The cross between the short-horned and Ayrshire breeds produces a very good animal, generally well suited for dairy purposes. The cross between the short-horned and polled Galloway breed produces a very excellent animal, possessing, in a great measure, the feeding qualities and best points of the short-horn, and the hardiness and docility of the Galloway cattle. On good lands, this cross is here preferred to any other stock. The pure short-horned cattle are found, after many years' experience, to be rather too tender for the climate, and difficult and expensive to winter.

Galloway cattle are the general stock of the district. They possess many advantages, as they can at any time be brought to market. Their hardy and very healthy habits fit them well for the climate and soils of Cumberland; and although the first cross with the short-horn does produce a good beast, no good breeder would choose to continue his stock from these crosses. Thirty of the best West Highland heifers, and four-score aged Highland black-faced wedders for the family use, along with the Galloway cattle, form the permanent stock on these lands. But from their extent, it is impossible to winter as many cattle as the grounds can summer; and therefore in April and May yearly, a flying stock of cattle, chiefly Galloways and West Highland heifers, are purchased in the local markets on their journey southward, and fed off on these pastures; and it is the custom to have an annual public sale of this flying stock. They are sold in lots, and are generally bought by cattle dealers and butchers. The greatest number are resold again at the great fair of Broughhill in Westmoreland, on the 1st of October. Thus the pastures are completely eased at the proper season, and left rough for the wintering stock, and about this period all accounts are settled, the remaining stocks, crops, &c. valued, and the profits or loss on the whole concern annually struck.

Sheep.—Except the black-faced stock already mentioned, as kept for the consumption of the family, no other sheep are kept, for it has been found that cattle pay much better; pure Leicester and South Downs have been kept as breeding stocks, as well as Cheviot and half-bred sheep, but the result has been to abandon a breeding stock of sheep entirely.

Lambs.—The breeding of lambs for sale to the butcher, has never been followed here, but breeding for a stock has been. The ewes have in every case lambed in the open pastures, and little or no loss has ever ensued from the practice.

In extensive stocks, it is impossible to protect the ewes in the lambing season, from the fall of rain or snow. In very small stocks, sheds for sheep may answer a very good purpose, but it has never been found necessary to provide such protection here. Folding ewes in a confined place in the lambing season, is decidedly an improper mode, and is never practised in this country.

The sheep commonly grazed in the district are the Cheviot breed, but probably the most profitable is the half-bred or cross, between the pure Leicester, and the pure Cheviot; for these possess the stamina or hardy constitution of the Cheviot, with the docile and gentle nature and feeding qualities of the Leicester breed, while the wool is improved by the cross Sheep are seldom laid with tar and butter on these grounds, but otherwise every thing that can conduce to their health and comfort is attended to by a careful person who manages the stock.

Horses.—The farm horses in greatest repute in this district are the rough-legged Clydesdale or Lanarkshire breed. In this establishment, these and the Cleveland horses are generally used. The preference in the reporter's opinion is due to the Cleveland breed, for they are more quick in their movements, and consequently better adapted to light soils than the Clydesdale, which breed, however, is admirably adapted to heavy soils, and are remarkably quiet, and generally possess good constitutions.

Pigs.—This particular district produces great quantities of bacon and hams for the London and Liverpool markets, and the breed of pigs is in consequence a point much attended to. There are different breeds here, but the kind preferred in this establishment is what are provincially called the "prick ears," a well made, short-legged animal of its kind, of a yellowish-white color, averaging, when quite fat, sixteen or seventeen stone of fourteen pounds each. This variety seems of a remarkably sound constitution, and is generally fed off at from twelve to fifteen months old. In this district pigs are allowed a range of pasture, with food in their piggery at regular intervals, and they thrive remarkably when so managed. On this farm, however, they are only allowed the range of the straw-yards. They consume the refuse from the kitchen, aided by potatoes, &c. steamed for their use, and they have always yielded a very fair return.

Management.—Cleanliness, as well in making ready the food as in the piggery, is essentially necessary to promote the health of the animal, and fresh beds of clean straw are regularly given them. A steaming apparatus on the most approved principles for preparing the food of the horses, dairy cows and pigs, has always been used here, and ought to be used on every large farm, but attention should be paid not to give any food more than lukewarm to any stock.

IMPLEMENTS.

Ploughs.—Iron ploughs only are used. The first of the kind was manufactured by Wilkie, of Uddingstone, near Glasgow, but these implements are now regularly made on the best construction, by tradesmen in the neighborhood. They are uniformly drawn by two horses abreast only, and with such ploughs and horses, any kind of soil may be well cultivated. The furrow-cutting plough, described under the head of grass husbandry, may be made by any plough-wright, and is a most useful implement. The number of horses employed in drawing it, depends on the depth of the furrow, and the nature of the soil.

Carts.—Carts with iron axles and two shafts, as commonly used in Lanarkshire, drawn by a single horse, are decidedly the best, and no other kind is used here. In harvest and hay-making, a frame is mounted on the shelvings of such carts for bringing the crops from the fields.

Harrows.—Finlayson's patent harrow is greatly used here for cleaning lands. It is a very useful and excellent implement for such purposes. The common seed harrows are in use on this farm; some of these are made of iron.

Drill Machines.—A machine for sowing turnips by two drills at once is used here, and another machine mounted on a small wheel, and pushed by a man, for sowing grass and clover seeds, is also in use.

Threshing and cleaning the Grain.—At first for many years this was done by a threshing machine driven by horses—latterly, it is altogether done by hand labor and by the flail, and paid for by the bushel of cleaned grain. The expense is probably as cheap by the flail as by the machine, and employment is thus given to the poor, and every purpose required is answered by the present practice.*

MANURE.

No part of rural economy is less understood or attended to than the management of manure; and it would require a treatise on the subject to detail the systems pursued in the best farmed Scotch districts, which are always held as the guide for good management here. It may be shortly stated that all the urine from the stables, yards, cow-houses, piggeries, &c. is carefully conducted by under drains into the dung-pits. The dung collected is carted out during the winter for turnips, and laid up in convenient places for a speedy application to the lands, the instant the season suits for sowing. The middens, or dung-hills, in the fields, are hollowed out in the bottoms, so as to prevent the moisture from escaping, and are regularly covered with mould. The carts are never allowed to pass along the dung-heaps. The manure made in summer, when cattle get green food in the house, is always of better quality than winter-made dung, and is generally applied to the summer fallows. Short dung is unquestionably most suitable for turnips, as in that state it affords no interruption to the plough and drill. Long dung, that is to say, dung not fermented, may be applied to potatoes without any impropriety. The management of compost occupies considerable attention; frequent turnings, and probably twelve months are required to reduce the stubborn lumps of clay often used in the making compost, and turnips are in many cases raised by no other application.

GENERAL CHARACTER OF THE DISTRICT.

The estate, of which the lands here described form a part, consists of an extensive district, in which there is a very considerable quantity of good loamy clay and gravelly soils on the rivers, but by far the greatest portion is clay soil. Horses are regularly bred by almost every farmer, and the dairy husbandry (chiefly in the making of butter) is largely followed. Every person produces a certain number of young cattle as well as fat beasts for market, and large quantities of pork and bacon are produced, besides considerable quantities of wheat, barley, oats and turnips. In this district, where a mixed system of husbandry is followed, from the necessity of attending markets, and from having a considerable intercourse with strangers, the farmers are sharp clear-sighted people, alive and ready to adopt any successful experiment, *after it has succeeded under the proprietor's management.* On this estate, a local farmer society, confined to its bounds, but having three hundred members, has long existed, by whom prizes are yearly awarded to every branch of good management in agricultural matters, and to the various descriptions of stock. The yeomanry thus meet regularly once a year; they hear the management of their farms discussed openly and freely; good managers are praised and rewarded, and indolence and bad management would be ashamed to exhibit themselves. All the good stock of the country is annually shown, and the spirit of emulation is invariably attended with good consequences at the next meeting.

The country is purely agricultural. No man is above his profession, and almost all are possessed of means fully equal to managing their lands in the best style. The country is now enclosed and subdivided into suitably sized fields. Quick hedges of thorn, kept neatly dressed by the pruning knife, are the common fence of the country, and few countries can boast of better hedges than this.

Except along the sides of the great roads, hedge-row trees are not usually seen or planted, and the country where grain is chiefly produced, has been purposely and judiciously left open, to admit a free current of air and sun to the crops, a point of much consequence in bad seasons, and in a climate as damp as this is. This district lies low. It extends from the head of the Solway Frith, rising from the level of the sea, with a very

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* The experience of every other district of the kingdom is contrary to this conclusion. The machine threshes much more cleanly, and it is equally beneficial to the consumer and the farmer, from the facility with which it enables the latter to meet all the changes and exigencies of the market.

gentle general rise for twelve miles, to an altitude of about five or six hundred feet. The district is not subject to any epidemical disease. The people are temperate in their habits, and often attain a great age: pulmonary consumption, however, frequently makes its appearance, particularly in the vales descending towards this open country; and numbers of the youth of both sexes are cut off by this fatal malady.

PLANTING.

The management of plantations is probably foreign to the common operations of the farmer, but the shelter which they afford, render them at all times, and especially in an open district, objects of great moment even to him. Hundreds of acres have been planted on this estate, and the general success has been cheering. Trenching by the spade has never been done here preparatory to planting timber, the scale on which planting has been conducted being far too large to be managed in this way, but the lands have in every case been laid dry by open drains, and in some cases (particularly in planting land covered with short ling) the ground has been ploughed before planting by a plough drawn by four horses. For the first three years, the young trees have not grown so luxuriantly as might be desired, but in the fourth year, and afterwards, they push out vigorously. In every case care has been taken to plant hardwood trees of oak and ash, &c., and at such spaces that they may ultimately become the standard trees; and larch and Scotch fir are, in the meantime, planted as nurses, to be removed according to the necessity of the case. Every variety of tree thrives well on this property, but more particularly on the loamy soils.

CAPITAL AND ACCOUNTS.

Without an adequate capital, good farming cannot be followed. This, however, though a point of first consequence, we fear is often too little considered by the young farmer, and probably by the proprietor in letting his lands. Before letting lands, the proprietor or his agent should, if possible, be thoroughly acquainted with the farmer's means and capital, as well as his general habits and disposition; and if this is insisted on, it will prevent, in many cases, tenants of inadequate capital and bad character from obtaining leases.

Few, or almost no farmers, keep *regular* accounts, and the consequence is they are often in the dark as to the true state of their affairs. A system sufficiently simple and concise might be easily contrived to answer all the ends in view; but, from prejudice or want of habit, it is to be feared the general run of farmers dispense with the keeping regular accounts.

Laborers.—Laborers are easily obtained here, either for piece-work or by the day. Their wages by the day are generally 1*s.* 4*d.* to 1*s.* 6*d.* in summer, and 1*s.* 2*d.* to 1*s.* 4*d.* in winter. These men are bred from infancy to all kinds of agricultural labor, and are generally expert in the use of the spade, scythe, &c. The real good farming laborer here cannot, with justice, be said to be in distress, for he always finds employment; and in this district the laborer has advantages unusual in some other parts of the country. For instance, his fuel costs only his own labor in cutting and preparing the peat; he, in every case, keeps a pig, and sometimes two; and the manure, ashes, &c. his pigs and cottage produce, are readily laid on by the farmers on their fallows for the cottager, who receives one crop of potatoes from his own manure. The great evil is early marriages: young men generally marry before they are twenty, and the females much sooner, and the alarming extent to which bastardy has increased in the country is a most serious evil. No laborers in these parishes possess any little property, such as a cottage and garden of their own. The poor-rates have not increased here for eleven years past, and the county rates are rather less now than at that period. The farm laborers are generally well behaved, cheerful, and obliging; and it is very rare indeed that any of that class ever appear to solicit aid from the parish vestries.

POOR-LAWS.

The lands described are situated in two parishes. The management of the poor-rates is conducted in each parish by a select vestry, under Mr. Sturges Bourne's Act, the rector of the parish acting as chairman. The poor, (chiefly the aged and infirm, and the hand-loom weavers of Longtown, and some small villages in the neighborhood,) have their various cases heard and relieved, and if ever there is an appeal from these vestries to the local magistracy, the case of the applicant is fairly and properly inquired into, and suitable relief afforded. Indeed, there is an evident wish among all parties to do what is fair and just to the poor. The presence of the clergyman in these vestries, however, has no doubt had a great influence in checking any thing improper on the part of the members of vestries.

Assistant Overseer.—Each parish has an assistant overseer, who, besides a regular salary, receives ten per cent. on all moneys he may recover from the fathers of illegitimate children. This is a point of much consequence, for, from the local situation of the district, divided from Scotland by an ideal line, the fathers of such children, from either side of the border, easily escape from the maintenance of their progeny if they are so disposed. These overseers are thoroughly acquainted with their profession, are respectable in their way, have a perfect knowledge of the paupers, and are exceedingly useful in keeping down the poor-rates and seeing the funds properly applied.

CHARACTER OF THE PEASANTRY.

As already remarked, the peasantry are generally civil and obliging in their dispositions, and grateful for the good treatment and kind words they may receive from their masters. It is a truth which constantly strikes the reporter's observation, that however illiterate they may be themselves, the peasants strain every nerve, and often deny themselves many little comforts, in order that their scanty funds may be saved to get their children decent education at the parish schools. It is no uncommon thing for laborers to continue in one master's employment many years, and on this farm of Netherby all the servants have been in their present service for a long period, although their engagements are only from week to week.

Parish schools.—In these two parishes, there are eight endowed schools, at which all the useful braches of common education are taught by schoolmasters appointed by the rector of the parishes: these schools deserve, and do receive every support from all classes of society here, and are indeed a blessing to the country. The many thriving and wealthy merchants and tradesmen of respectability, natives of this district, now settled in London and elsewhere, fully prove the good effects of educating the lower orders, and the example of the good character and the enterprise of the young who leave the district, acts as a spur to push on those left at home to emulation and good conduct.

Means of improving the condition of the peasantry.—Ploughmen cannot be employed by the piece,* but a great portion of agricultural labor may be so done. It has long been the practice on this farm to let every thing possible by the piece, as a matter of justice and propriety, both to the employer and his laborers. This is a most encouraging plan to the industrious peasant, who thus secures the fair return for his labor. Jobs are always let by estimate, but the competition, though fair, is never so very keen as to reduce the prices given too low.

Medical aid.—The family surgeon attends the whole permanent servants of the establishment in cases of bad health, and he receives a regular allowance for his services.

Gardens.—All the permanent servants have small gardens, well kept. These patches are a source of great comfort to the possessor, and a rational amusement at his leisure hours. A few of the ploughmen are allowed to keep a cow each, on paying a very moderate rent for the pasture through summer.

Separate dwellings.—The dwellings of the laborer ought undoubtedly to be separate from each other. This, however, unluckily, is not the case here, for all the permanent servants live under one roof in a large three-story building erected many years ago, near the farm-yard. These people are all respectable in their way, but huddled together as they are, it is not possible to prevent little quarrels and bickerings from breaking out occasionally, where people with families (although each has two separate rooms,) are so congregated. It is in contemplation to remedy this mistake, by erecting separate cottages for the servants.

Residence of the proprietors.—In this district one great proprietor owns the whole, whose residence is constant.

Marriage.—There can be no reason why the laborer should not marry, except that they are too ready to enter into that state when very young, and before they have saved a little money to begin the world with; though as yet, the excess of the agricultural population is not felt as a serious burden in this district, for the country is making rapid strides in improvement, and all good hands find at present ready employment.

Believing that details of real practice are of more use to the cause of rural improvement than theoretical opinions, unsupported by the test of experience, the reporter has confined his observations, as closely as possible, to giving an accurate account of the management of a gentleman's park and farm on a large scale; and he has only further to say, that the profits or returns have been always fair, and such as completely to warrant a communication of the systems pursued.

Glinger Bank, Longtown,
19th July, 1830.

*But for that reason are paid at a higher rate of wages than the ordinary day-laborer.

For the Farmers' Register.

THE MORALS OF MANURING.

Bad health is a good excuse for most of the negligences of man; and it is with grief that I offer you this for not communicating with you more freely. Little now remains to me in life more dear than to give my young friends the benefit of my experience, and show them how to make themselves prosperous, abundant, and happy. Holding, as I do, that the moral power of every community depends upon the facility of man's obtaining subsistence, I assume as undeniable, that he who teaches how ten grains of corn and as many blades of grass can be grown where now but one can be shown, in that very proportion increases the moral power of society. In plain disrobed English, I hold that our duty to Mother Earth is the basis of moral law and moral duty; and disguise it as you may, the facts which sustain me are abroad and "trumpet-tongued." Neglect of this duty has created the necessity of legislating society to death, or into deep disease; but this is mere quackery. Loco-focoism is marking and banding its party, and in the fulness of time it will produce the madness of battle, and, like that of the cats of Kilkenny, nothing but the tails of the combatants will be left. Man is strictly and purely selfish; and he is nothing loath to seek his self-gratifications at every hazard deemed compatible with his safety, or his *probable* safety; else why your court-houses, jails, whipping-posts and penitentiaries? not forgetting that summary contrivance with which Haman was wont to remove Mordecai from the king's gate? Disguise it as you may, neglect of duty to dear old Mother Earth, to "till and dress her" faithfully, has hatched and now feeds those necessary Vampyres. Nor is this all. Look back upon the whole history of man, and hatred of labor and self-gratification are his ruling passions. He has not always been cannibal; but let self-gratification make it necessary, and he has been ever found ready to take the blood of his fellow, or make him his servant. If, in the beginning, Moses had taught that to "till the earth and dress it" was a paramount duty, divers other commandments would never have been broken. True it is that he did say "whosoever sheddeth man's blood, of him shall blood be required;" and yet we learn that more than ten times the number now living have been slain for the gratification of the selfish purposes of others. If it be the duty of man to till the earth and dress it, and we show him how much self-gratification he will have in the result, surely, though we preach of the resurrection of dead land, we may be heard; for this is the great panacea of church and state. First let the land be made perfectly dry, and lay upon it 50 or 100 bushels of shell or stone lime to the acre, let it lay three months if possible before you plough it for corn, (a shorter time will do,) then harrow down well to close the cracks, and plant in checks or straight lines as may suit the cultivators' fancy, this done coulter the land well, clean the corn with the hoe as soon as it is large enough, passing the cultivator as many as three times in a row five or five and a half feet wide; this keeps the land light and free to the roots of the growing plants, and saves the evaporation of the volatile fertility of the earth; in this way a single horse will well cultivate as much land as will make 100 barrels of corn. For fallow, lime your land in the same manner, and turn it well in May and June, and harrow it down close. After your wheat is thrashed and delivered, throw your land in the desired shape, and keep it clean until seeding time. My life for it, there will be no mistakes; nature never makes any; it is the lazy man who mistakes, and finally cheats himself. I now have a most beautiful field of 100 acres thus prepared, and I am deceived if it be not equal to two crops of clover lay. Let me be understood fully; I take it as granted that every farmer, or every man pretending to be a farmer, makes and applies all the manure he can, his farm affords him a great mass of material, and if he will add to this all the rich earth he can collect, mixing the same with lime, I doubt not he will soon begin to doubt whether he is upon his own miserable tattered estate. I seed my land in clover in February. I think, sir, if I could take you over my fields, you would agree that I was in a fair way to carry out my premises. Court-houses, jails, and penitentiaries, you would see in imagination going into dilapidation, and the very church superseded in half of its moral labors. For why denounce vices that have ceased to exist? Who would practice "coward deceit and ruffian violence," if not urged on by want and envy? From Canada to Mexico we have but one cry, and that is, "stand by your party." If, sir, our fields were covered with abundance, who would dare to raise that cry? Who would dare to raise any cry unfriendly to our beloved country? Where would the wretch hide himself who would dare to declare that "to the victors belong the spoils?" I am no politician, sir, but I stand by my country, and her would I have covered with abundance.

Before I close this, let me say a few words about manure. It is the bread and meat and the money-power of the farmer; without it, he is a poor fellow. Let him therefore keep in mind that as it is his only active capital, his dividends of profits *must* depend upon it. Let him therefore at all opportunities cover his farm-yard with rich earth, and over that apply a good coat of lime; upon this pen his cattle, and so go on through the year, and the quantity he will make will surprise him. If possible let him apply it as surface dressing upon grain or grass; but apply it as he may, it is productive power. Let his motto be "my duty to Mother Earth," and my life for it, dear old Virginia is once more great, patriotic, abundant and happy. Let me say to you, Mr. Editor, that you have no cause to despair; you are acting upon that great and absorbing principle in man, self-love, and you cannot fail.

I bid you farewell, in the name of dear old Mother Earth, whose kindness is only limited by our own acts.

LIME.

Fairfax County, 6th May, 1838.

Extract from the British Farmers' Magazine for April, 1838.

RELATION OF SOILS TO MANURES.

There is an essential difference between sands and sandy loams; the former are greedy of manure, and being almost purely silicious, they decompose it rapidly, and relapse into their original poverty; but loams, though composed of little more than one-tenth of fine aluminous and cretaceous matter, with nine-tenths of silex tinted by oxyd of iron, retain and fix manures; they are pulverizable, reducible to ash fineness, yet cannot be deprived of manure otherwise than by the attractive energy of a vegetable crop. Thus, to borrow the excellent description given of a *naturally* good and rich soil, by an American agricultural chemist:—"After being exhausted by cultivation they will recover their productive power by merely being left to rest for a sufficient time, and receiving the manure made by nature of the weeds and other plants, that grow and die upon the land. * * * The better a soil was at first, the sooner it will recover by these means, or by artificial manuring."

There is one fact which cannot be too strongly impressed upon the purchasers or renters of arable and pasture land, it is this:—that, be the natural quality of the staple what it may, it remains permanently the same! Poor, beggarly land may be glutted with manure, but *that* is evanescent: the more hungry the native earth, the more speedily will it become exhausted. By parity of reason, it may be shown, that *rich land* may be deprived of its decomposable manures, and by a wretched parsimonious management can be prevented from exerting its decomposing powers,—that is, it may be rendered inert and idle, but its native inherent worth can never be depreciated, and hence he who purchases good and sound land, embarks his property on a venture which must be prosperous, if he act upon the principles of a liberal philosophy, which will teach him that *the decomposition of putrescent manures in soil* is brought *about by a mutual energy exerted between the vital principle of the roots*, and the staple *undecomposable native* earths. This energy is not remote from that of the galvanic battery; and when we become more conversant with the powers of electricity and magnetism, we shall feel ourselves proportionally enlightened upon the points, now involved in mystery, connected with the laboration of vegetable aliment. My own mind is satisfied thereon; but, in the absence of incontrovertible evidence, we must wait the progress of further discoveries.

From the British Farmers' Magazine.

USE OF FISH MANURE IN ENGLAND.

The fish which are usually employed as manures, are, 1st, sprats; 2dly, pilchards; 3dly, herrings; 4thly, sticklebacks; 5thly, whale blubber. These are very rich fertilizers; the fleshy or muscular portions abounding in oil. The scales are composed of coagulated albumen and phosphate of lime; the bones are full of oil, and their solid portion is composed of phosphate of lime and carbonate of lime, in different proportions.

Sprats.—In the counties of Essex, Kent, and Suffolk, the use of this manure is very general, although the practice is not of very long standing. The quantity applied per acre varies from 25 to 45 bushels, the poor gravelly soils requiring more than the loamy lands.

They are actually spread by hand, and on winter fallows intended for oats, of which, especially if the summer is not too dry, it produces most luxuriant crops, of a peculiar dark green color, yielding ten or eleven quarters per acre, and that on land of a very second-rate description. The effect of the application, however, remains only for one crop. They produce an equally good result if mixed with earth and suffered to remain and dissolve, for some time, in the heap, before they are carted on the land. In this way they answer exceedingly well for turnips. They are usually obtainable at the rate of from sixpence to eightpence per bushel.

The extent to which this manure is used may be judged by that of the Stow-boat fishery, which is solely devoted to catching fish. Upon this fishery the committee of the House of Commons of the session of 183[?] thus reported—

"This fishery, which prevails principally upon the Kentish, Norfolk, and Essex coasts, has been proved to your committee, to occasion very extensive injury to the spawn and brood of fish. The nets used in it are of a very fine description, so small as not to let a pea pass through, and they enclose not only sprats, but the spawn and young brood of all other kinds of fish, and as these nets are frequently drawn along the ground, and in shallow waters during the breeding season, and in the winter months before the young fish are gone into deeper waters, an immense destruction of the spawn and breed of fish is the inevitable consequence; whilst from the almost unlimited demand for this species of manure for land, and there being a ready sale for all that can be procured, this branch of fishing has greatly increased; and there are at present from four to five hundred boats engaged in Stow-boating on the Kentish coast only, which remain upon the fishing grounds frequently for a week together, not for the purpose of catching sprats or any other fish to be sold as food in the market, but until they have obtained full cargoes of dead fish for the purpose of manuring the land."

The farmers of Essex and Suffolk purchase these fish by thousands of bushels at a time, and carry them in wagons ten or fifteen miles into the inland districts.

Pilchards are extensively employed in Cornwall and Devonshire, both in the fresh and in the salted state. The pilchard is a small fish not larger than a herring; it visits part of the coast of Cornwall and Devon in large shoals, during the months of August and September, and again in November or December.

The refuse fish, which are those principally used by the cultivator, are usually mixed with earth, sea-sand, sea-weed, or some other substance, to prevent them from causing too rank a growth. The effects of these pilchards, according to Sir H. Davy, are apparent for several years.

The pilchard is a very oily fish, and may be had in almost inexhaustible quantities. Between eight and nine thousand persons, at sea and on shore, are employed in this fishery, and about 30,000 hogsheads are annually exported either to the West Indies or the Mediterranean.

The Herring.—The employment of this valuable fish for the purpose of manuring the ground is limited to those districts near the sea, to which the shoals of herrings are regularly visitors, and even there, their use is confined to those seasons in which there is an unusual glut, as occasionally happens on the coasts of Scotland and the eastern side of England. They are a very oily fish, and produce the same rank luxuriance of growth as sprats or pilchards.

The celebrated Arthur Young has given us an account of an experiment, in which some wheat, manured with these fish, grew so luxuriantly that it was entirely laid before the period of harvest.

Very numerous or accurate comparative experiments with this fish can hardly be expected, for its use must necessarily be confined to peculiar districts; and when obtained, it is generally ploughed in with considerable expedition, or dug into earth heaps, which is a mode found to answer extremely well.

Sticklebacks.—The use of the stickleback is principally confined to the neighborhood of the Fens of Lincolnshire and Cambridge, in which it breeds with great rapidity, and in whose shallow waters they are caught at certain seasons, specially as an article for manure. They are used in much the same proportions, either by themselves or mixed with earth, &c., as sprats, and are not more durable in their good effects.

The fat or blubber of the whale.—Whale blubber was employed by the late Lord Somerville, at his farm at Fairmile, in Surry, as a manure, and produced the richest crops. Its general high price, however, rarely admits of its employment by the farmer. It was mixed with the sandy earth, and suffered to dissolve in the heap. It cost, at the wharf in London, 20s., and, with the expenses of carriage, cost his lordship about £2 per ton. It answered equally well upon arable and pasture lands, producing most luxuriant crops; and its good effects were visible for two or three years.

Whale blubber is composed principally of train oil and other animal matters; but the oil is by far the largest portion of the blubber; and to the presence of this fish oil, which does not appear to differ materially in composition, from whatever fish it is obtained, must be attributed the chief fertilizing value of all fish.

Train oil has been analyzed by Dr. Thomson. He found in 100 parts—

Carbon	-	-	68.87	
Hydrogen	-	-	16.10	
Oxygen	-	-	15.03	
				100.00

Spermaceti oil, according to Dr. Ure, contains in 100 parts—

Carbon	-	-	78.00	
Hydrogen	-	-	11.80	
Oxygen	-	-	10.20	
				100.00

Fish oils, therefore, are composed of exactly the same substances that constitute almost all vegetable substances, differing only in the proportions for sugar, starch, gluten, gum, &c., &c., which are all composed of these three substances—carbon, hydrogen, and oxygen; blubber, therefore, may be regarded as the most condensed manure that it is possible to apply to a soil: it contains little, if any, water, and every portion of it is a food for plants.

The same remarks will apply to the dregs of train oil, &c., which are sometimes applied; mixed with earth, to the same purpose; but it is seldom that these substances can be procured in any quantity, at a sufficiently reasonable rate.

Some farmers may possibly doubt the correctness of my assertion, that all the principal vegetable substances are composed of precisely the same ingredients as oil and other purely animal matters; and as it is of the first importance that the cultivator should clearly understand the reason why the decomposition of animal matters furnishes such admirable food for vegetation, I must beg of him to compare the analysis of the oils which I have already stated with that of the following common vegetable substances, as ascertained by the most careful analysis; and, not to be tedious, I will merely give that of three substances:—

1. Sugar, 100 parts of which are composed of—

Oxygen	$51\frac{1}{2}$	parts.
Carbon	$41\frac{1}{2}$	"
Hydrogen	7	"
	100	

2. In 100 parts of starch from wheat flour are found—

Oxygen	$49\frac{1}{2}$	parts.
Carbon	$43\frac{1}{2}$	"
Hydrogen	7	"
	100	

3. The wood of oak is composed of—

Oxygen	$42\frac{1}{4}$	parts.
Carbon	52	"
Hydrogen	$5\frac{3}{4}$	"
	100	

All oily and other animal substances, therefore, as they putrefy in the soil, are slowly converted into those gaseous substances which are the food or breath of vegetable life, such as carbonic acid, gas (fixed air) or carbonated hydrogen (the gas employed for illumination), and which are absorbed either by the roots or the leaves of the plant as they are formed. There is little or no waste, in these, for when the decomposition of the oils and fibrous matters of fish is finished, there is very little or no earthy or solid matter remaining, unless in the soil. In this, again, the experience of the farmer substantiates the chemist's doctrines, for he uniformly tells us in answer to our inquiries, that "the fish only last for one crop."

In the east of England the farmers of the soils conveniently situated for water carriage employ to a very considerable extent as manure several kinds of fish besides sprats, such as five fingers, cockles, muscles, &c., and this use is only limited by the supply, or what is commonly a more important impediment, the difficulty of transporting them any distance while sufficiently fresh.

When once the fish begin to putrefy, their fertilizing properties rapidly diminish; the oil from the fermenting sprats I have seen dripping from the wagons as they travelled along; thus they speedily lose in weight, and become intolerably obnoxious to the district through which they pass; several convictions have, indeed, taken place among my neighbors in Essex, for carrying putrefying fish through towns and populous villages.

This is hardly a matter of astonishment, since the farmer who has to convey a freight of several hundred bushels of sprats, perhaps ten or twelve miles, has often much too little time allowed him for that purpose. The fish perhaps arrive stale. Is a load detained by contrary winds, or prevented by circumstances from reaching another destination, the farmer has to be informed of their arrival, cannot despatch his teams as speedily as the nature of the case requires, the fish become offensive, and his ardor for the improvement of his land is checked by a magistrate's summons and a conviction for a nuisance. These are the reasons which retard the use of these kinds of fish as manure, but cannot entirely prevent their being employed. Their use is still, in spite of all impediments, annually increasing, especially in the neighborhood of those places to which the fishing smacks find a ready access.

By the general formation of railroads, the cultivator even of the inland soils of England will have all these valuable sources of improvement offered for his service—fertilizers of even national interest, since they are drawn from an inexhaustible source, afford employment to a branch of industry invaluable in a maritime point of view, as a nursery for seamen, and have, moreover, this great and paramount advantage, that they add to the permanent riches of the land, and are not, as is the case with other fertilizers, drawn from one district of the state to enrich another. There need be no fear of the supply not keeping pace with the demand, for the ocean is inexhaustibly tenanted with fish. As fresh agricultural markets arise and are satisfied bythe railways, fresh sources of supply will be discovered, other coasts explored, and increased fisheries established.

From Miseries and Beauties of Ireland.

THE PRICE OF RENTS, AND OF THE TENANTS' "GOOD WILL" IN IRELAND.

"The circumstance that would strike an Englishman as most remarkable on first investigating the agriculture of Ireland, is the enormous price given for the tenant-right or good-will of a farm, in addition to a full and sufficient rent. Ten pounds per Irish acre is no unusual price. This cripples the farmer, and keeps him in debt as long as he lives. Nor is the practice confined to farms held under lease; those held from year to year are purchased; and, if belonging to a kind landlord, fetch nearly as much as those held on lease, though the tenant is liable to be turned off whenever the landlord chooses. Such is the confiding disposition of these people, when the conduct of the landlord, whatever be his politics or religion, is regulated by honorable principles. This confidence in their superiors is one amongst many proofs of the docility of the Irish people, and the ease with which they may be governed. I was anxious to ascertain how these farmers, always poor and in debt, could possibly raise the money to buy the farms. This I never got satisfactorily answered, and I believe they scarcely know. Some go to England and earn money by trading, shearing, and other work. They borrow the greatest part by becoming sureties for each other; in this they exhibit great kindness. Under this system of paying tenant-right, the landlord has always security for his rent, even supposing the stock to be driven off, because he would take advantage of the property which the tenant had in the farm, and the new tenant always pays the arrears of rent, the balance only being paid to the off-going tenant. It has also naturally induced the tenant to consider that he has a beneficial interest in the farm; the practice, by long usage having assumed the character of a right—so much so, indeed, that in some places, (the county of Donegal, for instance,) a tenant, I am told, sells his interest in his farm in spite of his landlord. A father leaves it by will to his children, or gives it whenever he pleases, and it passes by will like real property. This may account for the peculiar hardships the people feel, and the way in which they prosecute their revenge against the landlord, or his steward, and the incoming tenant. In many parts of Ireland the difficulty consists not so much in dispossessing the present tenant, as in securing peaceable possession for his successor."—Vol. i, pp. 84—86.

"Small farmers pay their rent in money; laborers generally in labor. The competition for small holdings, single acres, &c., causes the tenantry to bid any thing in order to get in. 'If a farm of five or ten acres,' said Thomas Rogan, 'were vacant in the barony, there would be dozens of bidders for it.' This witness occupied a farm of three acres and three roods Irish, for some of which he paid £1 5*s.* per acre, and for more of it £3. 'If you were going away,' he was asked, 'what would you expect for the land?' 'I dont think I'd leave it under £60 or £70,' was his answer. Mr. Trotter, one of the witnesses, had known £170 to be given for a farm of Lord Downshire's, at Ballykanly. The land was six acres, at a rent of £2. 2*s.* per acre; this value was set upon it, not because it was building ground—it was a common farm. The same witness stated a case where £100 per acre was given for six acres (Irish measure) paying 10*s.* 6*d.* an acre rent; this, however, was in the war time.

"When the tenant gets a year or two in arrear, the landlord, instead of ejecting him, allows him to sell his 'good will,' on condition that so much of the purchase-money as will clear the arrear be given to himself. Of those thus got rid of, some, said Mr. Gracey, go to America; but the majority repair to towns with the remainder of the money, and set up business—generally a public-house. It did not appear from any of the witnesses that a single penny of rents is reduced in case of a hard year; and yet it seemed that the anxiety to obtain land, even at a high rent, increases, as the means of paying the rent diminishes. From all that could be ascertained, the farmers now give every thing towards the rent, except a bare subsistence. 'People, in fact, are mad after land, and in the bargains respecting it, the landlord is sure to be on the winning side.' It was stated however, that Lord Bangor, in letting some ground lately, refused the rents that were offered. He sent out his valuator, and though several offered considerably above the valuation, his lordship did not accept of any advance upon it. The witness who furnished this information stated also, that rents in general were increasing; that the average in the vicinity of Strangford was about 25*s.* per Irish acre; the cess 4*s.* per acre; and the tithe, 2*s.* 6*d.*

"The average extent of farms is about twenty acres Irish; there are very few exceeding one hundred acres. The size of the holdings has rather increased than otherwise. According to the statement of Lieutenant Martin, there is only one dairy farm, properly so called, in the barony. Those proprietors who have attempted to enlarge their farms have incurred considerable odium; the farmers would as soon part with their lives as with their farms. When a man is in arrear, the landlord causes him to sell his farm, and is anxious that some adjoining farmers should purchase: this was stated to be the usual course. 'I myself,' said one of the witnesses, 'commenced the world on seven acres, but by hard labor and care I have purchased up to forty-one now.' 'One of my neighbors,' said Mr. Gracey, 'began on nine acres, and by strong industry he has purchased £600 worth of land.' All the farmers agreed that if a farm of fifty acres were divided into five farms, more would be produced than if the whole were in the occupation of one man: more care and labor can be devoted to it. There is a wonderful competition for farms of all sizes, of which Captain Saunders gave us an instance. 'A tenant of Major Beauclerk's,' said he, 'some time ago bought ten acres in addition to his own farm of forty, at a very high rate. I told him at the time it would be his ruin, because he had to borrow some of the purchase-money; and so it turned out. He came to me the other day, wanting to sell it again, in order to pay up his arrear: and what do you think he was offered for it? A neighboring tenant offered £200 for his 'good will;' for the ten Irish acres are out of lease. But I refused to permit the bargain to be completed, knowing that it would only break the other man, inasmuch as he also would have to borrow most of the purchase-money. I only consented to the sale on condition that the purchase-money should not exceed £50. The ten acres paid a rent of £2 2*s.* an acre.' "—Vol. i, pp. 113—118.

Extract from the Rev. H. Colman's Report on Spring Wheat.

MANURES FOR WHEAT.

Land among us can seldom be found too rich for wheat; but the enriching manures may be applied in too great quantities; or in an improper condition; or at an improper time. The feeding of plants is as imperfectly understood as the feeding of animals. As with animals, so with plants, we know that they cannot live without food, and their vigor and fruitfulness depend much upon the quantity and quality of their food. But how it is taken up, and by what means elaborated and distributed, remain as yet, in a great degree, among the deep secrets of nature.

Manures are of two kinds; putrescent, animal, or such as are supposed to furnish directly the food of plants; or active, such as excite either the organs of the plant to receive, or the powers of the earth to prepare, this food to be received, or by themselves educe from the substances, with which they come in contact, the means of sustenance and growth for the vegetables to which they are applied. The former class consists of animal or vegetable substances in a state of putrescence or decay, the latter, of mineral substances capable by their action of rendering these vegetable and animal substances soluble and receivable.

I shall go little into any theory of vegetation or of the operation of manures. Many theories have been framed, but no one so demonstratively established, that none other can be substituted in its place, after farther inquiries shall have made us better acquainted with these mysterious but profoundly interesting operations of nature. Facts established by repeated experiments, are mainly to be relied upon. The application of green and unfermented manures has always been prejudicial to wheat crops. We know that the food of plants cannot be taken up unless it is reduced to extreme fineness or rendered soluble. This is applicable to all plants. If green and unfermented animal or putrescent manure be applied to wheat, it is always advisable to plough it in deeply, so as not to be reached by the roots of the plant until it has undergone some degree of decomposition. If, however, the manure be completely fermented and decomposed, it may then be safely applied, by being spread on the ground and harrowed in. It is desirable, however, in general, that the manure should be applied to the crop which precedes the wheat.

Lime.—The presence of lime in some degree in the soil, seems essential to the growth of wheat, and in a degree to the perfection of any plant. A very minute portion of lime is always found in the wheat plant. Some portion of lime likewise is found, it is believed, in all soils, excepting those composed entirely of decayed vegetable matter like peat, or of pure silex or sand.* In the most productive soils for wheat, lime is found in the form of a carbonate; and the permanent value of a soil for grain crops may be in a degree determined by the presence of lime. In Europe, the analysis of the best soils gives 25 to 30 per cent. of carbonate of lime.† We shall soon be favored with the analysis of the soils of our own state from our learned geological surveyor.

Lime is not however the food of plants. It is not a mere stimulus to the plant. The most reasonable theory is, that it causes the dissolution of other substances in the earth; and prepares them to become the food of plants, or to yield that substance which constitutes their food. As lime itself does not constitute the food of plants, this explains why lime alone does not enrich a poor soil; and why, where it has been applied in excess and without the addition of other manures, it for a time impoverishes a soil.

A new theory of vegetation has been suggested by some distinguished European philosophers, which professes to approach nearer to a solution of this great mystery than has yet been reached. "A new substance has been discovered in all soils and manures, which is denominated *humin* or *geine*. It has been found likewise in all barks; in saw-dust, starch, and sugar. Humin is a substance not unlike carbon, for which it has hitherto been mistaken. It combines with the salts and forms the humic acid. There is a strong analogy between humin and other nutritive substances, such as gum or fecula. It forms a humate with an alkali, which is very soluble in water. All substances which contain carbon, are dissolved in the water of vegetation through the means of humin; and the dissolved mass is taken up by plants as food. Humin in combination with lime, ammonia, or potass, also becomes soluble in soils or dung. Humic acid, and carbonic acid gas, mixed with water, according to this discovery, constitute the chief food of plants. Every description of manure is only valuable in proportion as it contains these substances."

Such is the modern theory of vegetation; which is in itself plausible, but which will be farther tested by the lights of chemical science; from which examination the best results to agriculture are to be expected. Lime causes the evolution or extraction of this matter from various substances. Potash leads to similar results, and with more power than lime and bone manure; and night soil and all animal manures are supposed to furnish humin or geine in abundance. In respect to night soil or human excrement, a discovery has been recently made in France, which promises valuable results. The charcoal procured from burning wood, peat, or coal in close vessels has been mixed with it in the form of a fine powder, which operates to disinfect it of all offensive odor; and reduce it to a powder, which is portable and may be easily distributed. I have seen this process perfecty effected in the course of an hour. Manures in a decomposed and fermented state, are said to supply this humic acid much more abundantly than in a crude or fresh state. In what precise condition they are best applied must be matter of farther inquiry and experiment; and depend somewhat on the mode of their application. If designed to be spread broad-cast and ploughed in, experience seems decidedly in favor of applying them in a green and unfermented state; but it is as well decided that green and unfermented manure should never be brought in immediate contact with the roots of a growing plant.

The rules for the application of lime to the soil, are of more immediate importance to the farmers than any further discussion of the theory of their operation.

Limes are found of various qualities from their different measures of combination with silicious, argillaceous, or magnesian earth. Magnesia is found combined with some of our limestones in considerable quantities, and when in great amount is deemed prejudicial to vegetation. The quality of our various limestones is of great importance; and this will soon be furnished to us by the highest authority. Lime may be applied to soils for two objects. The first to make a permanent change in the nature of the soil, as for example, to render a clayey soil less adhesive, and make it

* Which need not be stated as exceptions, as neither pure silex, or vegetable matter alone, deserves to be called "soil"—to constitute which more than one ingredient is always required.—Ed. Far. Reg.

† And in all our Atlantic States, not one acre in 100,000 has even one per cent. of carbonate of lime. Still Mr. C. is correct in saying that some small portion of lime is in every soil (properly so called)—and a larger proportion is as certainly a part of every *fertile* soil.—Ed. Far. Reg.

friable. In this case, a very abundant application would be required; and at the present prices of lime and of land, would be an experiment not likely to be undertaken by many of our farmers.

The second object is to afford immediate aid to vegetation. In this case, if we had means of reducing the limestone to a fine powder without calcination, it might at once be advantageously applied, and with permanent benefit. This has been done by an intelligent observer in West Stockbridge. He has obtained the ground stone in the form of a fine powder from the mills and shops for sawing and planing marble. The usual form in which lime is to be applied among us, is in a calcined state, and with a view to its immediate effects. In order to apply it advantageously, it must be either air-slaked, or slaked with water. It may be slaked with water in the field, and distributed immediately while warm; or mixed with mould, in the proportion of one bushel of lime to five of mould, and spread in that form; in which latter form it is, perhaps, more likely to be equally diffused. It may be mixed with peat earth; but in this case it should be allowed a considerable time for fermentation, in order to render the vegetable matter of peat soluble, and to extract from it the proper food of plants. But it must not be mixed with animal or putrescent manure. Its effects in such case are to destroy the animal matter, and leave only the woody fibre.

The effects of lime, whether applied in a caustic or an effete state, either air-slaked or water-slaked, are not very different. The heat imparted to the soil by its application when warm, would undoubtedly be to a degree beneficial. It should be applied on the surface of the soil, and merely harrowed in. It has a constant tendency to sink into the soil: and its operation is wanted in the vegetable mould, which is at the surface. In regard to the quantities to be applied, there are great diversities of practice. In England, upon soils comparatively destitute of calcareous matter, from 100 to 600 bushels have been applied; the last quantity, however, with injury to the land for some time. The English consider that 300 bushels are ordinarily a proper dressing for an acre, and this is applied at once; very much larger quantities have been applied, but the advantages of such copious liming are not always a compensation for the expense.

The French, and the Germans, of late especially, have been highly successful in the application of lime. The practice of the former differs from that of English agriculture; but its advantages have been fully tested. They recommend the application of about 12 bushels per year, annually, for three years in succession, or 40 bushels applied at a time once in five years. This is deemed ample. In this case is probably intended 12 bushels of unslaked lime, the bulk of which in the form of a hydrate, or slaked with water, is more than doubled. The plants on an acre will not take up a sixth of this quantity; but much of it is lost by gradually sinking into the soil, or goes to its permanent improvement. The French method rests upon the highest authority of science and actual experiment; and may be commended to our farmers.

Marls, which contain a good proportion of lime, are of great value in ameliorating soils; and operate in improving soils and supplying calcareous matter, though not in the active and immediate manner in which lime operates. Their application, however, is considered by many as preferable to lime. On this subject we want more experience. The Berkshire shell-marls, which have been recently discovered, contain from 80 to 90 per cent. of lime. The operation of shell-marl, or marl containing a large amount of shells in a state of decomposition, is much slower than that of quick lime; but its effects are quite lasting. When applied to heavy soils and soils naturally cold, it enriches vegetation, but does not forward it.

Potash, or vegetable alkali, is stated to be of more value than lime in producing the humin which is deemed the essential food of plants. Some value it at a much higher rate. It has been applied at the rate of from 50 to 100 lbs. to an acre; and, as stated, with great success; but I have no knowledge of any such decisive experiments as would justify me in speaking with confidence of its effects, or the mode of its application. Mr. Williams's great crops of wheat have been assisted by fifty bushels of wood ashes spread to an acre; and a good crop of wheat seldom fails to be obtained on newly cleared and burnt land. The potash is here present in large quantities.

Leeched ashes and soapboilers' waste are esteemed a most valuable manure. A good deal of lime is ordinarily mixed with them; and they abound in vegetable alkaline matter, which is highly favorable to the crop. They should be spread on the surface, and harrowed in. From fifty to one hundred bushels can be safely applied to the land, though few farmers will feel that they can afford the application at the prices at which they are at present held. I have used them with great advantage; and one great advantage from the use of bone manure and ashes is, that they do not introduce weeds into the soil. The farmers on Long Island often import leeched ashes from New England for their wheat lands; and, as they say, with much advantage. They must not be too often repeated on the same land.

Bone Manure, in the form of dust, or small pieces and dust intermixed is a most valuable manure. It contains a large proportion of the phosphate of lime, which has always proved a most efficient aid to vegetation. Forty bushels of crushed bones, or twenty-five bushels of bone dust, to an acre, have been found as efficient as a much larger quantity; and no advantage whatever has come from doubling this amount. Bone dust mixed with ashes has been highly efficacious. The best mode of application is to mix them with mould, or barn-yard compost; and if for grain crops spread and harrow them in lightly; but it is essential that they should undergo a degree of fermentation before they are applied to the land; and that the land to which they are applied should be dry. The lands on which bone manure has been found efficacious have been light, dry, and sandy soils:—upon clayey or heavy soils it has not been useful. If for immediate effect, the bone dust is to be preferred; if for permanent improvement, the crushed bone. At the only mill known in Massachusetts, which is at Roxbury, the manufactured article contains a good deal of the dust intermixed with the crushed bones. It is sold here, we understand, at 35 cents per bushel, and large quantities are on hand to be supplied.

The application of lime, too, should never be made but in dry weather, and when the land is dry; as otherwise it is apt to be formed into a mortar, which is not easy of solution. Lime applied in any form to the land, it is to be remembered, is not an enricher of the soil; and therefore, if lime alone should be applied for a succession of years, and all putrescent or vegetable manures be omitted, the land would be losing instead of advancing in fertility. It is merely a preparer or evolver of the food of plants.

Gypsum has not been found of any apparent value to wheat.

Saltpetre. Another manure, never, we believe, used in this country, from foreign accounts deserves a trial. This is saltpetre. It has been used at the rate of one cwt. to the acre, finely pulverized, and sown broadcast upon the growing crop; and its beneficial effects upon the plant are stated to have been remarkable, especially in its effects upon the straw. It is to be used, however, with caution, as not having been sufficiently tested.

From the American Turf Register.

TAMING WILD HORSES.

Having announced some months since, that the editor of the Turf Register had become possessed of the secret for taming wild horses, some publication of the results of our experiments has been of course expected, and we now proceed with a statement of facts. We must premise, that there is no man who detests quackery in all its forms, or that abhors more thoroughly the witchery of *charms*, then does the writer of this. It was this contempt for empiricism, that kept him for some years from even listening to the reports of 'taming wild horses' in a few minutes, by aid of some secret means; and when the high respectability of the reporters was forced upon him as a voucher for the correctness of the reports, the same feeling compelled him to attribute those wonderful results, to delusion, to the practice of which, respectable men are as liable to become the dupes as any others. At length, a report came from a source which could not be doubted, either on the score of respectability, or the supposition of delusion—the reporter practised with his own hands, and witnessed the results with his own senses, (see Turf Register, vol. viii. page 261, 262, 263, and 500.*) We then determined to obtain the arcanum and try it ourselves. We have done so, and we are convinced. We shall now state a few facts. Having had no opportunity of course to try it on *wild horses*, our experiments have been confined to balky horses, and we have had but three chances even with them, and they were accidentally met with, and of course we were not *duly* prepared. A friend was found in the street with one of his carriage horses refusing to go. It was an old trick of hers, (it was a mare,) and in a ride of two miles, she had stopt several times, laid down in the road, and acted the stubborn and sulky brute in all its characters. When we found him, our friend was stuffing the animal's ears with soft paper; he had whipped the brute till he was tired, the paper was speedily shaken out by the animal. We approached the mare, asked our friend to desist from further efforts, saying the mare would go presently, at the same time applying the arcanum slightly, but not perceptibly to any of the bystanders. In less than ten minutes, I told my friend I thought she would go; he took the reins, she went off handsomely, travelled seven or eight miles out, returned in the evening, and exhibited no more signs of balking. We have not heard whether the animal has balked since; but should not be surprised if it did, as the operation was very slight and imperfect, from our not being properly prepared. The other two cases were both alike precisely, at different times. They were horses with heavy loads of wood on carts at the foot of the long hill in Charles street. We found the drivers whipping and beating them with the but-end of their whips over the head, and the horses in a perfect frenzy from fear. We prevailed on the drivers to rest the horses, put up the shafts, approached gently their heads, patted them, and applied the acranum slightly, (being unprepared.) In about five minutes the horses were perfectly composed, and we then told the drivers to take the reins, and start them, but not to let the horses see the whip. They both started handsomely, went up the hill to the top with perfect ease, and without the slightest symptom of a balk. The crowd of negroes standing around were greatly surprised, and expressed their feelings in loud tones. Now, in relation to all of these cases, it may be said, that the change of treatment from an extremely severe, to a mild and conciliatory course, would naturally produce the same result, and therefore, we are not left to the necessity of attributing it to a cause so mysterious as the pretended arcanum. We confess these were precisely our own reflections almost reduced to conclusions, until we had an opportunity of applying the same treatment *without* the arcanum, which had no effect whatever; and before we could return and supply ourselves with the remedy, the horse had been taken out and sent away. But a gentleman on the Eastern Shore of Maryland, has made four experiments with it, much more satisfactory and important than our own. We shall give the description of them in his own words, premising that there is no gentleman in our state who stands higher in the estimation of good men than he does.

1*st Experiment.*—"I have a horse that had stopt at a particular hill two or three times. In every other respect, perfectly gentle and kind. When I got to the hill the horse halted, I got out, applied the arcanum, gave him the word, and he moved off instantly. It appeared to me, that he went with more spirit afterwards than usual."*

2*d Experiment.*—"My next experiment was on a *bull.* It was for the most part satisfactory. We had to throw a rope around his horns and draw him up forcibly to a post and secure him. For some time pending the operation, he made the most violent efforts at intervals to break loose, but in vain. I discovered that he was pinched severely by the rope about his head, and on relieving him from the pressure, he soon yielded to the influence of the arcanum. A yoke and bow were

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* See Farmers' Register, p. 481, vol. 5.

* This horse balked afterwards with another person. The remedy has not yet been tried on him thoroughly.

placed on his neck and he was put in the shafts of a cart alone, and driven a mile out and back, and was perfectly tractable. The two negroes who had hold of him were perfectly astonished. The following day, however, he became sullen, but was gentle to handle, would go a little way and then fall flat on the ground, but was in no way vicious. The third day he exhibited the same sullenness, and after various means had been resorted to, to move him, some straw was placed along side of him, and fire applied to it; as soon as the blaze reached him, he jumped up and went to work honestly. He has fine spirit, can be approached every where, and handled with perfect gentleness—he never laid down after the firing, and never from the first showed any bad symptoms but the one of being sullen."

3d Experiment.—"The next trial was on a fine four-year-old mule. A partial attempt had been made to break him last summer, but he kicked every thing to pieces, and I determined to wait for the secret. He was exceedingly vicious, and difficult to approach. We finally succeeded in barring him up in a stall, and getting a bridle on, and securing him properly. The operation commenced by very slow degrees and great caution. He twice got over the bars of the stall with two powerful men holding on to him. You will understand, that his position was reversed, his rump was against the manger, and two bars were put across the stall, resting against the post, the upper bar as high as the top of his back, and to my astonishment he got over, but did not get loose. It was a long time before the arcanum took effect, and I had absolutely begun to despair. A violent storm of wind and rain came on during the operation, and I was much troubled what to do; but just as the rain abated, he began to yield; we could then handle him any where; the gear was put on him, he was led out and put in the shafts of a light cart, the wind blowing terribly, he moved off finely, was driven out several miles and back; taken out, fed, and after dinner, eight or ten light loads of manure were hauled by him. He is true to the draft, has prodigious spirit, and works well in a cart; he has, however, kicked a few times. This mule could probably never have been subdued by the ordinary methods."

4th Experiment.—"I broke another mule of the same age as the above, this evening, with about one-fourth part as much of the arcanum as was used on the preceding."

It is proper to remark, that the same gentleman tried the remedy on a fine blooded mare last winter, and failed to produce any effect, or if any, very slight. But believing that circumstances prevented a full and fair trial, the report of her case is deferred until another effort is made.

In relation to the experiments above reported it is also proper to explain that the sullenness of the bull might probably have been overcome by the application of the arcanum, though the firing was equally as easily applied. As to the prolonged and tedious operation on the mule, in the third experiment, the cause is perfectly apparent to us, and we were surprised that it did not occur to the very intelligent operator. It was the violent *wind.* We cannot with propriety explain the *modus operandi* of this cause in this place, but it will be perfectly plain when suggested to those in possession of the arcanum. The weather should always be perfectly calm during the operation, or the animal should be placed in a stable perfectly closed against its effects. It was not, we think, the devilishness of the animal, that resisted such persevering treatment, but the unfair chance the treatment itself had of being effectual.

Now let us ask all persons acquainted with horses, to examine the above cases candidly, and to refer to the statements of 'Signa,' (above referred to,) and then say whether there is any delusion in the 'secret for taming wild horses.' Next to the evidence of our own senses, is the testimony of reputable men; but we surely cannot resist both. We know the magnitude of the draught we are making upon human credulity; but are we not armed with a force that at least authorizes the attempt? We know full well that the present received system of philosophy, will reject even all the testimony we have adduced, because "the why and because" are not developed—because the philosophers cannot trace the effect to the cause, or because an effect is said to be produced by a cause not heretofore recognized! But we will venture to place before them, a still more formidable stumbling block. This singular effect is produced by causes heretofore held by philosophers to be utterly *powerless!* Though they have been known, perhaps, for hundreds of years, and used by millions of people, with the thoughtlessness of thumbing a nosegay, none but the initiated few ever suspected the power of the toys they were playing with. Physicians do not recognize in them any medical effect whatever, (nor are they mentioned in their books,) and yet the writer of this believes them to possess a power over the animal economy, superior to that of any received practice. *How* they operate the writer has not fully made up his mind upon, but he thinks from the few observations he has been able to make, that they effect a complete change in the nervous system, rendering the animal proof against nervous irritation of all kinds.

The most unpleasant circumstance connected with this great remedy is the necessity we are under of keeping it secret. The few persons who possess it, have obtained it under solemn pledges that it should not be published, and paying considerable sums. We have the privilege of communicating it to individuals in our discretion, but not to authorize them to divulge it to others. This circumstance of secrecy gives it the appearance of a speculation, and causes doubts as to its value. As soon, however, as all interested, shall have been *indemnified*; we have hopes of getting the privilege of publishing it, and we pledge ourselves to the public that we shall omit no effort to accomplish the object.

REAPING MACHINE.

The *Mémorial de l'Allier* mentions a very simple and ingenious machine, which had just been examined, the aim of which is an increase of produce to the cultivator, with less labor. Its other advantages are, the simplicity of the mechanism, the facility of construction, and the moderate price (15 francs at most.) Two sickles, seven or eight pieces of wood, some semicircles *(demi-cercles,)* and two yards of cloth, compose the materials. The corn is cut by the play of the sickles in a breadth of 4 ft., and at the desired height. *(L'Echo du Monde Savant, Dec.* 13, 1837.)

From the National Gazette, October 6th, 1836.

TOBACCO TRADE.

It was desired by several of our friends, who are largely interested in the trade of tobacco, that we should endeavor to obtain and forward to them a statement of the exports of that article, and of its various kinds, viz.: Ohio, Kentucky, Maryland, and Virginia, for a series of 15 or 20 years, to enable them to form some opinion as to the probable increase or falling off of the consumption of tobacco, and of the particular description increased or diminished in consumption in particular countries. Such a statement would not only be highly useful to dealers, but also to planters; but there are no data from which it can be compiled, as the records of exports seldom or never designate the description of tobacco exported. In the course of our efforts to obtain the desired information, we became possessed of all the facts relating to the growth and exportation of tobacco which are to be obtained from the records of our own country, and the published documents of others, so far as they were accessible.

A letter of the Governor and Council of Virginia, dated James City, January 20th, 1622, says, "that there was not above 60,000 pounds made in the colony;" but in 1639, only 17 years afterwards, the Grand Assembly passed a law, which recites, that, "Whereas, the excessive quantity of tobacco of late years planted in the colony, has debased the quality," and enacts, "that all the tobacco planted this present year, and the two succeeding years, in the colony of Virginia, be absolutely destroyed and burned, excepting and reserving so much in equal proportion to each planter, as shall make in the whole just the quantity of 120,000 lbs. of tobacco, stripped and smoothed, &c. In consideration whereof, the creditors of the planters were compelled to "accept and receive 40 lbs. of tobacco so stripped and smoothed, in full satisfaction of every 100 lbs. now due them." It is not important to ascertain whether this law was re-enacted at the end of the 3 years named in it; for we find in an official report to the commissioners, that the yearly exports of tobacco for ten years ending in 1709, were 28,868,666 lbs. of which 11,260,659 lbs. were annually consumed in Great Britain, and 17,598,007 lbs. in other countries of Europe. In 1744--1776, the average annual exportation was 40,000,000 lbs., of which 7,000,000 lbs. were consumed in Great Britain, and 33,000,000 lbs. in other European countries. The annual average exportation from 1768 to 1770, both inclusive, was 67,780 hhds. of about 100 lbs. each, or 67,780,000 lbs. As we have now approached the period when the exportation of tobacco arrived at a point from which it has vibrated, (sometimes a little above or below it,) we subjoin a statement of the exportation for the years 1772-1775, inclusive, which will furnish the remarkable fact that (compared with any succeeding four years since that period) the annual exportation of tobacco just before the revolution, was about the same that it has been at any time since, in our most prosperous periods. For although 1790-1792 were three years of very heavy exportations, they fell off in 1793 nearly one half, making the annual average exportation not materially different from 1772-1775;

Statement showing the quantity of tobacco exported from the United Colonies from 1772 *to* 1775 *inclusive.*

Years.	Pounds export'd	Pounds consumed or remaining on hand in Great Britain.	Pounds consumed or remaining on hand in other countries of Europe.
1772	97,799,263	97,791,805	7,458
1773	100,472,007	3,695,564	96,776,443
1774	97,397,252	18,698,337	78,676,915
1775	101,828,617	27,623,451	74,205,166
Tot.	397,497,139	147,809,157	249,665,982

Total exportation for the four years, 397,497,-139 lbs., or an annual average of 99,374,785 lbs. This brings up to the period of the Revolution. The following will exhibit the exportation of the article during that period.

Statement showing the quantity of tobacco exported from the United Colonies, from 1776 *to* 1782, *inclusive.*

Years.	Pounds export'd	Pounds consumed or on hand in Great Britain	Pounds consumed or on haad in other countries of Europe.
1776	14,498,500	*	14,498,500
1777	2,441,214	†	2,441,214
1778	11,961,533	7,520,550	4,440,783
1779	17,155,907	10,982,899	6,173,008
1780	17,424,267	11,474,791	5,950,176
1781	13,339,168	7,600,296	5,738,872
1782	9,828,244	6,364,813	3,463,431
Tot.	86,649,533	43,943,349	42,705,984

Total exportation for the 7 years, 86,649,533 lbs. or an annual average of 12,378,504 lbs. Of the total 7 years' exportation, 33,974,949 lbs. were captured by the British during the war.

The following table exhibits the exports of tobacco from the United States, for the years 1787, 1788, 1789, immediately preceding the adoption of the present constitution.

Statement showing the quantity of tobacco exported from the United States from 1787 *to* 1789, *inclusive.*

Years	Pounds export'd	Pounds consumed or remaining on hand in Great Britain.	Pounds consumed or remaining on hand in other countries of Europe.
1787	99,041,000	45,379,795	44,661,205
1788	88,595,000	39,600,404	48,995,186
1789	88,675,000	48,831,232	39,843,768
Tot.	267,311,000	133,811,431	133,500,159

*This year Great Britain exported to the continent nearly 26,000,000 lbs. of old stock.

†Great Britain exported this year to the continent 6,000,000 lbs. of former stock.

Statement exhibiting the number of hogsheads of tobacco exported from the United States from 1790 to 1835, inclusive, and the average price per pound, and gross value from 1802 to 1835, inclusive. Also the number of pounds of manufactured tobacco and snuff exported from 1791 to 1835, inclusive, and gross value from 1817 to 1835, inclusive.

Years.	No. of hhds. leaf tobacco.	Average price per lb.	Total value.	Manufactured tobacco lbs.	Snuff.	Value of Manufactured Snuff.
*1790	118,460	Average price per lb. not ascertained.	Total value of leaf tobacco unascertained.			
1791	101,272			81,122	Snuff and manufactured tobacco included.	Value unascertained.
1792	112,428			117,874		
1793	59,947			137,784		
1794	72,958			19,370		
1795	61,050			20,263		
1796	69,018			29,181		
1797	58,167			12,805		
1798	68,567			142,269		
1799	96,070			406,076		
1800	78,686			457,713		
1801	103,758			472,282		
1802	77,721	$6\frac{5}{8}$ c	$6,220,000	233,591		
1803	86,291	6	6,230,000	152,415		
1804	83,341	$5\frac{7}{8}$	6,000,000	298,139		
1805	71,251	$7\frac{2}{3}$	6,341,000	428,460		
1806	83,186	$6\frac{1}{4}$	6,572,000	381,733		
†1807	62,236	$7\frac{1}{3}$	5,476,000	274,952		
‡1808	9,576	$7\frac{1}{2}$	838,000	36,332		
1809	53,921	$5\frac{7}{8}$	3,774,000	350,835		
§1810	84,134	5	5,048,000	529,285		
1811	35,828	5	2,150,000	752,553		
‖1812	26,094	5	1,514,000	588,618		
‖1813	5,314	5	319,000	283,512		
‖1814	3,125	$6\frac{1}{4}$	232,000	79,377		
¶1815	85,337	8	8,235,060	1,034,045		
1816	69,241	$15\frac{1}{4}$	12,800,000	576,246		
1817	68,365	$12\frac{1}{3}$	9,230,000	1,115,874	5,080	$281,509
1818	84,337	10	10,241,341	1,486,240	5,513	373,875
1819	69,427	$10\frac{1}{2}$	8,874,167	926,833	13,710	237,192
1820	83,940	8	8,188,188	593,358	4,996	149,589
1821	66,858	$7\frac{1}{4}$	5,798,045	1,332,949	44,552	149,083
1822	83,169	$6\frac{1}{3}$	6,380,020	1,414,424	44,602	157,182
1823	99,009	$5\frac{3}{8}$	6,437,627	1,987,507	36,684	15 ,955
1824	77,883	$5\frac{1}{3}$	5,059,355	2,477,990	45,174	203,789
1825	75,984	$6\frac{7}{8}$	5,287,976	1,871,368	53,920	172,353
1826	64,098	$6\frac{7}{8}$	5,347,208	2,179,774	61,801	210,134
1827	100,025	$5\frac{3}{4}$	6,816,146	2,730,255	45,812	239,024
1828	96,278	$4\frac{3}{4}$	5,480,707	2,637,411	˜5,655	210,747
1829	77,131	$5\frac{5}{8}$	5,185,370	2,619,399	19,509	202,390
1830	83,810	$5\frac{1}{2}$	5,833,112	3,199,151	29,425	246,747
1831	86,718	$4\frac{3}{4}$	4,892,388	3,639,856	27,967	292,475
18 2	106,806	$4\frac{3}{4}$	5,999,769	3,456,071	31,175	295,771
1833	83,153	$5\frac{3}{4}$	4,755,968	3,790,310	13,453	288,973
1834	87,979	$6\frac{1}{4}$	6,595,305	3,956,579	57,826	328,409
1835	94,353	$7\frac{1}{4}$	8,250,577	3,817,854	36,471	357,611

It may be proper to remark, that the weight of a hogshead of tobacco is much greater now than formerly. Originally, tobacco being less compactly pressed, the hogsheads averaged only 600 lbs., but they gradually increased, and in 1770, reached 1,000 lbs. average. At this time Kentucky averages about 1,300 lbs. per hogshead, and the average of all kinds (Kentucky, Virginia, Maryland, and Ohio) we have estimated at 1200 lbs. per hogshead, which we believe to be very nearly right. The annual average exportation for the last 21 years, from 1815 to 1835, inclusive, is within a fraction of 82,760 hogsheads. Taking our estimate of 1,200 lbs. per hogshead to be the true weight, we shall thus have 99,313,000 lbs. as the annual average for the last twenty-one years; and we have seen that the annual average exportation for the four years ending in and including 1775, was 99,374,785 lbs., which establishes the remarkable fact, that the exportation of leaf tobacco has remained stationary for a period of 60 years.

On a careful examination of the foregoing statements, it appears, that when our exports of leaf tobacco, for two or three successive years, much exceed one hundred millions of pounds; for some succeeding years they are proportionably reduced below that standard. It is also evident that the

*French revolution. †Berlin and Milan Decrees. ‡Embargo. § Rambouillet Decree ‖War with Great Britain ¶ Peace.

revolutionary war gave a check to the exportation of leaf tobacco from which it has never recovered; for until that period, as may be seen by reference to the preceding statements, the annual average exportation increased regularly and steadily. It was 37,780,000 lbs. greater for the years 1763 to 1770, than for the years 1744 to 1746; and for the years 1772 to 1775, it was 31,594,785 lbs. more than the annual average for the years 1763 to 1770. In other words, for the 31 years immediately preceding the revolution, our exports of leaf tobacco annually increased very nearly 2,328,000 lbs., and for the 60 years since that period, it has remained stationary, except when interrupted by wars or other commercial embarrassments. The reason is apparent. Before the revolution, all Europe depended on us for supplies of the article; but, being cut off from the supplies, by the war, Europeans turned their attention to growing it for themselves, and have continued to cultivate it all over the continent.

It will be observed that the exportation of manufactured tobacco and snuff has increased more than forty-four fold since 1791, and more than three fold since 1817; but the gross *value* has not proportionably increased, at least since 1817.

From a review of the subject, as above detailed, it will be perceived, that, if it were in our power to furnish a precise statement of the exports of each description of tobacco, and the countries to which it was exported, (although very desirable on many accounts,) it would not furnish satisfactory evidence that the consumption of tobacco generally, or of any particular description, had increased or diminished in Europe, without knowing *what they grow*. as well as *what we export*. We have devoted much labor and attention to this part of the subject; but, although we can learn generally that the production of it in Europe keeps pace with the increased consumption, yet our researches have not enabled us to lay before you any useful statement, either as to the quantity or the qualities grown, except for three years in France, as follows:—

Statement showing the quantity of Tobacco grown in France for the years 1818—1820.

Years.	Kilogrammes.	Pounds.	No. of hhds., estimated at 1,200 lbs. per hhd.
1818	7,418,000	18,545,000	15,454
1819	10,360,000	25,900,000	21,583
1820	13,155,000	32,887,500	27,406

This shows an increased production of nearly double in the three years.

It will strike you with surprise, as it did us, that the consumption of tobacco has increased so much in our own country, as to carry off the very large surplus grown beyond the foreign demand. Formerly, when all the tobacco was grown in Virginia and Maryland, we exported as much as we do now; and now, in addition to those states, which produce nearly, or quite as much as they did then, Ohio, Kentucky and Tennessee, together with Connecticut, Pennsylvania, Indiana and Missouri, produce as much more. We must, therefore, consume more than the quantity repuired for exportation.

Remarks.—If the preceding statements may be relied on as correct, it appears that there has been a very surprising increase of the use of tobacco in this country, and that the annual consumption now amounts to upwards of 100,000,000 lbs.:—giving about 7 lbs. to every man, woman, and child. The sum annually paid by the consumers of this quantity of tobacco in its manufactured state, has been computed by a writer in "The Portsmouth Journal," at $20,000,000.

The following passage is extracted from Dr. Mussey's "Essay on the Influence of Tobacco on Life and Health."—"Eighty thousand dollars' worth of cigars, it was estimated, were consumed in the city of New York in 1810; at that rate, the present annual consumption would amount to more than $200,000. The statement of Dr. Abbot, in his 'Letters from Cuba,' in 1828, is that the consumption of tobacco in that island is immense. The Rev. Mr. Ingersoll, who passed the winter of 1832-3, in Havanna, expresses his belief that this is not an overstatement. He says, 'call the population 120,000; say half are smokers; this, at a bit (i. e. 12½ cents) a day, would make between $7,000 and $8,000. But this is too low an estimate, since not men only, but women and children smoke, and many at a large expense.' He says, that 'the free negro of Cuba appropriates a bit (i. e. 12½ cents) of his daily wages, to increase the cloud of smoke that rises from the city and country.' This, in 30 years, would amount to $7,058 72, a respectable estate for a negro, or even for a white man.

"The Rev. O. Fowler, from considerable attention to the statistics of tobacco consumption in the United States, estimates the annual cost at $10,000,000; time lost by the use of it, at $12,000,000; pauper tax which it occasions, at $3,000,000.

"This estimate, I believe to be considerably below the truth. It has been estimated, that the consumption of tobacco in this country is *eight times* as great as in France, and *three times* as great as in England, in proportion to the population."

According to an estimate given by the editor of the "New York Commercial Advertiser," in a late number of that journal, the cost of the tobacco smoked in the city of New York, is much greater than is stated by Dr. Mussey; but his estimate will probably be thought, by most readers, a great exaggeration. According to the "Commercial Advertiser," 100,000 persons in the city, (about one-third of the whole population,) are supposed to be smokers; and the average cost to each smoker is computed to be ten cents a day—total daily cost, $10,000; and the annual cost, $3,650,000. The annual cost of bread for the inhabitants of the city, allowing thirteen ounces of bread for each person, and computing flour at ten dollars per barrel would amount to $3,493,050. "Thus a little attention to the subject discloses the painful and disgusting fact that in the clear-headed, sharp-sighted, money-making city of New York, the inhabitants pay more for tobacco than they do for bread."

Statement showing the quantity and value of tobacco exported from the United States, from 1832 to 1835, inclusive.

Treasury Department, Register's Office, July 4th, 1836.

To	1832.		1833.		1834.		1835.	
	Hhds.	Value.	Hhds.	Value.	Hhds.	Value.	Hhds.	Value.
Russia,	229	$7,500	8	$1,164	21	$1,966	58	$4,818
Prussia,					10	1,100		
Sweden and Norway,	1,912	117,874	1,965	126,888	2,224	138,279	2,735	255,906
Swedish West Indies,	32	874	8	630	52	3,926	59	6,415
Denmark,	292	21,134	206	16,698	311	23,128	168	23,082
Danish West Indies,	673	43,093	252	16,833	387	34,526	407	40,233
Holland,	24,006	1,115,962	19,022	883,625	19,101	1,012,442	17,730	902,911
Dutch East Indies,								
Dutch West Indies,	331	14,623	253	9,584	183	15,720	264	24,010
Dutch Guiana,			57	2,358	21	1,750	33	2,841
Belgium,			3,224	181,980	1,910	96,575	1,005	66,246
England,	36,176	2,319,596	23,772	2,245,733	30,658	2,937,020	27,563	3,397,415
Scotland,	68	3,783	102	12,159			20	3,224
Ireland,	149	22,071	10	1,305				
British Guiana,					51	3,848	40	4,303
Gibraltar,	2,255	116,612	2,455	153,012	2,312	172,711	2,493	306,281
British East Indies,	56	4,046						
British West Indies,	481	26,799	481	30,360	571	51,117	651	67,190
British Am. Colonies,	361	22,070	521	34,563	345	21,460	430	41,154
Hanse Towns,	27,930	1,192,024	21.408	1,091,436	20,611	1,126,728	27,989	1,539,362
France on the Atlantic,	5,626	662,333	4,670	682,766	4,641	613,952	5,259	743,181
France on the Mediter.	153	7,229	112	9,650	134	9,126	1,053	121,170
French West Indies,	726	49,638	477	25,324	665	53,866	600	62,069
Hayti,	514	28,994	399	26,040	417	34,239	537	55,816
Spain on the Atlantic,	1,095	52,081	489	32,077	857	66,328	1,337	178,387
Spain on the Mediter'n.			46	3,202			155	19,186
Teneriffe, &c.,							50	6,287
Cuba,	256	13,536	177	13,072	378	39,094	568	61,747
Other Span. W. Indies,					22	1,343	73	5,149
Portugal,			130	13,115			352	38,043
Madeira,					24	2,388		
Cape de Verd Islands,	214	14,836	209	15,405	57	5,673	77	8,595
Italy,	738	41,670	804	24,040	301	26,106	820	94,582
Sicily,							25	2,413
Trieste,			14	980	5	612	68	6,752
Turkey, Levant, &c.			172	8,030	4	275	4	400
China,								
Cape of Good Hope,							38	4,845
Mexico,	94	2,712	403	14,354	225	14,095	165	10,976
Honduras,	18	621	5	312	18	1,328	62	3,823
Central Rep. of Amer.	41	1,912	70	1,360	480	8,561	114	8,988
Colombia,	45	2,711	13	1,079	17	1,240	87	8,413
Brazil,	815	10,892	141	8,893	21	1,171	237	22,329
Argentine Republic,	164	9,146	111	6,947	1	44	118	13,847
Chili,	87	5,177	71	3,511	245	15,673	44	3,172
S. America, generally,	2	137	13	773			16	1,707
W. Indies, generally,	153	8,429	67	3,910	133	12,653	99	10,095
Asia, generally,								
Africa, generally,	906	58,883	590	41,791	516	49,906	583	56,457
South Seas,			1	68				
N. W. Coast of Amer.	5	275			2	234		
French African Ports,								
Guernsey, Jersey, &c.	10	496						
Malta,			217	10,891	30	3,006	172	16,557
Bourbon,					18	2,116		
Total,	106,806	5,999,769	83,153	5,755,968	87,979	6,595,305	94,353	8,250,577

For the Farmers' Register.

DEEP PLOUGHING, &c.

The Athenian orator, to whom your Frederic correspondent refers, who esteemed action the first canon in the art of eloquence, had reference to the taste and genius of his own times; such would not have been the answer of the late William Pitt, the prince of orators, in the age in which he lived. Your correspondent considers deep ploughing the first rule in successful agriculture: if his theory had been confined to the Valley of Virginia, I should not feel disposed to question its accuracy. Opinions founded on practical experience are entitled to great respect; but the circumstances upon which they are formed are fair subjects of investigation. I spent some time last summer in that part of Virginia, and I did not remark extraordinary diligence in improvement by lime or putrescent manures, nor did I esteem their agriculture of the highest order; but the fine crops of Indian corn and oats afforded full evidence of the richness of the soil. The cause is now disclosed in the substratum containing a portion of carbonate of lime; and improvements made in Maryland and lower Virginia at large cost, are accomplished in that fortunate valley, (for fortunate I must call it,) by the ordinary operations of cultivation. This property in the soil must give great value to the lands, and fully justifies deep ploughing.

Successful, diligent farmers, who have kept their lands up to a state of moderate product, and have improved their fortunes by thrift and care, not unfrequently speak lightly of knowledge derived from books, and, by way of reproach, call it "book farming;" and they derive support from the fact, that good theoretical writers sometimes fail greatly in their practical illustrations. I do not think it can be justly denied, that books on agriculture have contributed greatly to its improvement. By periodicals the approved experience of one region is communicated to another: I am a debtor to the Farmers' Register, and to the Cultivator; but I have seen some mischief done by confident theorists acting upon limited experience.

About thirty years ago, a farmer of this state published a tract on agriculture. Like your Frederic correspondent, he insisted that deep ploughing was suitable to all soils. He supported his theory by facts, and some plausible reasons: among others, as I recollect, that the old exhausted surface might be turned down to recover, and a fresh soil brought up for production. The scheme was generally condemned by the old and experienced farmers, but found favour with the young and confiding, and the price paid for their credulity was diminished crops and impoverished lands. The late Col. E. Floyd, of Talbot, who had then recently come into possession of his estate, and was full of enterprise, was greatly taken with the plan, and experimented to the full extent of the theory. Many years afterwards, I asked him the result of his deep ploughing: he said it proved a most injurious business, and the lands he had so treated were greatly injured. I do not think your correspondent derives support by his reference to England and Belgium; the extent of marling in those countries has rarely been attained in ours in crop cultivation. By lime, ashes, and other suitable manures, they there make a soil; in ours, we only seek to improve. If one cubic foot of suitable manure be added to three or four cubic feet of soil, it is no great matter whether the soil be sand or clay. In this we are instructed by our garden cultivators; and when the facilities of labor and the prospects of profit offer the same inducements, perhaps we shall plough our lands as deep as they do theirs in the Valley of Virginia.

Successful agriculture has of late become a matter of national consideration; whilst schemers and projectors, under color of increasing the national wealth, have received largely assistance from the general and state governments, no fostering ray has been shed on agriculture. Without any support but what it has derived from its own energies, it has been often embarrassed by the wild and extravagant schemes of the commercial and manufacturing community. The failure of the grain crop for the two last years, and the large European importations, have demonstrated that the present production, in a favorable year, is but little more than sufficient to supply domestic consumption; and when the crop is diminished by an unfavorable season, we must look to foreign countries for supplies. In the event of a war this dependence would be exceedingly precarious. Under the administration of the younger Pitt, in a year of scarcity in England, large quantities of rice were imported from the East Indies, and our old enemy, George the Third, ate potato bread, not as a punishment for his sins, but as a good example to his subjects. The "American system" (falsely so called) was adopted under color of making our country in all things independent of foreign nations; and surely, if the manufactures of cotton, wool, iron, and copper, were entitled to a high protective tariff, bread, the staff of life, demands some consideration. I would not ask from congress a protective tariff; because I think the people of the country have a just claim to articles of necessary consumption at the cheapest rate, and because I think a power imparted to the general government for one distinct, separate object, cannot be lawfully exercised for another; but I do think that a sound and enlightened policy dictates that each state should essay the discovery of its own agricultural resources and capacities. It is little more than thirty years since marl was first discovered in Talbot county; it was then thought peculiar to that region; accident, more than enterprise, has disclosed it in many parts of the Eastern Shore. A geological survey and examination of our state by skilful and faithful agents, I have no doubt, would lead to many important discoveries. I should be much better pleased to see a company of men engaged in this work, at the cost of the state, than a corps of civil engineers surveying railroads, on the borders of our navigable rivers.

In most of the schemes of internal improvement there are two classes of adventurers—a large one who pay their money, and who look for profit in the success of the project, and a small band of choice, adroit spirits, to whom the success or failure of the work is a matter of secondary importance. They count on profit in the progress of the work, in salaries, contracts, and speculating on the fluctuating of the stocks. They fully understand the signs of the times, and in prospect of a sinking concern, sell out, clear themselves, and leave the poor gents at the bottom of the well, to surfeit on bitter waters, which they had represented as exceedingly sweet.

Maryland has embarked millions on the Chesapeake and Ohio canal. The notion of carrying it further than Cumberland, I believe, is now abandoned by the wildest schemers; and remuneration is promised by the company to the state, in the transportation of coal from the Alleghany mountains. Suppose coal mines should be discovered on the waters of the Chesapeake, I apprehend the fires of the Alleghany coal would soon go out. The projectors of this great scheme have started on the hypothesis that no coal is to be found in Maryland but in the Alleghany mountains, and our profound legislature has adopted it. I have never heard that there has ever been any boring for coal in Maryland, excepting by Mr. Richard Caton of Baltimore, who was led by a German to believe there was coal at the head of the Severn, in consequence of a small quantity being found on the shore, which most people thought had floated up the river from a Virginia boat. Mr. Caton is an Englishman, a native, I believe, of Liverpool, and well knows what some of our wise men may hereafter discover, that coal is not confined to the mountain regions. There are many coal-mines in England and Ireland at no great distance from the sea. A remarkable one, at Baristones, was for many years worked with profit under the ocean. The Richmond mines are at no great distance from the tide, and coal is found in the champaign regions of the north. It wound, perhaps, have been a matter of prudent calculation, before Maryland had embarked her fortunes so deeply in the Chesapeake and Ohio canal company, to have ascertained whether coal could not be found in more accessible parts of her territory. Americans are said, by some traveller, to be a people of very ready impulse. They seize a scheme with the same avidity that old Mr. Shandy did a theory, and often run it to the same excess, of which full evidence may be found in the first annual report of the directors of the Eastern Shore railroad company, to which I invite the attention of all persons who desire a short road to Mexico.

I find I have sadly digressed from my subject: I will conclude with a very few words to the Frederic farmer. I entirely concur with him in his preference of horses to mules and oxen, as beasts of the plough. Perhaps the Conestoga is to be preferred in the Valley of Virginia; but in our hard loamy lands, where there is no stone, a pair of fine-blooded horses will plough more in three days, than a pair of Conestoga in four. His objection to the blooded horse is one of my grounds of preference: I like to see him play and gambol, even at the risk of his neck; and I prefer him to the Conestoga, as much as I do a light-hearted, mercurial Virginia yeoman (who, after the labors of the day, sports with his fellows, and indulges his stray joke, at the risk of a broken head,) to a dull, heavy Dutchman, who eats his supper, smokes his pipe, and goes to sleep.

AN EASTERN SHORE FARMER.

Queenstown, Md. May, 1838.

From (Loudon's) London Gardeners' Magazine.

JAUFFRET'S NEW MANURE.

We have in a preceding page (p. 111.*) directed attention to Kimberley's manure, said to be a most extraordinary and valuable discovery; and that of Jauffret seems to be a parallel discovery of the same kind in France. M. Jauffret, it appears from '*l'Ami des Champs*' for December, 1837, died in November last. He was born at Aix, in the neighborhood of Provence, and succeeded to a considerable landed estate there in 1798. In its cultivation, finding a great deficiency of manure, he tried innumerable schemes to increase it, till at last he hit upon a certain liquid, the composition of which remains a secret, except to those who have purchased the patent right; and which, poured upon any description of soil, mixed with organic matter, produces fermentation, and rapid decomposition. The ley *(lessive)* which is poured over the materials to be converted into manure is said to consist of various ingredients, but not to be expensive; two large heaps of materials to be converted into manure not requiring more than may be purchased for about 3s. This manure is said to have been tried in England by H. Handley, Esq., M. P., and found effective; but by others, it is represented as an imposition on the public. We have applied to sources in France which will enable us, we trust, to state something positive respecting it in our next number. In the mean time, our readers may refer to a pamphlet on the subject, of which we have elsewhere given a title. That pamphlet, however, does not give the slightest hint as to the ingredients of the ley.—*Cond.*

* See Farmers' Register, vol. vi., p. 65.

TREATISE ON BONE MANURE,

By Henry Colman, Commissioner for the Agricultural Survey of Massachusetts.

Bones, it is well ascertained, contain in an abundant form the food of plants. They are made up of a large amount of animal substance mixed with earthy and saline matter; and they abound in what chemists call the phosphate of lime, a substance found in some measure in all plants, and a powerful means and instrument of vegetable growth.

Bones have been used as a manure for many years in England. Used in an unbroken state, they were slow in becoming decomposed; and their effects were not very observable. The next attempt was to reduce them by burning; but besides the expense and trouble of doing this, much of the valuable matter contained in them escaped by the operation. Afterwards, mills were invented for crushing or grinding them; and since that time they have been experimented upon in various soils; and are now sought after by intelligent farmers abroad with the greatest avidity. There is no reason why they should not be used to as great advantage among us.

Bones constitute a very efficient manure; a portable manure; and a comparatively cheap manure. Stable manure in Boston and its vicinity costs the farmer in its first purchase, its transportation, and its preparation for the land, not far from five dollars a cord. His land may be manured with bone manure, with equal advantage and for a third of the expense of stable manure; and its actual improvement of the soil will be more permanent.

In England this manure has been principally used for turnips. This is the crop which on their land commonly precedes wheat. The effect on their turnip crop is very great; causing lands to produce a crop, which had been comparatively barren; forwarding the crop several days in advance of that manured with stable manure; and greatly increasing the product. The effects have been most beneficial upon all the succeeding crops of grain and grass. Few decisive experiments have been made as yet in this country; but in one case the last season, where applied to ruta baga growing side by side with a crop manured by stable manure. 25 bushels of bones produced a much better crop than a heavy dressing of barn dung.

They have been used with signal advantage spread upon grass land; the feed being greatly improved, and the return from the stock fed upon it, in milk and butter through the season, very much increased.

Their effects upon the cultivation of wheat, in Great Britain, have been thus stated after careful observation, compared with best stable manure.

"In respect to the quality of the grain, as 7 to 5.
In respect to the quantity, as 5 to 4.
In respect to the durability of its effects on the soil, as 3 to 2."

In these cases, likewise, are to be taken into consideration the difference in the cost of the two applications; the lightness of transportation of bone manure; and the ease of applying it to the soil.

Of its application to Indian corn no experiments have come within my knowledge; but its advantages cannot be questioned.

As to the form in which it is to be applied to the land, it has been tried in the form of broken dust; of pieces crushed to the average length of half an inch; and of larger pieces. If to be spread broad-cast upon grass land, it should be fine; and in all cases the more finely it is reduced the more immediate are its effects. In long pieces their application is not convenient nor efficient. In the mill at Roxbury, near Boston, they are crushed in small pieces, and at the same time in the process much comes out in the form of fine dust. This is undoubtedly the best form in which they can be furnished; the fine dust supplies the vegetable pabulum for immediate use; and the pieces being longer and gradual in their decomposition effect a permanent improvement of the soil. To the turnip crop they are applied in the drill with the seed; and in their application to Indian corn it might be advisable to deposite them in the hill.

They are sometimes applied singly or mixed with dung or mould. To be thus mixed is deemed the best mode of applying them, and in this case the dung should be decomposed and fine. A compost is formed of bone dust and barn-yard scrapings and muck in the following proportions:

From 50 bushels of bone	to 4 or 5 of dung.		
" 20	do.	to 4	do.
" 12	do.	to 8	do.

The proportions, however, must be matter of judgment and experiment with the cultivator.

It is deemed important, in the next place, that the bones should have acquired a degree of heat by being laid in a heap before application to the soil. They will soon ferment laid in a heap and mixed with earth or dung are in a condition to be used. It is deemed well if this preparation of them can be made a month before they are to be applied.

Of the quantity to be applied no certain rule can be given. From 16 to 80 and 100 bushels have been applied: 25 bushels of fine bone dust, or 40 bushels of crushed bones, pieces and dust together, are considered proper proportions for an acre. Persons have found that a larger application than this has not been attended with corresponding advantages: indeed that 25 bushels have been as efficient as 80. As it respects the permanent improvement of the land there is no doubt that the larger quantity would be in proportion efficient; but as to immediate effects no advantage is to be expected from an excessive application; as a small application will probably furnish all of that kind of food or stimulant, which the plant or a single crop will take up. Eight bushels of bone dust mixed with eight bushels of coal ashes, are represented in one experiment as efficient as the whole amount of bone dust. This was, however, only a single experiment; and the permanence of the effects had not been tested. I mention this mode, not so much from confidence in its success as in the hopes of producing experiments, which may prove instructive and useful.

Of the kind of soil to which bone manure is best suited, some matters are well determined. On wet and heavy soils it will not answer. On clayey soils it is stated to have proved positively injurious. On light, dry and sandy soils it has proved most efficacious. It is indispensable to obtaining their benefits, that the land should be dry. Lands deficient in lime are much more benefited by its use than lands abounding in lime. This was to be expected, as a combination of lime forms a considerable part of their substance. On peat soils, when thoroughly drained, its efficacy is very great; and, mixed with sandy mould, perhaps no application could be better for peat soils, when laid entirely dry.

The bone dust, which is to be obtained, is that from bones which have passed through the soap-boiler's hands. This deprives them undoubtedly of some portion of their gelatinous or oily properties, and renders them less valuable than if they could be broken and applied in an uncooked state; but the effect of this operation is not like that of calcining to deprive them of *all* the soft and oily matter; a great deal remains, and experiment has proved that their efficiency is diminished in a much less degree than would be supposed.

This is the best and most authentic information that I have been able to collect on the subject. My own experiments with them have been on a small scale; but accidental circumstances prevented my giving them a fair test. I have great confidence in their utility; and their portable character must strongly recommend them. They may be sent by railroad and water conveyances into the interior in many cases at almost as small an expense as the manure in some places can be carried from the barn into the fields. If they fulfil what they promise, the market gardeners in the neighborhood of the city must find them invaluable.

From what has been here stated we may draw these conclusions:

1. Bones constitute a most valuable manure.

2. The soils to which they are most usefully applied are sandy and light soils; and the land must be dry. On heavy loams and clays they are not useful. To peat lands completely drained they may be applied with advantage.

3. They may be sown broadcast; or they may be placed in the hill or drill. In either case they are not to be buried deep.

4. They are the best applied mixed with mould, or finely rotted barn-yard manure at the rate of six bushels of bone manure to one load of dung.

5. They may be applied to soils at the rate of twenty bushels of bone dust or forty bushels of crushed bones to an acre.

6. For immediate effect bone dust is to be preferred. For permanent improvement bones which are merely crushed into small pieces. At the Roxborough mill the prepared bone contains much fine powder mixed with the crushed bone.

7. Before they are applied they should undergo a degree of fermentation.

8. They may be applied to grass and to pasture lands with great benefit.

It is hoped that the farmers who apply them will carefully observe their operation and effects; and communicate the results to the Agricultural Commissioner of the state.

Their effects, in general, have been much superior to that of stable manure. This has not always proved so; but their lightness of carriage, ease of application, and cheapness are very strong circumstances in their favor. Another circumstance most strongly in their favor, is, that applied in great or small quantities, they carry no weeds into the fields. This is a most valuable quality.

Boston, March 26, 1838.

From the British Farmers' Magazine.

ON THE CULTIVATION OF SMALL FARMS.

Review of an "Essay on the Improvement to be made in the Cultivation of small Farms. By William Blacker, Esq. Dublin: Curry & Co. London: Groombridge."

That this little work should have gone through five editions in so short a time, is pretty good proof that the doctrine that would sweep the small farmers and cotters from the land, is being successfully combatted. The economists may talk as they like, but poor Goldsmith was right:

"Ill fares the land, to hastening ills a prey,
Where wealth accumulates and men decay;
Princes and lords may flourish or may fade;
A breath can make them, as a breath has made:
But a bold peasantry, their country's pride,
When once destroyed, can never be supplied."

Mr. Blacker is determined they shall not be destroyed. He has a better method of curing the poverty of the "peasantry," if the term must be applied to them, than by sweeping them away into workhouses and cotton factories. Their poverty, he knows, has been brought on, generally speaking, by no fault of their own; and that independent of that fact, the destruction of them would be a deadly affliction to the country.

Mr. Blacker's remedy for the poverty of the "peasantry," is *proper encouragement*:—

"I consider myself most fortunate that I am not obliged to act, at present, upon the system above alluded to," [the economist sweeping-away system,] "and that my employers, however they may feel resolved not to continue on their estates persons of careless and indolent habits, are nevertheless determined to assist and encourage all those of an opposite character; and impressed with this kind feeling, are anxious I should make trial whether any thing can be done to reclaim the one and to stimulate the other, and if possible, to put both upon some better plan of supporting themselves and their families, than they at present appear to be acquainted with.

"The only way in my mind to accomplish this is, by introducing such a system of agriculture as would bring the entire of the small farmers' holdings into a productive state, in place of allowing nearly half their farms to remain nominally in grazing, but in reality producing nothing."

He then explains what the system of agriculture he would introduce is. We must here state that Mr. Blacker appears to address himself to the tenants on an estate under his management:

"By referring to the experience of all good farmers in all countries, and under all circumstances, it is ascertained beyond dispute, that by the practice of sowing green crops, such as clover and rye-grass, winter and spring vetches, turnips, mangel wurzel, &c., the same ground which in poor pasture would scarcely feed one cow in summer, would, under the crops mentioned, feed three, or perhaps four the whole year round—by keeping the cattle in the house, and bringing the food there to them; and the manure produced by one of these cows so fed, and well bedded with the straw saved by the supply of better food, would be more than equal to that produced by three cows pastured in summer and fed in winter upon dry straw or hay, and badly littered.

"Here then are two assertions well worthy your serious attention—first, that three cows may be provided with food in the house all the year, from the same quantity of ground which will scarcely feed one under pasture for the summer; and secondly, that one cow so fed in the house, will give as much manure as three fed in the field. I call these important assertions, for if they are really founded in fact, then any of you who may now be only able to keep one cow, would, by changing his plan, be able to keep three, and each one of these producing as much manure as three fed in the way you have hitherto been accustomed to adopt—the result must be, that you would have nine times as much manure by the new method as you have hitherto had by the old.

"One acre of good clover and rye-grass, one rood of vetches, and three roods of turnips, (making up in all two acres, which are now allotted for grazing one cow in summer,) taking a stolen crop of rape after the vetches, will afford ample provision for three cows the year round. For you all know that an acre of good clover will house-feed three cows from the middle of May to the middle of October; and with the help of a rood of vetches, you will be able to save half the first cutting for hay to use during the winter. Then when the first frosts about the middle of October may have stripped the clover of its leaves, the early sown rape, which ought to be put in ridge by ridge as the vetches are cut, and the land well manured, (if the seed has been sown by the middle of July,) will be ready to cut and feed the cattle until the turnips are ripe. Here then you have plainly provision secured until towards the middle of November; and we have to calculate what remains to feed the cattle until the middle of the May following. For this purpose there is a rood of turnips for each cow. Now, an acre of the white globe and yellow Aberdeen turnip, ought to produce from thirty-five to forty tons per acre; but supposing one-half to be of the Swedish kind, let us calculate only on twenty-eight tons to the acre, which is not more than an average produce, even if they were all Swedish, and see what that calculation will yield per day for one hundred and ninety days, which is rather more than the six months. If an acre yields twenty-eight tons, a rood will yield seven tons, which being brought into pounds, will amount to fifteen thousand six hundred and eighty pounds; and this divided by one hundred and ninety days, will leave eighty-three pounds of turnips for each cow every day, which, with a small portion of the hay and straw you are possessed of, is a very sufficient allowance for a common-sized milch cow; and over and above all this, you have the second growth of the rood of rape coming forward in March and April, which would feed all the three cows much longer than would be necessary to meet the coming clover crop, even in the latest season.

"I think, therefore, I am warranted in considering my first assertion proved; namely, that the ground generally allotted to feed one cow, will in reality supply food for three—and have now only to offer some calculations as to the accumulation of manure; which I hope will be considered equally conclusive. During the summer months, your cow, which is only in the house at milking time, (and perhaps not even then, for the practice is sometimes to milk her in the field,) can afford little or no addition to the manure heap, being upon the grass both day and night; and even in winter and spring, whilst there is any open weather, they are always to be seen ranging over the fields in search of food, so that I think you cannot but admit (upon a calculation for the entire year round,) the animal is not in the house more than eight hours out of the twenty-four, and it is only the manure made during this period, which can be reckoned upon; therefore, upon this supposition, (which I think is sufficiently correct to show the strength of my argument,) if there is any truth in arithmetic, one cow fed as I calculated on, in the house for the entire twenty-four hours, will yield as much manure as three cows that are only kept in the house for eight hours—the quality of the food being supposed the same in both cases; and this would manifestly prove my assertion, that one cow fed within, would give as much manure as three fed without; and therefore when three can be kept in the one way, as I have already shown, for one kept in the other, it is as clear as three times three make nine, that the result of the calculation will be just as I have stated —namely, that the farmer will obtain by the change of system, nine times as much manure in the one case as he would have had in the other. Now, if after all that has been said, (which seems to me, at least, quite convincing,) any of you should be so astonished by the quantity of manure thus proved to be gained, as still to have some misgivings on the subject, and be inclined to think that matters would not turn out so favorable in practice as I have shown in theory, I would wish any such person to consider one very material point which I have not yet touched upon—for in the foregoing the argument is founded entirely on the time the animals are kept within, viz.—it is stated that one cow kept within for twenty-four hours, will give as much manure as three cows which are only kept in for eight hours, the food being assumed to be the same in both cases; but it is quite evident, that if the cow kept within should be fed with turnips, and bedded with the straw which the others are fed upon, leaving them little or no bedding whatever, that the calculations must turn decicedly in favor of the animal which is well fed and bedded, both as regards the quantity and quality of manure—so that it appears the estimate I have made is decidedly under the mark."

Mr. Blacker, after this, enters into minute details of the proper methods of cropping and general management. We cannot in fairness offer our readers even an abridgment of them. They are most judicious, and perfectly practicable to the utterest blunderhead that ever handled a spade. Though addressed to small farmers, not a few "big" ones would profit by attending to them.

But some of our readers will be apt to remark, that though Mr. Blacker's system is so good and perfect, the poverty of the persons who are recommended to act on it, will prevent them from doing so. This certainly seems a serious difficulty. Mr. Blacker, however, shows there is not so much difficulty as seems.

"It is seldom," he observes, "that any one deserving the appellation of even a small farmer, is so very low in the world as not to have a cow of some sort; and the more common case is, that he is possessed of one at least of those useful animals. Let us suppose him then, to have four acres of land and one cow, and that two acres are in grazing, or put out to rest, as it is termed; and of the remainder, half an acre is intended for potatoes, half an acre for first crop of oats on last year's potato ground, half an acre of second crop oats, and the remaining half acre third crop oats; which, altogether, make up the four acres; and, with a small garden, may not be considered to be an unfair representation of the general circumstances of the poorer class of small farmers. Now, if an industrious man, reduced to such a situation by bad health, or any other calamity, without capital, and without friends, was to ask me how he, as a small farmer, might contrive to extricate himself from his difficulties and retrieve his affairs—(and this is a question which, above all others, most vitally concerns the poor of Ireland)—I should answer by saying, if a small farmer means to live by his land, his first object ought to be to make every inch of that land as productive as its nature will admit of; and this can only be accomplished (as I have stated in the commencement,) by having plenty of manure, and pursuing such a rotation of crops as shall prevent the ground from being ever exhausted. Various methods may be taken by him to arrive at this, according to his particular resources and the circumstances of his farm: but, under any state of things, he must keep in mind the fixed maxims of farming already enumerated. By reference to these, he will, in the first place see, that wherever he intends to put on his manure, the land should previously be effectually drained; and likewise, that the weeds should, as far as possible, be eradicated before putting in his crop. If these directions are not attended to, a cold wet subsoil will destroy more than half the strength of the manure, and half the remainder will perhaps go to nourish the weeds, in place of the crop he intended it for. The next thing he will see pointed out is, to provide for the increase of his manure, by preparing the means of feeding his cow in the house, and to refresh his land by a change of crop. It is from want of attention to these points, the returns from his farm have been heretofore so much reduced, that he has been kept struggling in poverty, when, with less labor and more skill, he might have been living comfortably. But as an example will make every thing more intelligible, I should be inclined to recommend him, as one mode of carrying the rules laid down into practice, (draining and clearing his land being always attended to in the first instance,) to sow clover and grass-seed with his first grain crop, as a provision for house-feeding his cow the following year; and he must begin early and put in kail or cabbage into his potato ridges, and sow a succession of vetches on the stubble of his last year's potato-land oats, to serve as feeding for the present. If there should be any overplus after feeding his cow, and that he should not be able to buy pigs to consume it, he may let such part stand for seed, the produce of which will generally be more valuable than any second crop of oats, and the straw from it will be found much superior to oat straw, as fodder, and contribute to the support of his cow in winter. He will farther observe, by the fourth rule, that the manure for his green crops, such as potatoes, turnips, &c. should be put out upon that part which has been exhausted by grain, therefore let it be given to the stubble of last year's second and third crop of oats; and by attending to the fifth and sixth, and seventh rules, let him take care not to have any of his land or manure wasted; and by burning the backs of old ditches desired to be levelled, he will obtain such a quantity of ashes as will enable him, with his other manure, to sow half an acre of turnips and an entire acre of potatoes, in place of the half acre, as formerly supposed. By this means, he will be able to bring in half an acre of the poorest part of the grazing, the remaining one and a half acres of which may be used for the support of his cow, until the vetches become fit for cutting, when, if he has any ashes remaining, or as far as the summer manure will cover, the grazing may be broken up and prepared for rape. Supposing these matters to have been conducted upon this plan, when the turnips become ready for use, it will be practicable for him to fatten his cow, and sell her for a price that will enable him to make up the price of two lean ones, or at least to add a heifer to his stock. One rood of turnips is calculated to fatten a cow of moderate size, that has been well fed in summer, which his would have been on the vetches; therefore he would have remaining still one rood of turnips, the curled kail, and what rape he might have got sown, to enable him to support the two cows, thus supposed to be bought, for the remainder of the year, until the clover would be fit for use, which was formerly directed to be sown.

"In considering the foregoing, I do not see any extra outlay which can be said to render this commencement impracticable, nor any reason to suppose that the person's means of paying his rent will be in a manner curtailed; on the contrary, it appears to me that, besides the additional half acre of potatoes, the vetches substituted for the second crop of oats will produce, by the superior keep of the cow, in milk and butter, and the rearing of pigs, more than double what an inferior crop of oats would be worth; and that by these articles alone, the entire rent of a four-acre farm would, in common years, be paid, leaving the profit of the remainder of the farm to go entirely to the support of the family and the increase of the stock. But if it is clear from this statement that the farmer's circumstances the first year will not be made worse, it is still more clear that the second year they must be made better; for it is plain he will then have more than double his former quantity of manure, (owing to the turnip feeding and the second cow,) which, with the ashes of his remaining old ditches, will be fully sufficient to bring into cultivation all the remainder of the grazing land lying out to rest, which will now be made to yield him a valuable crop of potatoes and turnips, and he will have the manured land of last season, amounting to one and a half acres, in place of half an acre, as formerly: besides all which, he will have as good a crop after the vetches as after his potatoes; and thus there will be no part whatever of the entire farm which will not be under profitable crop; and the clover, with what vetches he may think it necessary to sow, will supply him with the means of feeding his two cows in the house, by continuing which practice, he will have sufficient manure to keep his land constantly in good heart, and enable him to follow for the future any rotation of crops he may think proper.

"In order to make what I have said more intelligible, I put the statement into figures, viz:—

"*Supposed Case of a Four-Acre Farm.*

Field No.		A.	R.	P.
1	In potatoes (having only one cow, and not fed in the house,) he will not be able to manure more than	0	2	0
2	In oats, upon last year's potato land	0	2	0
3	In oats, being the second crop after potatoes	0	2	0
4	In oats, being the third crop after ditto	0	2	0
5, 6, 7, 8	In grazing, lying out to rest	2	0	0
	Entire Farm Acres	4	0	0

"*Proposed Crop to begin an Improved System.*

Field No.		A.	R.	P.
1	To be sowed in wheat or oats, being last season's potato ground, and laid down with clover and grass	0	2	0
2	To be sowed in vetches, after first crop of oats	0	2	0
3	To be sowed in turnips of different kinds,	0	2	0
4, 5	To be planted in potatoes, supposed	1	0	0
6, 7, 8	Best part of the grazing to remain for one cow, with vetches	1	2	0
	Acres	4	0	0

"*Second Year of Improved System.*

Field No.		A.	R.	P.
1	In clover fit for cutting	0	2	0
2	In oats, (after vetches) if a second cow has been got, one-half vetches may be necessary, unless cabbage and kale are cultivated	0	2	0
3	In barley (after turnips) laid down with clover and grass-seed	0	2	0
4	In wheat (after potatoes) supposed planted on house manure, laid down with clover	0	2	0
5	In oats (after potatoes)	0	2	0
6	In turnips, having been trenched up before the frost	0	2	0
7, 8	In potatoes	1	0	0
	Acres	4	0	0

"The ditches of Nos. 7 and 8 burned, and the produce of two cows fed in the house for most part of the year, will give the requisite manure; and on a comparison of the crops and the keep of two cows, the return appears to be fourfold the value of what it was, with the certainty of the land every year getting better.

"I think any one who will afford a few minutes' consideration to the foregoing, will be of opinion that a satisfactory answer has been given to the question proposed, and that by a simple reference to the maxims laid down, a mode of recovery has been pointed out, which cannot fail to accomplish its object, having for its foundation, principles which may be successfully applied to the circumstances of every such farm as the case supposed; and a more important case cannot well be submitted to the consideration of the friends of Ireland, in its present situation. The plan recommended has been selected as affording a clear and concise exemplification of the operation of the principles laid down, but it is not meant to be a prescribed course that every one should invariably follow, on the contrary, it may be changed and modified in a variety of ways, according to the nature of the farm, which may call for the introduction of other crops. Thus cabbage, field peas and beans, mangel wurzel, and many other things which I have not taken into account, may, in many cases, be found more desirable than those I have adopted. Where manure is scarce, kale, and thousand-headed cabbage, are particularly valuable; they will grow with great luxuriance upon the back of a new made ditch, without manure of any kind, which proves that nothing more is required to insure a crop than to turn up new earth, by deeply trenching the ground before the frost sets in. Curled kale should be sown the last week in July, or the first week in August, and planted out as early in March as any soft weather takes place; thousand-headed cabbage should be sown in March, and planted out in June or July, as soon as the plants are sufficiently grown; both will give a plentiful crop of leaves at November, and also the following spring, besides giving a large after-cutting, in the manner of rape, when shooting up to go to seed. But, in whatever way the object is accomplished, still the principle of house-feeding, and a rotation of crops, must be equally attended to.

"I am fully aware that a person whose resources enable him to buy lime or other manure, may at once succeed in making his entire farm productive, without waiting for the slower process, which, to his poorer neighbor, may be quite indispensable; but the person with such resources, although he may hold a small farm, does not fairly belong to the class of those by whom the question was supposed to be put, and the answer therefore seems properly restricted to the single object of showing all those to whom it was addressed, that they might get on by their own industry, without any outlay beyond the means they may be fairly supposed to possess; and that if they do not better their situations, it is not by reason of its being out of their power so to do: such being the case, persons so circumstanced, I trust, will not shut their eyes to what is so plainly for their advantage to see. If their farms should be somewhat larger than the case stated, it may perhaps take a little longer time to bring them round, but still the improvement will be progressive, and they will be encouraged as they proceed, by seeing that every step is not only attended with its own peculiar advantages, but likewise facilitates that which is to follow; and I therefore cannot but hope, that any among you whose cases may resemble that which has been stated, may be induced to take what has been said into their most serious consideration, and to try the effect of the proposed change in their system of cultivation, notwithstanding the obstacles which may be started by those who are too indolent to exert themselves, or so much prejudiced in favor of old habits as to think they cannot be improved."

He concludes by showing how he proceeded to improve the condition of the small farmers on Lord Gosford's estate.

"In this, I hope, I have at least so far succeeded as in some degree to weaken your attachments to old customs, and dispose you to follow such instructions as may be given to you; and in order to set aside any excuses that might be made, either on account of ignorance or inability, I have, with the concurrence of your landlords, engaged two Scotch farmers, or agriculturists, for the purpose of giving the instructions you so much require. You will find them to be practical men, who have had experience of every kind of soil, and know how each should be treated. After minutely examining your different farms, they will point out to you how they are to be drained, cleaned, and prepared for the growth of green crops, so as to introduce the plan of house-feeding and accumulating of manure, which has been already insisted on. Thus your want of skill in the management of your land will at once be remedied; and then, to provide you with manure, (the want of which, at present, I am aware would incapacitate you from cultivating the crops recommended,) your landlords have kindly consented to lend such of you as may require assistance, as much lime as will be sufficient to insure you as many potatoes as you may require for your families; on condition that the house manure you may be possessed of shall go to the other crops which the agriculturist may point out. Thus nothing will be wanting to the perfect cultivation of your farms, but your own industry and that of your families; for the above-mentioned assistance will be continued to all such as show themselves deserving of it, until they are brought into a situation no longer to require it. My employers, therefore, I repeat, having gone to such expense and trouble to better the condition of the small farmers on their estates, and the benefit to be derived by following some better plan of cultivation being so evident to the commonest understanding, no one who, by his own want of industry, fails to take advantage of the assistance offered, can have just grounds of complaint, if the land, which he refuses to cultivate, is taken from him, and given to some of his more industrious neighbors, which will most assuredly be the case, when a fair time for making the experiment has been allowed."

We earnestly recommend the Essay of Mr. Blacker to all those who are anxious to preserve the small farmers and cotters, "the bold peasantry," who should be "their country's pride," on the land. Its principles are as applicable in England as in Ireland. D.

ROUTE OF THE MICHIGAN AND ILLINOIS CANAL.

[The following is the most particular account of what will be (when completed) the most grand and remarkable public work in the world. The opening of navigation from the great northern lakes to the Illinois river, and thus connecting the Atlantic, by way of the Hudson and the St. Lawrence, with the Mississippi and the Gulf of Mexico, would of itself be a very great work, and of incalculable value, when the great and rich north-western region shall have been brought generally under cultivation. But the economical effects of this work, great as they will be, are far less striking to the imagination, then the manner in which the navigation will be made; which is by giving to the water of Lake Michigan a new and opposite direction, down the Mississippi. According to the statements given below, of the levels of the waters, and the intervening land, it is practicable, by increasing the depth of the artificial canal, to draw off any quantity of the water of the great lakes Michigan, Superior and Huron, down the channel of the Mississippi; and even to make this new outlet, the principal one of these great sources of the St. Lawrence; if there were any sufficient object for directing these waters to the Gulf of Mexico instead of the Gulf of St. Lawrence. The world perhaps does not afford so magnificent a subject, for the art and labor of man to change and control the appearance and the action of nature. One of the ancient kings of Abyssinia made a vain effort to convey the waters of the upper Nile, by a canal, into the Red Sea, for the purpose of depriving Egypt, of that source of fertility, and even of existence. In this case, a diversion of a much greater volume of water, and to a more remote destination, will be perfectly practicable; and the power which holds the upper extremity of the canal, may at pleasure direct this enormous flood either to a northern or a southern part of the ocean, two thousand miles apart.

But the interest of these speculations extends still farther, and to another subject. It is evident, from the geological features of the country, that the great northern lakes at some early time stood so much higher than at present, that part at least of their waters actually were discharged down the valley of the Mississippi; and that the proposed new canal will but renew a passage of water which nature had at first provided. The great barrier of limestone which forms the southern boundary of Lake Michigan was less destructible than that which is still wearing away under the action of the cataract of Niagara; and by that slow but continued process the levels of the lakes have been greatly lowered.—Ed. Far. Reg.]

[Extract from the Journal of Science.]

Before dismissing this very striking appearance of the coast connected with the action of the lake, I must be permitted to express the opinion, that a careful examination of the country bordering on the Kankakee and the Des Plaines valleys, will afford evidence of the occasional overflow of the lake at ancient periods, in those directions. It is a well known fact, that the lip of the lake, near its south-western extremity, is at one place so depressed as to permit canoes to pass from the head waters of the Chicago river across to that of the Des Plaines. Nor would the circumstance cease to be an alarming one to the safety of this portion of country, except for the fact that the border to the lake is every where composed of a firm limestone. If then the waters of the lake are still capable of interlocking with those of the Des Plaines, it is clear that at a higher level of the lake, considerable descents of water upon the low country must have taken place. Traces of such incursions appear to exist on the stage road from Chicago to Ottawa, in the general direction of the swells of land on the rolling prairie, and more particularly in the width and depth of the Des Plaines valley, and the immense diluvial accumulations it contains below Juliet.

No internal improvement in the country will surpass in commercial importance the canal which is to unite the waters of Lake Michigan and Illinois river, since it will complete the navigable route from the Gulf of St. Lawrence to the Gulf of Mexico, and open a water communication, so to speak, from the Rocky mountains to the Atlantic coast. The cost of the undertaking in some degree keeps pace with its importance; for although neither the line of its extent, nor the amount of its lockage, is great, still the difficulty which grows out of obtaining an adequate supply of water for the summit division of the route, renders it the most expensive work of the kind ever projected. It is indeed a fortunate circumstance as affecting the certainty of its completion, that the means for defraying its construction are already in the possession of the state, the general government having given the alternate sections of land for five miles on each side of the canal to the state of Illinois, to be appropriated to this important undertaking.

Before speaking of the geological features of the country over which the canal passes, a brief sketch of the route it takes, and the nature of the difficulties it has to encounter, will be given, inasmuch as such a notice will serve in some degree to explain the topographical features of the region.

The canal passes up the south branch of the Chicago river a distance of four miles, thence over the level prairie in a direct line eight miles, to the valley of the Des Plaines river, down the valley of this stream, past the mouth of the Kankakee, to the banks of the Illinois, whose border it pursues for a distance of fourteen miles below Ottawa, where it enters the river. Its length is one hundred and two miles; and it is constructed with a breadth of sixty feet at the water surface, and a depth of six feet. The lockage is all downwards, and amounts to one hundred and forty-two feet.

Before adopting the present route, an attempt was made to obtain a supply of water for the summit division, from the Des Plaines, the Calumet, and the Fox rivers; but on running a level from the Des Plaines, nearly opposite the mouth of Portage lake, to the Fox river at Elgin, (thirty-five miles south of the state line,) where the surface of the stream is one hundred and fifteen feet above Lake Michigan, it was found, that the intervening ridge had an elevation of fifty or sixty feet, the cutting down of which would be too expensive to justify the expedient. The commissioners were accordingly led to adopt the magnificent plan of making Michigan the feeder to the canal. The first level thereby becomes thirty-four miles in length, with an average depth of cutting of eighteen feet, which is principally in solid rock. The depth of six feet of water has been decided on, in order to secure to the canal a constant depth of four feet during the fluctuations of tide in the lake, occasioned by high winds. A declivity is given to the bottom of the canal, of one-tenth of a foot per mile. There are two locks situated at the end of this level, having a lift of eighteen feet. Above the first of these, for the distance of three quarters of a mile, the canal has a width of one hundred and twenty feet. The estimated expense of this level is $5,871,324.

The middle division of the work extends thirty-seven miles from the head of the first lock. It has six locks, with an aggregate lockage of fifty-seven feet in the first four miles, for the whole of which distance the route is over little better than solid rock, and is consequently very expensive. Another difficult portion of this division commences about two miles below the crossing of the Du Page, and extends nearly to Dresden, below the mouth of the Kankakee. The bluffs here are from one hundred to one hundred and fifty feet high, and approach so near the river as to be washed by it, which renders it necessary to construct the towing path wholly or in part, in the river, for a distance of more than two miles; consequently, an expensive protection will be demanded to defend the work from the ice-floods of the Kankakee.

The western division has sixty-eight feet lockage, and is twenty-nine miles in length, exclusive of four miles of the Fox river feeder. From the first lock, below Ottawa, to the termination of the canal at La Salle, (on *section* fifteen,) the route lies through much wet ground, being along the bottoms of the Illinois, just under its northern bluff. As these lands are overflowed during the spring-freshets, the level of the canal requires to be considerably raised, and to be guarded by strong embankments. The construction of a canal-basin, at the termination of the canal, with an area of five and a half acres, whose bottom is to be considerably elevated above the present level of the bottom-lands, serves to render this division of the undertaking also very expensive. The cost of the entire canal, as estimated according to the report of the commissioners, is \$8,654,337; but it is admitted that the estimate is too low, it being generally believed that the work will not be brought to a state of completion under ten millions of dollars.

The geology of the chief portion of the route above described, is exceedingly simple and uniform, the great rock formation of the country being the *magnesian limestone;* at least, this is the rock from the commencement of the canal, (four miles from Chicago,) nearly to the mouth of the Kankakee. It also re-appears west of the Fox river, as will presently be pointed out, and enjoys a wide distribution probably throughout the whole of Upper Illinois and Wisconsin. A good opportunity for examining its character occurs near Chicago, where the excavations have already been commenced. It here rises quite to the surface of the prairie. It is imperfectly stratified, with an evident dip of 10° or 15° to the north-west. Its color is light grayish-white, with a frequent shade of yellow. It is compact in texture, and often slightly cellular or cavernous—a peculiarity which seems to be connected, for the most part, with the profusion of organic remains existing among its materials at the period of its formation. The following is a brief list of the fossils which fell under my observation at this locality: two species of *Orthocera*, a *Turbo* (one and a half inches in diameter) with a depressed spire; a large species of *Pectunculus? ;* a *Terebratula*, (with very prominent ribs, and but few in number;) two species of *Ammonites;* a *Caryophyllia*, and a *Favosites.** Some of the beds are wanting in fossils, and occasionally the rock puts on a shistose or slaty structure, in which case it forms a valuable flagging-stone, which is already employed to some extent in Chicago.

The same rock re-appears in the bed of the Des Plaines, twelve miles from Chicago, on the road to Juliet, as well as near the surface of the prairie at Plainfield, nine miles from Juliet, and very abundantly also at this last place. The beds at Plainfield and Juliet, however, are not rich in fossils. The rock is quite close in its structure, and where acted on by the weather, of a yellowish buff color, much resembling the lithographic stone of Sohlenhofen, in Bavaria. The quarries at Juliet afford it in very even, distinctly stratified layers, whose position is nearly horizontal, their thickness being such as to render it a very valuable building material. I noticed one variety of the rock at this place, which had been thrown out in sinking a well, the appearance of which was very analogous to that of true dolomite, (the gurhofian variety.) Its color is a grayish-white, with a tinge of green; throughout the masses were crevices and openings, whose walls were lined with transparent crystals of quartz.

The magnesian limestone continues very abundantly in the bed of the Des Plaines, below Juliet, and recurs frequently on the road across the prairie to Holderman's grove, twelve miles east of Ottawa; after which, no more rock was observed until I reached the bed of Fox river, just above the village of Ottawa. At this point, we strike upon the coal formation.

Of the existence of formations more recent than the magnesian limestone in this region, my own observation permits me to add nothing, beyond what has already been stated under the head of the lake shore near Chicago. By the kindness, however, of Mr. W. B. OGDEN, the mayor of Chicago, and Col. THORNTON, president of the board of commissioners for the canal, I am enabled to annex some additional particulars. The excavations for the canal on the wet prairie give the following superficial formations: one to two feet, black vegetable mould, and two to six feet, yellow, clayey loam, resting on blue clay. On reaching the Des Plaines, the sections give, in the first place, one foot of black mould; secondly, four feet, yellow sandy clay; thirdly, one and a half feet clean black sand, and lastly, twelve feet "vegetable formations with shells."*

The occurrence of boulders in the rolling prairie had often been mentioned to me, under the significant and original appellation bestowed upon them in this region, of "lost rocks." Their abundance, however, surpassed my expectation. They first attracted attention soon after leaving the twelve-mile house from Chicago, and appeared to form a belt between a quarter and half a mile in width, whose direction was north-west and south-east. In crossing this belt, it was uncommon to pass many rods without encountering a boulder. In general, they were rather more than half buried in the soil. They varied in diameter, from ten inches up to three feet, and belonged to the following species of rocks; granite, granitic gneiss, and trap. A few detached boulders only were noticed between this deposit and Ottawa. Soon after leaving this place, however, another band or patch of them was passed. They were here scattered over the Illinois bottoms so plentifully, as to prove objects of no inconsiderable annoyance in the road. Two miles below this locality, likewise, a number of large masses were seen. Others were occasionally met with south of this point, out upon the rolling prairie, in the direction of Vermilionville. What serves materially to heighten our interest in these boulders is, the consideration that they must have been transported over a distance of between two and three hundred miles, since the southern shore of Lake Superior is the nearest region affording rocks of a similar character, *in situ*.

* Several of these species I am persuaded are new; but I defer a particular description of them until I shall obtain an additional supply of specimens, promised me by Dr. Brainard, of Chicago.

* From the same source, I learn that the magnesian limestone beneath these deposits often abounds with vertical fissures, filled with clay, from one inch to several feet in breadth.

BADEN CORN—FOSSIL SHELL BANKS OF SOUTH CAROLINA.

To the Editor of the Farmers' Register.

Columbia, S. C., May 9th, 1838.

A writer in your last number is desirous to have it established, that the Baden, or twin corn, of Maryland, will yield 20 per cent. more than the common corn. In reply to this writer, I will state my experience of it last year in South Carolina.

I planted two acres of this corn on gray, clayey, high land in Fairfield district. The ground had been several years under cultivation, and the corn was moderately manured with compost in the hill. It was planted six feet by two apart, one stalk in a hill. It grew vigorously, and looked well until a drought overtook it in the midst of silking. It did not grow quite as tall as our common corn, (which seems to be a variety formed from the old gourd seed and Tuscarora,) yet the stalks were rather larger and more robust, and it was earlier by two or three weeks. It had put forth luxuriant shoots in abundance, from six to thirteen on every stalk; but the drought seemed to act upon it with peculiar severity, and very many of the shoots perished. When ripe, however, I found it was pretty good corn; and at the gathering, I had one acre of this, and one of the best acres of common corn measured off, that was planted about the same time, on the same kind of land, and measured in the same way; and the corn of each carefully measured for the purpose of comparison. The acre of common corn yielded twenty-four bushels, and the acre of Baden yielded thirty-one bushels and twenty-eight quarts. Here then was a product of upwards of thirty per cent. in favor of the Baden corn. Nevertheless, I should not like to trust to a crop of Baden corn on high land, unless it were naturally rich, or highly manured. A drought in silking time, seemed to be more severe upon it than upon the common corn; and although this may be accounted for in part from the fact, that the common corn was later, and did not get into silk until later in the drought, yet, nevertheless, the Baden corn puts forth such a profusion of shoots, it must necessarily require more rain to support them than a corn that bears only one or two: and if growing upon poor high lands, a drought should fall upon it at the period of silking, I should apprehend a serious failure. I think upon rich high land, retentive of moisture, and especially upon rich, moist, bottom lands, it would yield a prodigious crop. As seed has been pretty widely spread this spring from this crop of mine, we shall have an opportunity next fall for forming a more correct opinion of it.

In your remarks on the Hon. Mr. Elmore's communication, you seem not to have been apprised of the existence of the fossil shell banks of South Carolina. They have been recognised as a continuation of the shell beds of Virginia and North Carolina, from the time of the earliest records of our state. About four years ago, I analyzed a specimen of these shells from a plantation called Mount Moriah, on the Santee, and found it to contain eighty-eight per cent. of carbonate of lime. I then urged it on the proprietor and others, to make a trial of its effects upon their soils; but until the present spring, I believe, not a single trial has been attempted. These beds crop out prominently from the banks of the Santee; and there are abundant indications that they lie extensively at some depth, more or less, underneath the surface of all that belt of country quite across the state, and sometimes crop out upon the surface. Nevertheless, I have reason to believe from all the information I have been able to obtain, that the soil of that region generally contains little or no lime, and their lands are not generally productive. I learn, however, there are certain limited localities, some of which have been more than one hundred years under cultivation, that are still extremely fertile. Is it not probable that these are spots where the shells formerly cropped out upon the surface, and have been decomposed and mixed with the soil?

In conversing with some gentlemen from that section last fall, I was pleased to learn that a spirit for making experiments with these shells was springing up; so that after this year we may hope to begin to hear of some of the results. The community of a considerable part of this shell region is already wealthy; but it is probable they have under their feet a mine that will rapidly increase their wealth very many fold.

J. D.

P. S. The early character of the Baden corn renders it very suitable for replanting the general crop, as the fodder will all ripen together.

From the Cultivator.

CULTURE OF ONIONS.

The onion grows to full size in the northern states in *one* season; but in Pennsylvania and south, it requires *two* seasons to perfect its growth. There, the tops generally die the first season, when the bulb has attained the size of a filbert or walnut; these are planted out the second season, and come to maturity. * *

The cause of the difference, we believe, is to be imputed wholly to climate: the warm weather of the south impairing the elaborating organs—the leaves—and consequently checking the growth, before the bulb has time to acquire the full size. We remember seeing, in the garden of Col. McAllister, near Harrisburgh, Pa., a bed of full grown onions, which the owner seemed proud in assuring us had grown from the seed that year, and which he stated as a remarkable circumstance. We made no inquiry when they were sown, but conjecture that the seed was sown the previous autumn, a practice which, according to Loudon, is common in Portugal, and is often practised in Britain. The onion, in this case, attains its full size by the first of August, before the intense heats of summer. Although the onion is said to be a native of Spain, it probably is indigenous to the mountainous regions, for it seems adapted to the the temperature of this latitude. It withstands our winters, especially if protected by straw or litter. The onion planted for seed is often put out in autumn, or left in the ground for a second, after the first crop of seed has been gathered; it is often sown in September, and particularly the tree or bulb bearing variety. We recommend to sow in autumn, say in September or October, and at mid-winter, if the state of the ground will permit.

Onions are sown in this neighborhood from the 1st to the 25th April, on rich, well prepared ground, in drills 12 inches apart, and are afterwards thinned to a proper distance. The earlier they are sown, the sooner they come to maturity; and, well managed, are a sure and profitable crop.

The tree onion is said to come from a high latitude, where the climate being too cold for them to flower and seed, the flower becomes viviparous, and bears bulbs instead of flowers.

FACT IN NATURAL HISTORY.

We understand that the Beaver has been discovered in Surrey county, near Cabin Point, from 40 to 50 miles from this city. It was for some time believed that they were extinct in that part of the country. A correspondent says: "We saw the dams they had formed of the branches of trees thrown across, and we brought home several of the bits of wood nibbled by them for that purpose." As it is possible they may also be found in some of the adjoining counties in Virginia, we should be happy to receive communications upon the subject. —*Richmond Enquirer.*

LOSS OF SPECIES OF PLANTS.

M. De St. Hilaire states that many species of plants have been lost within the period of history. Within a few years, many species, quite common in the environs of Paris have become very rare; Scilla italica, Spartium purgans, and Pæonia corallina have entirely disappeared from the neighborhood of Orleans; and, even in our own days, the rocks of Vaucluse have been completely despoiled of the Asplenium Petrarchæ. Is it not possible, then, he adds, that many flowering plants, really phosphorescent, may have been lost in the long period which has elapsed since the days of Democritus, Pliny, and Josephus?—*L'Echo du Monde Savant.*

SILK WORMS FED UPON RICE.

In a Chinese work on the culture of the silkworm, lately translated into French by M. S. Julien, a curious process is mentioned, the correctness of which has been proved by experiment. It is said that, in China, in order to supply more nourishment to the silkworms, the mulberry leaves upon which they feed are powdered with the flour of rice. But M. Bonafons of Turin, who translated the work into Italian from the French, wishing to prove the truth of the Chinese process, powdered the mulberry leaves with the flour of rice, with wheat flour, and with other fecula; and found that these various substances, which otherwise are not eaten by the silkworms, become, in this case, excellent nourishment, and cause the worms to develope themselves rapidly. The cocoons of the silkworms fed upon rice flour are much finer and heavier than usual. The other kinds of fecula did not produce a satisfactory result; but it is to be hoped that, by experiments made among the European keepers of silkworms with different farinaceous substances some substitute may be found for the rice.—*Ibid.*

From the Louisville Advertiser.

THE GREAT WORK DONE.

The Herculean task of removing the great Red river raft, has been accomplished. A free and safe navigation for steamboats has been opened entirely through it. If we may be allowed the expression, a mighty river has been restored to its natural channel, from which it had been forced for some centuries. Many steam and keel boats have passed through the channel where the raft was, and heavily freighted. The United States steamer passed out of the head of the raft on the 29th ult., having run up from Shreveport, a distance of fifty two miles, in seven hours and fifty-two minutes. Shreveport is on the river, one hundred and fifteen miles above the original foot of the raft. This shows that the raft was one hundred and sixty-seven miles in length—much of which was covered with a rich soil and heavy timber.

From the point lately termed the head of the raft to the mouth of the Kiamecha river, a distance of six hundred miles, there is no obstruction to the navigation of Red river, and the land is as fertile as any on this continent. In addition to this it is said the tributary streams of Red river afford about eighteen hundred miles of good steamboat navigation, the advantages of which depended on the removal of the raft. When the great work was completed, there was in the country above it about twenty thousand bales of cotton, which have probably been freighted since on steamers to New Orleans. In the region of the raft, we learn the country is rapidly settling, and it is believed two hundred and fifty thousand bales of cotton will be made on lands redeemed by the removal of the raft, in 1842. The value of the improvement is really incalculable. Towns and villages are springing into existence and flourishing where there was nothing but one wide wilderness in 1834. The dense forest is disappearing and immense cotton fields are to be seen in almost every direction. The inhabitants are not squatters, but men owning from forty to two hundred slaves—planters, who will make from two to three hundred bales of cotton each in 1838.

We also learn that vast beds of iron ore have been found in the vicinity of the head of the Raft.

It would thus appear that the ingenuity, perseverance and boldness of H. M. Shreve, superintendent of the work, have added thousands of miles to the steamboat navigation of the southwest, doubled the value of some thirty or forty millions of acres of public land, given an impetus to cotton growing in that region which will accelerate the onward march of New Orleans, and opened a new and most fertile region to the enterprise of his fellow citizens. His snag boats have been found not only serviceable but indispensable machines. Without them the great undertaking could not have been accomplished for several years to come.

From the American Almanac, for 1838.

AGE AND SIZE OF TREES.

There is a great difference in the age that may be attained by different kinds of trees. Some continue to flourish through a long series of ages; nor can any definite time be assigned to them as the natural period of their existence. There are individual trees whose age, as computed by some naturalists, would carry back the commencement of their existence to a period anterior to the deluge; and though we have no very satisfactory evidence that there are any trees now existing of so great an age; yet there is no physical impossibility that such may be the fact.

The age of many kinds of trees may be ascertained, with some degree of accuracy, by felling them and counting the number of the concentric circles or rings of their stem or trunk. The age of trees is also estimated, while they are standing, by their size, appearance, and a knowledge of the laws by which their growth is regulated; and there are some old and celebrated trees, the age of which is known, with some degree of accuracy, by historical documents. There are, however, but very few of the most remarkable veterans of the forest or the field, of which the ages can be ascertained with any precision.

We can notice briefly only a few of the most remarkable trees. For further information, we would refer to the writings of Michaux and De Candolle, the volume on Timber Trees, in "The Library of Entertaining Knowledge," "The Penny Cyclopædia," and "Gentleman's Magazine," for June 1836. The facts in this paper have been derived from these sources and from other works to which reference is made.

1. "The *oaks* are among the patriarchs of Europe." In America there are no less than 29 varieties of the oak enumerated by Michaux. The white oak of the American forest is a much taller tree than the British oak; though its timber is not so hard nor so durable. "It is," says Michaux, "70 or 80 feet high, and 6 or 7 feet in diameter; but its proportions vary with the soil and climate."

The *Wallace oak*, at Ellerslie, in Scotland, 3 miles from Paisley, was a remarkable object at the beginning of the 14th century, and must be at least 700 years old. Its branches are said to have covered a Scotch acre of ground. Many cases of oaks of extreme old age are recorded, some of which have been estimated at 1,500 or 1,600 years. The largest oak known in England, was called Damory's, in Dorsetshire, and was 68 feet in circumference. It was destroyed in 1755. The largest oaks now growing in England, are two near Cranborne Lodge, Windsor; one 38, the other 36 feet round.

There has recently been published in the newspapers a notice of an oak at Ashton, England, said to be the finest in the country, which had been lately sold for 60 guineas, and was expected to be cut down when the barking season for the year (1837) should arrive. The circumference of its trunk, 6 feet above the ground, is stated at 20 feet; the length 72; the circumference at this height being 2 feet. About 30 years since it was sold for £100; but a chancery suit then arose, which saved it from the axe.

In Samagitia, Poland, 30 miles from Kowno, there was a famous oak, which was cut down in 1812. It was 38½ French feet in circumference, and 14 in diameter. "When sawed through, its age was clearly discernible, and found to be almost 600 years."—*Bib. Univ. Aug.* 1831.

Mr. Welles, in a communication in "The New England Farmer," states that in a lot in Dorchester, [Mass.,] given by Governor Stoughton, for the benefit of college education to Dorchester scholars, he measured several oaks which were from 18 to 20 feet in circumference; and in one of them he counted 200 rings, indicating as many years.

The writer of an article on "American Forest Trees," in "The North American Review," for April, 1837, says:—"The largest oak, and indeed the largest tree which we have seen in this country, is a white oak, on the estate of James Wadsworth, Esq., of Genesee, N. Y. The tree is from 24 to 27 feet in circumference at the smallest part of the trunk. Its age cannot be less than 500 years, and it must, therefore, have been a majestic tree at the time when Columbus discovered the western world. It appears to be still in a healthy and vigorous condition, and bears in its exterior no marks whatever of decay. It is by no means improbable that this tree exceeds in size many both in Europe and elsewhere, which are recorded as of greater diameter. For, in the measurement of large trees, it is of great importance to ascertain at what part of the trunk the measurement was taken. Every one must have remarked the difference between the bulk of such trees at the surface of the ground, and at a few feet above."

2. The *yew* attains a great age. The famous *Ankerwyke yew*, near Staines, in England, is older than the meeting of the English barons at Runnymede, when they compelled King John to grant Magna Charta. It is 9¼ feet in diameter. The yews at Fountain's Abbey, in Yorkshire, are estimated at more than 1,200 years old; and some at Fotheringay, in Scotland, have been computed at 2,500 or 2,600 years. One at Fortingal, in Perthshire, is said to be 56½ in circumference; one at Brabourn in Kent, nearly 20 feet in diameter; and one at Hedsor, in Bucks, 27 feet in diameter.

3. The *lime* is said to acquire a larger diameter, in a given time, than any other European tree. There is one at Friburg, in Switzerland, which was planted in 1476, on the occasion of the battle of Morat; and it now has a diameter of 13 feet and 9 inches.

A lime at Trons, in the Grisons, which was a celebrated plant in 1424, existed in 1798, when it measured 51 feet in circumference. Its age is computed by De Candolle at 583 years.

4. The *elm*, both of Europe and America, is a large tree, and has a rapid growth; but the American elm has a more majestic appearance than that of Europe. The former is represented by Michaux as much inferior to the latter for useful purposes; yet he characterizes the American elm as "the most magnificent vegetable of the temperate zone." One which grew at Morges, in Pays de Vaud, is mentioned by De Candolle, which he estimated at 335 years old; and its trunk was 17 feet 7 inches in diameter—(the foot of Pays de Vaud.) Mr. Strutt mentions an elm of

30 feet in circumference, planted in the reign of Stephen; and one near Powick Bridge, Worcestershire, is 25 feet round. The largest elm of Scotch growth, now nearly destroyed, in Teviotdale, near Roxburgh, measured, in 1796, 30 feet in girth.

The elm on Boston common is very conspicuous, both on account of its situation and size; and it is a very beautiful and well proportioned object. According to the statement of Mr. Welles, in "The New England Farmer," "it measures near the ground 23 feet, and about 3 feet above, 20 feet in circumference." Mr. Welles mentions, that "a publication states the measurement of an elm at Hatfield, Mass., as 34 feet in circumference, at 2 feet from the ground, and 24 feet 8 inches above, with a supposition that it is the largest tree in New England. But 'The Gazette' of Northampton states that there are several elms which would compete with it in that place, measuring 21, 22, and even 25 feet, and that one is said to measure 28 feet at some distance from the ground." —*N. E. Farmer*.

5. Some *cedars* on Lebanon, measured in 1660 by Maundrell and Pococke, were found to be 36½ feet in circumference; and were computed to be then 609 years old, and about 800 years old in 1787, when seen by M. Labellordière.

6. In the garden of Olives at Jerusalem, there are now existing eight *olives*, which can be proved by historical documents to have existed anterior to the taking of Jerusalum by the Turks; and consequently must be at least 800 years old.

7. "In the island of Teneriffe, there is a *dragonier*, or *dracæna draco*, which is reputed to have lived a thousand years, and is called the *great dragon*. In 1402, when the island was conquered by Bethancourt, it was as large and as hollow as it now is. Humboldt measured it in 1799, and found it to be 45 French feet in circumference a little above its root. This tree is called dragon's-blood, because there flows from its trunk during the dog-days, a liquor of a deep red, like blood, which is soon condensed, and becomes dry and brittle. It is the true dragon's blood of the shops." *Nouv. Dict. d'Hist. Nat.* This famous tree, which has been frequently visited by travellers, was destroyed by a storm in 1822.

8. The *banian* or *burr tree* (the *ficus indica)* is one of the most curious and beautiful productions of nature. Each tree is in itself a grove, being composed of numerous stems or trunks which are connected together; some of the stems being the size of a large tree. A celebrated banian, called the cubbeer burr, stands on an island in the Nerbuddah, near Baroach in Hindostan. It is said by the natives to be 3,000 years old. It is described by Milton in his "Paradise Lost;" and it is supposed by some to be the same that was visited by Nearchus, an officer of Alexander. The large trunks of this tree amount to 350, and the smaller ones exceed 3,000; and each of these is constantly sending forth branches and hanging roots to form other trunks. The circumference of the whole is nearly 2,000 feet.—*Clarke, Penny Mag.*

9. There are three celebrated *sweet-chestnuts*, on the side of Mount Etna, called *de' cento cavilli*, 180 feet in circumference at the bottom of the trunk; *di santa agatha*, 70 feet; and *della nave*, 64 feet in circumference. They must be of high antiquity; but nothing precise is known on this point; and it almost certain that the first mentioned has been, in reality, formed of five or six trunks grown together. According to Brydone and Glover, this chestnut is 204 feet in circumference.

The Tortworth chestnut belonging to Lord Ducie, in Gloucestershire, England, has been computed to be 900 years old. It measures 50 feet in circumference 5 feet from the ground; and the height of the main stem is 70 feet.

10. The *baobab* of Africa, considered by Humboldt, "the oldest organic monument of our planet," is estimated by Adanson at the extraordinary age of 5,150 years; and, if this is not an over-estimate, it must have been a tree of considerable age at the time of the deluge! The method adopted by Adanson for ascertaining the age of the baobab, was by making a deep cut in the side of the trunk and counting the concentric rings; and thereby ascertaining the proportion between the number and the part of the diameter examined and the whole diameter. But this method cannot insure an accurate computation. The enormous dimensions of its trunk bear a striking disproportion to the other parts. It is not uncommon to find a trunk not more than 12 or 15 feet from the root to the branches, with circumference of 75 to 78 feet. Humboldt mentions baobabs having a diameter of 30 feet. The size of the flowers is said to be in proportion to the size of the tree.

11. Some *cypresses* that were celebrated even in the time of the Moorish kings, existed in the palace-garden of Granada, in 1776, and were supposed to be at least 800 or 900 years old. In America, according to Michaux, the largest stocks of the cypress are 120 feet in height, and from 25 to 40 feet in circumference, above the conical base, which at the surface of the earth, is always three or four times as large as the continued diameter of the trunk. Strabo mentions a cypress in Persia, in girth as much as five men could span; and he believed it to be as much as 2,500 years old. At Atlexo there is a cypress 76 feet in circumference; and one at St. Maria del Tuli, 118 feet round. The deciduous cypress of Chapultepec in Mexico, said to be 117 feet 10 inches in circumference, the younger De Candolle considers even older than the baobab tree above noticed.

12. The *plane tree* (the *platanus orientalis* of the eastern continent, and the *platanus occidentalis* of America) commonly known in the Eastern States by the name of the *button-wood*, and in the Western States by that of the *sycamore*, is celebrated in both continents for size and majestic appearance; but the American species is said to possess a richer foliage, and afford a deeper shade than the Asiatic.

There is now growing in the valley of Bujukdere, near Constantinople, an immense oriental plane, 150 feet in circumference, with an internal cavity of 80 feet. Pliny mentions a plane tree in Lycia, which had a hollow trunk, that afforded a retreat for the night to the Roman consul Licinius Mutianus, with 18 persons of his retinue. This interior grotto was 75 feet in circumference, and the summit of the tree resembled a small forest.

"The *sycamore (platanus occidentalis)*," says Mr. Flint, in his "Geography of the Mississippi Valley," "is the king of the western forests. It flourishes alike in every part of the valley that we have seen. It is the largest tree of our woods, and rises in the most graceful forms, with vast spreading lateral branches, covered with bark of a brilliant white. A tree of this kind near Marietta, (Ohio,) measured 15½ feet in diameter. We have seen one on the Big Miami, which we thought still larger. Judge Tucker, of Missouri, cut off a section of a hollow trunk of a sycamore, and applied a roof to it, and fitted it up for a study. It was regularly cylindrical, and when fitted up with a stove and other arrangements, made an ample and convenient apartment."

A hollow trunk of an enormous sycamore was fitted up with the requisite appendages and made use of at Utica, N. Y., as a retail shop; and it was afterwards carried to the city of New York for a show. The following notice of such an object, which was exhibited in the saloon of the American Museum, and supposed the same that was used at Utica, is extracted from the New York Traveller. "A sycamore tree of most singular and extraordinary size has been brought to this city from the western part of this state. The interior is hollowed out, and will comfortably accommodate some 40 or 50 persons. It is splendidly furnished as a sitting-room, and contains every article of elegance and usefulness. It has a handsome piano, sofas, glasses, and mirrors, of fit and becoming style; and is decorated with pictures and fancy articles."

13. Of the *pines* of North America, Michaux describes fourteen species, some of which grow to a great size, surpassing in height all other trees of the forest, and are very valuable for timber. He measured near Norridgewock on the Kennebec the trunk of a white pine felled for a canoe, which was 154 feet long, and 54 inches in diameter. The greatest height attained in that region, by the pine, he states at about 180 feet.

Mr. Douglas, a botanist, who was sent out from London, in 1825, to explore the northwest coast of America, mentions two species of pines which grow to an enormous size. One of these species, called the *Pinus Douglassi*, found on the banks of the Columbia, grows, as he states, to the height of 230 feet, and is upwards of 50 feet in circumference at the base. The other species, called the *Pinus Lambertiana*, was found in Northern California. "One specimen, which in consequence of its having been blown down, Mr. Douglas was enabled to measure, was 215 feet in length, 57 feet 9 inches in circumference at three feet from the root, and 17 feet 5 inches at 134 feet. It is probably the largest single mass of timber that was ever measured by man; though some of the growing specimens of the same pine were evidently of greater elevation."—*Timber Trees.*

Lewis and Clark in their "Expedition," mention six species of firs or pines in the country watered by the Columbia, the largest of which is doubtless the same as that called *Pinus Douglassi*. "This species grows to an immense size, and is very commonly 27 feet in circumference, 6 feet above the earth's surface. They rise to the height of 230 feet, and 120 of that height without a limb. We have often found them 36 feet in circumference. One of our party measured one and found it to be 42 feet in circumference, at a point beyond the reach of an ordinary man. This trunk for the distance of 200 feet was destitute of limbs. This tree was perfectly sound, and at a moderate calculation, its size [height] may be estimated at 300 feet."

14. The *mahogany*, a tree found in the West Indies and the central parts of America, is highly valued for its timber. It is a tree of rapid growth, but supposed to be not less than 200 years in arriving at maturity; its trunk has often a diameter of 4 feet; and the timber of a single tree sometimes produces $4,000 or $5,000. The mahogany, or "*Swietenia mahogani*, is perhaps the most majestic of trees; for though some rise to a great height, this tree, like the oak and the cedar, inspires the spectator with the strongest feelings of its firmness and duration. It expands into so giant a trunk, divides into so many massy arms, and throws the shade of its shining green leaves, spotted with tufts of pearly flowers, over so vast an extent of surface, that it is difficult to imagine a vegetable production, combining in such a degree the qualities of elegance and strength, of beauty and sublimity. A single log, imported into Liverpool, weighed nearly 7 tons; was, in the first instance sold for £378; resold for £525; and would, had the dealers been certain of its quality, have been worth £1,000."—*Timber Trees.*

15. The *apple-tree*, though not to be compared, especially in height, to the large forest trees above mentioned, sometimes grows to a considerable size. Mr. E. Hall, of Raynham, Mass., states, that there are two *apple-trees* standing near his house, the circumference of one of which is 13 feet 5 inches 5 feet from the ground, and 12 feet 2 inches 3 feet from the ground; of the other, 12 feet 2 inches 1 foot from the ground, and 11 feet 6 inches 3 feet from the ground; and the reputed age 130 years. Mr. J. Ives states, that in Wallingford, Vt., there is an *apple-tree*, whose circumference is 8 feet 4 inches one foot from the ground; and about 50 yards distant from it, there is a *butternut tree*, the circumference of which is 9 feet 2 inches 18 inches from the ground; and that the branches extend over a tract of land 5 rods in diameter.—*N. E. Farmer.*

For the Farmers' Register.

ON THE ROTATION FOR GRAIN FARMS.

Many publications in the Register disclose a great difference of opinion on the routine of cultivation in a grain country; and some persons improvidently adopt plans without reference to the circumstances by which they ought to be governed. I possess no science in agriculture, and my opinions are the result of a limited experience; but I think the most profitable and advantageous system depends upon the quality of the soil, its state of fertility, and the means possessed for its cultivation. Large crops may be made; but the expenses may absorb all the profits. My aim is to combine profit and improvement. Many years ago, when actively engaged in other pursuits, I purchased a small farm, which had been greatly exhausted under the three-field system. I divided it into five, planted one in corn, in which I sowed wheat; and as soon as I got my fields set in clover, on clover fallow in addition. Under this system my lands improved, and my crops were good; the fallow generally yielding fifty per cent. more than the corn ground. A long-continued application of gypsum injured my wheat crop, but gave strength to the grass, which I found could not be subdued by a hoe-crop once in five years. Since that period, other lands have fallen into my possession; and having nearly relinquished all other pursuits, agriculture has become an object of greater interest. My lands are now divided into four fields, one of which I cultivate in corn, and another in wheat. I gather neither tops nor blades. My corn-field remains over a year, and is then sown in wheat, and the next spring in clover; after remaining two years in clover, it is planted in corn. I have some lots in orchard-grass, which supplied the loss of the fodder. The clover-field, at maturity, is surrendered to my stock. The advantage of this system is easily computed: the month of September, which was formerly spent in gathering fodder, is now devoted to manuring, and preparing my fallows. One good ploughing, rolling and harrowing will put them in good order, and my wheat can now be put in with ease and expedition. I select the most favorable time from the 5th to the 25th of October. I suffer my corn to remain in the field till the shuck becomes dry, which gives it I think a more perfect maturation; and in the time between sowing wheat and gathering corn, I can always find useful employment. After my corn is gathered, my horses, colts, dry cattle, and sheep are turned into my stock-field, where they find sufficient provision till the first of January, and sometimes till the middle. The shucks and straw are abundant for the winter, with a small allowance of corn for my horses. As an improvement to my system, I intend to enlarge my cultivation of ruta baga; for though you place this crop in the list of humbugs, I deem it very valuable, particularly in the spring, when cattle eat dry food with great reluctance.

The objection which I have heard urged to leaving a corn-field unsown, is, that the ground sustains injury by remaining bare. This has not been my experience. My corn is cultivated before harvest, the crab-grass and foxtail soon spring up; it grows luxuriantly till frost, when the cattle are turned into the field; they tread it into the ground, which I think tends more to improvement than forest-leaves, which are now extensively used in Virginia. Some of your correspondents speak of ploughing in clover in the month of June when in full bloom; by this and a second ploughing, harrowing, and rolling, a field may be well prepared for wheat; but this requires hands and horses dispensable at other periods of the year. In the month of June, I am under hard pressure in cultivating my corn, and cutting hay. I readily admit that a clover-fallow, in a state of perfect preparation, will produce more than a stock-field fallow; but I doubt if provident farmers are generally able to have their clover fallows in the best order. A gentleman who has seen one of my wheat fields within a few days, thinks, if there be no disaster, it will produce thirty bushels to the acre. My calculation is not so high. It is the nature of man to be confident of his own schemes and plans, and to attach little importance to those which differ from them. Of this the United States Bankmen, the Sub-treasury, and the Conservatives at Washington, have this winter afforded strong illustration; and probably, in my humble calling, I may be under strong delusion, but I believe a farm cultivated for ten years, with four fields of fifty acres each, and twenty separate acres for hay, with three acres of ruta baga in the corn-field, and worked by four men and two boys, would be of more value and produce more clear profit in this region, than under any other plan of cultivation.

I insist on the value of ruta baga. I have great respect for chemical experiments; but when experiment and fact are at war, I adhere to the latter. Fat cows, rich milk, and sweet yellow butter, are better proof of the nutritious properties of this plant, than the experiments of a legion of chemists. I think our encouraging prospects for a crop of wheat go to contradict the notion that the earth is waxing too cold for its production. It is strange how men of science differ. John C. Semmes, whom I take to be no mean philosopher, entertained the opinion, that there was a fine fertile country in the bowels of the earth, and that the Lapland deer entered it at the pole in the winter, and grew fat on the pastures; and with proper encouragement, he would have effected a settlement there, if he had found his theory true. Other philosophers hold that the whole is a mass of fire. Of the two, I rather incline to Mr. Semmes's theory; not from the lights of philosophy, but the impulse of taste. I do hope that the secretary of the navy will specially instruct the scientific corps attached to the exploring squadron, if they reach the Pole, to take a peep into the great hollow and fully ascertain whether it is filled with green pastures or burning fire.

RUSTICUS.

Eastern Shore, Md., 10th May, 1838.

REMARKS ON THE SOILS AND AGRICULTURE OF GLOUCESTER COUNTY.

By the Editor.

The agricultural traveller, or observer, who sees the county of Gloucester for the first time, cannot fail to be astonished, as well as delighted, with the general appearance and peculiar qualities of the great body of low-grounds; and his astonishment will not be prevented, or much diminished, by any previous account which he may have heard of this far-famed and highly eulogized body of land. At least so it was with myself. It was not that I had not inquired and heard much, and even of correct description, of the land and agriculture of Gloucester, from residents, or other persons well informed by long personal observation. But when viewing for myself, and for the first time, I soon found, as is often the case, that I had applied all accounts, before heard, to my own preconceived impressions, which were very erroneous, because made by other "low-grounds" and soils of entirely different character. Thus it is that so much of what we hear, and of what would otherwise be interesting or valuable instruction, is of no effect, and is either not noticed, or is forgotten almost as soon as uttered, because the narrator and his auditor have not common or accordant views of the things which are described; or of the opinions which serve as premises and ground-work for the reasoning and deductions. Hence it is, perhaps, that in addition to the want of fitness for the task, and of opportunity for careful and leisurely observation, of the reporter, that my sundry attempts in this journal to describe, and to furnish useful instruction by describing, some of the most interesting and peculiar agricultural soils and practices in Virginia, have had but little effect in spreading the practices which were described and recommended. For this want of common views and premises, it also often happens that a person is the less fitted to describe to strangers, because of his long and intimate acquaintance with the scenes and circumstances which furnish the subjects; and the reverse, that a new and even hasty and inaccurate observer and reporter may be more likely to seize on the most curious and novel points, and impress them the more deeply on others, who are as ignorant of the subject treated, as was the reporter but a short time before. I hope to be excused for thus presenting the claims of ignorance, or of very new and imperfect acquaintance with the subject, to make agricultural reports; for if that claim is not allowed, there will be but little of value left to mine, in this or in previous attempts, made under the like or greater disadvantages, of want of knowledge, and want of time and opportunity for proper observation.

Nearly half the boundaries of the county of Gloucester are formed by the wide waters of York river; but it is not on these waters, as I had supposed, and as most strangers suppose, that the district known as "low-ground" is situated. This great body of land is principally on the other side of the county, and consists of more than 35,000 acres in one body. It begins a little below Gloucester point, (opposite Yorktown,) on the lower part of York river, and includes the whole country to the North river. The short rivers Severn and Ware cut through the low-ground, and the extent of these and of North river, as exhibited on the map of Virginia, shows the breadth of this great body of land. The Severn, Ware, North, and East rivers, are, in fact, not rivers, but merely arms of Mobjack bay, which itself is a broad and deep indentation of the great Chesapeake bay. North river is between Gloucester and Matthews; and East river is wholly in the latter county; but I have named them with the others because all join to form Mobjack bay, and because the continuous level body of low-grounds, of similar appearance, general character, and geological formation, extends across and around the whole; so that a very uniform face and character are presented on all the Chesapeake slope (if that may be so called which is almost a dead level,) of the peninsula formed by the York and the Piankatank rivers. The same marked and peculiar character which distinguishes the Gloucester low-grounds, belongs also to the Back river lands in Elizabeth City; which, like the former, also lie on the refluent waters of Chesapeake bay. Indeed, the Back river lands, which I had before slightly viewed, and which are described in Vol. III. of this work, (page 414) are as much like the Gloucester low-grounds, as if they were part of them. The principal difference is, that the Back river soil contains gravel generally, and sometimes rolled stones or pebbles, both of which are entirely wanting on the Gloucester flats.

Almost every stranger would suppose, that the rivers are merely *bordered* by low-grounds; which, however broad they might be—even if a mile wide—(and my imagination did not stretch farther,)—were separated by ridges, or projecting points of higher land, dividing the waters of each two contiguous rivers. But not so. Though there are numerous and frequent variations of level, yet they are so slight, that the eye can scarcely distinguish them with certainty, or know whether the general inclination of surface, for a mile or two together, is as it may appear, or directly the opposite. It is not by trusting to the eye, but to the standing and flowing of rain water, and other certain indications, that the levels of the surface are known; and to the sight alone, the whole of this great tract, varying from two to more than six miles in width, (or more than the whole length of the short rivers which cut through it,) and from the mouth of York to the mouth of Piankatank in length, is an almost perfect level, elevated but a few feet above the tide-waters which intersect the country.

The "high-lands," which, by an abrupt and very marked change, form the land or western boundary of the low-grounds, are as different as one soil and surface can well be from another. The distance of twenty yards, and often much less, will generally take the observer from low-ground, having all its peculiar marks and qualities, to high-land possessing none of them. For the present, my remarks will be confined to the low-ground district.

The four short rivers are merely creeks, filled with the refluent waters of the Chesapeake. They receive but little spring or fresh water in streams, and therefore they furnish almost no alluvial deposite, to have formed, or aided in forming, the low-grounds. But though not indebted to the usual mode or source of alluvion, this great and valuable body of land is not the less certainly formed by deposites of the water. But it must have been an oceanic, and not a river deposite; and I entertain no doubt, but that the land once was the bottom of the Chesapeake bay, and afterwards up-heaved by some ancient convulsion of nature, as, more recently, other regions have been known to be, so as to be raised above the waters which once covered it, and to which it owes its singular formation, and great fertility and value.

Contrary to the usual mode of describing soils, I shall begin with these at the *bottom*, or at least as low as the foundation is yet known. This is believed to be one entire and continuous body of what is here and elsewhere erroneously called marl; ancient sea-shells, broken down, disintegrated, or by their softness ready to become so; which bed is seldom more than six feet below the surface, frequently not three, and sometimes near enough to be cut into by the plough; and which reaches lower than any digging for wells has yet been carried. Wells, however, generally reach enough water within 6 or 8 feet, sometimes within four; and the deepest diggings heard of were in one well of sixteen, and another of twenty feet; and of these, for all but the upper three or four feet, the digging was in these shells, or marl. The earth on the marl is always wet with veins of spring-water, and generally it is sufficiently abundant to supply a well, dug any where as deep only as the marl, and sometimes before. There usually lies over the marl a reddish yellow layer of sand, having enough of clay to be adhesive, and which varies in depth from an inch, or less, to more than a foot. Upon the authority of a good practical farmer, Mr Simcoe, who lately died, it was said that this yellow earth, as thrown out of the ditches, had been found to be a valuable fertilizer; and hence it was supposed by some, to be calcareous. But upon testing it, I found that it was not in the slightest degree calcareous; nor do I believe it can have any valuable effect as manure, unless it were desired to furnish iron, or sand, to the soil. It was probably mixed with the marl lying immediately below, and which also is very often thrown out in digging ditches of not more than 30 inches depth; and thus it might have become a manure by that admixture.

The low-ground consists of what is called gray land, black land, and a small amount of a third kind, called the chocolate-colored.

The gray land is a clay loam, of the color indicated by the name, close in texture, and lying on a very intractable clay sub-soil, which, when dug up from ditches, does not lose its barrenness by time and exposure. The gray land forms the larger proportion of the whole, and exclusively forms the points which run down to the rivers, made by their very crooked courses, or between their branches. Hence, in such places, this kind is also called "point-land." These points of gray land are a little the highest; and on them, and close to the margins of the rivers, are most of the mansion-houses of the proprietors situated. Before being cleared, this land was covered by a growth of large oaks; and though low and wet, was not often covered with water. The early and best product of such soil was not more than 20 to 25 bushels of corn to the acre. It is a better soil for wheat than for corn. Much of it is now reduced to a much poorer condition, by long-continued scourging tillage. But some has been much improved by manuring, and the better system of farming which is now getting into use; and many farmers say that this soil, when so improved, is more productive and valuable than the more celebrated black lands.

The black lands are interspersed on the surface among the gray in a very irregular manner, and of which there seems to be no sufficient explation, except in the supposition of the original formation of both which I shall offer, however wild and ridiculous such speculations may be considered. While the gray land seems to be exposed at the surface in the form of long, though low and wide points, narrow streaks or ridges, and circular prominences, all of which are but very little higher than the adjacent and interspersed bodies of black land, the latter seems to have such outlines as ponds of water might be supposed to have, if bounded, or separated, by the gray land. And such, I think, was the former condition of both. The gray land formed the entire surface, with such slight variations of level as had been caused by the different currents and eddy waters, when covered by the Chesapeake. When the highest parts were raised above the height of the tide, fresh water, from the springs and rains, filled the lower parts, rendering them shallow ponds, gradually becoming changed, by the growth, decay and deposite of vegetable matter, to swamps; and which now form the black lands. so celebrated both for their original and very durable fertility. According to these views, the original gray land, should be the sub-soil of all the black land; and such appeared to me to be the case, notwithstanding all the present existing differences of the two sub-soils. Both are stiff, tenacious, and very intractable clays; difficult to penetrate when dry, and difficult to clear from the digging implement, when wet. But while the sub-soil of the gray land, when thrown up, remains barren, that of the black land, though cutting like putty or pitch, when moist, and forming very hard clods when first dry, moulders down, after exposure, even though but to summer weather, and becomes finely pulverized, mellow, and fertile, so as not to be distinguishable from the black upper soil. The cause of this difference of the sub-soils, I infer to be this. All, as stated before, lie over a continuous bed of marl; but, according to the supposed formation, that under the black soil is of much the least thickness. It is, even now, penetrated by the craw-fish, (or cray-fish,) which sink their curious wells and dwellings from the surface of all the black soil to the marl below, and bring up the shelly earth, to form their buildings above the surface; and the annually renewed labors of millions of these little well-diggers, continued for ages, must have had no inconsiderable influence in rendering calcareous the black soil, and also its sub-soil, through which they pass. The craw-fish do not bore in the gray lands. But a still greater operation of this kind has been carried on by the growing trees; which, by their roots penetrating the marl below, drew up lime continually, and by their subsequent death and decay, deposited all the lime, thus incorporated in their substance, on the surface of the earth.

These geological speculations (if they may be dignified by that name,) may appear to some as foolish, and to others as idle and unnecessarily brought forward, even if true. But any plausible theory of the formation, and cause of the peculiar features, of this region, is not foreign or useless to an investigation of the nature of the soils; and this theory seems to me in perfect accordance with the now existing circumstances. This will be further seen in the following as well as the preceding parts of the description.

The soil of the black land, when moist, or just turned up by the plough, is as black as any can well be; and even when dry, is so much darker, as to be easily distinguished from the gray. It is mixed with a large proportion of vegetable matter, even when worn by exhausting cultivation for many years. From its being very favorable to the growth of white and red clover, melilot, and other products of calcareous soils, it is evident that much lime must have been drawn from the marl below, by the trees, or otherwise, and fixed in the soil. And this lime still remains in the soil, though it is not in the state of *carbonate* of lime. The soil is not generally calcareous; but is *neutral*, according to the doctrine of acid and neutral soils presented in the 'Essay on Calcareous Manures.' If any of the black soil has calcareous earth, exceeding the acid, and the vegetable matter, with which it combines, and therefore would show the presence of some carbonate of lime, it should be such as had been among the richest originally, and the most retentive of fertility under as long-continued and severe cultivation as any part has borne, and to which no manure had ever been given. From just such as this, I selected for trial, a specimen, at Warner

Hall, the farm of Colin Clarke, esq. The specimen was subjected to a very delicate and sure test, which gave evidence of the presence of an exceedingly minute proportion of carbonate of lime; but so small, that it was impossible to measure it, and certainly not equal to one grain in 10,000 of soil. This therefore, substantially, is a neutral soil. The gray has generally a sprinkling of sheep-sorrel; which proves sufficiently that the soil is actually, though but slightly, acid; and needs calcareous manure to remove that noxious quality, as well as for the other advantages, which the black soil might also derive, in a less degree.

Very little of this black land remains now in its natural state, in wood and almost under water, as all such was formerly. But at Warner Hall there is a large body (300 acres) both of black and gray soil in a state of nature, and which I examined carefully, and with peculiar interest, as furnishing the best indications of character. In this natural state, and at this time (May 12th,) and through winter and spring generally, the uncleared black land is truly what it is called, "swamp land." The soil is saturated and in many places covered by water, from rain, and it is troublesome to ride over the miry surface, and impossible to walk, except through soft mud and water. The larger growth is black-gum, of great size, white or sweet-gum, ash, sycamore, and other trees seldom found on high and dry lands. The papaw is very abundant, though generally of small size. When new, the black land is of the highest grade of fertility; and even under great defects of drainage, produced 50 bushels of corn to the acre. Under tillage, the soil becomes as finely pulverized and as light as can be in any case; and therefore it is not as well suited for wheat as for corn. After many years of scourging cultivation, and without manure, (for that was rarely given to any of this soil,) the black lands, thus abused, can yet produce 25 or 30 bushels of corn to the acre. I saw on the land of Major W. K. Perrin, on Ware river, a growth of very fair red clover, regularly and thickly set, on a field which had been for the ten previous years under the two-shift rotation of corn and wheat, and probably not rested from grain tillage, even one year, in the many that have passed since the land was first cleared.

The soil of the black land, though so light under tillage, is mostly a stiff and very tenacious clay loam when ploughed up, and while moist. Some however, as on parts of Whitemarsh, the farm of John Tabb, esq., is found much more sandy. The soil is very deep, say one to two feet; and it then changes to the stiff but open clay subsoil which has been already spoken of. Still lower, the clay is blue, close, and very heavy when dried, after being worked into a mass when wet. Still, like the upper clay, this also crumbles fine by exposure, and becomes good soil.

The clay shores of Mobjack bay, where left naked at low tide, seemed to my view to be not very unlike the clay soil of the gray land; and the shallows in the Chesapeake, stretching from the lower end of Gloucester, are composed of naked and solid marl, such as forms the lowest stratum of the low-grounds. This probably lies under all the adjacent shoals of the bay, and likewise under the marshes, which, though covered frequently by the tide, and always as wet as possible, are yet so firm that I rode briskly and easily across many acres without any danger of miring. In the firm parts of these marshes, shores, and still lower shoals, is presented another body of Gloucester gray land, which wants nothing but elevation, to be the same with such as is now distinguished by that name. But enough of uncertain speculation.

Of the "chocolate land" there is but little; and I saw none except that which is part of the farm of Jefferson Sinclair, esq., at the mouth of Ware, or rather on Mobjack bay. The marl there, under this chocolate land, is so near the surface as to be generally within reach of deep ploughing; and the common ditches of the farm sink so deeply into it, that from one-fourth to one-half of their banks is composed of a very rich marl. Thus, merely by ploughing, and by carting off the ditch banks as manure, the land is made more and more calcareous; and was probably so to a considerable degree before cultivation, as the rich marl is at so little depth below the surface. This marl, by its yellowish red color, seems to contain much iron; and to this, as well as its calcareous quality, is probably due the reddish-brown color of the soil, from which its name is taken, and also its remarkable productiveness. This kind is the most valuable land in Gloucester.

This land was, not many years ago, a shallow pond, covered with water-plants and gall-bushes, and was celebrated as a place of resort for wild ducks. This, as well as the greater part of the whole farm, is so low, that high tides flow up into all the ditches, or, at least, did so flow, until a bank was made and flood-gates erected, to exclude the tides. But though lower than any other arable part of the country, this land was decidedly the driest, when visited. The marl on which it lies appears to be an almost unmixed mass of finely broken fossil shells; and this very open stratum, though so little above the level of common tides, and though always wet within a foot or two of its top, yet serves, by its openness above, as a complete under-draining to the land.

Two specimens of this marl which I selected, as apparently presenting the average richness in calcareous matter, when analyzed, gave products of carbonate of lime, (or pure calcareous earth,) the one of 76 parts in the 100, and the other 72. The first was of the most usual appearance, consisting of very small, or broken and loose shells, mixed with either the oxide (or rust) of iron, or clay of that color. The last specimen was in parts tinged deeply with green, by a fine green clay with which it is mixed. The chocolate soil lying above this marl is every where mixed more or less with fine particles of shells, perceptible by the eye. A specimen selected from ploughed land, and among the best in productiveness, yielded 6 per cent. of carbonate of lime. This was more calcareous, to the eye, than many other parts, but less so than others. No marl had ever been carted there. But as very deep ploughing will almost every where bring up marl to mix with this soil, it is difficult to select an average specimen; and impossible to know whether the soil was partially, and to what extent, so mixed by nature, or by cultivation. Mr. Sinclair has made as much as 14 barrels of corn to the acre on some of this land. It produces clover finely; and part then had on it (after clover-fallow) the finest wheat which I saw in Gloucester.

Of other marls of the county of which I took specimens for analyzing, the following were the several proportions of carbonate of lime found.

White marl, from beneath black low-ground soils, taken out of a ditch 2½ feet deep, on Warner Hall, the estate of Colin Clarke, esq., contained 58 per cent. of carbonate of lime.

Three specimens from the diggings on the high land of John Tabb, Esq., surrounding the court-house—

No. 1, yellow marl - - -	69 per cent.
No. 2, yellow - - - -	57 per cent.
No. 3, blue - - - - -	36 per cent.

Two specimens from the high-land part of the farm of W. K. Perrin, Esq., on Ware river—

No. 1, at the bottom of the digging,	47 per cent.
No. 2, from the top, - -	52 per cent.

When compared with marls of 70 to 80 per cent., and even richer kinds, of which reports have been spread abroad, it may be that the poorer of these kinds may be thought too weak for use; and therefore the statement of their degree of strength may even discourage the working them. There is a general and very erroneous fastidiousness on this subject. Many are anxious to marl if they could be sure that their banks are rich enough; but would be reluctant to commence, and doubtful of the profit, with their marl, if its strength were supposed or proved to contain less carbonate of lime by 30 or 40 cent. than some other kinds. It is undeniable that such differences are very important; and that marl of 80 per cent. is worth per bushel twice as much as that of 40, and four times as much as that of 20 per cent., other circumstances being equal. Nevertheless, they who cannot use richer, may be well content with making proper applications of the poorest qualities. The facility of applying a very poor marl, may make it cheaper to give of it to the land a certain amount of calcareous matter, (the only object of the application,) than from a bed twice or thrice as rich. My own marls used during the first years of my practice, and through the first 400 acres covered, did not average, throughout the work, more than 38 per cent.; and in addition, and what is more important, the average difficulties caused by depth of the over-lying earth, the wetness of the marl, and the high hills and the distances over which it was generally drawn, were unusually great, and very far greater than any required in Gloucester; and that, nevertheless, and in spite of all the errors and losses caused by want of experience, and of any practical guide, these labors were more effective, and have resulted in a higher degree of continued improvement, and more net profit on the investment, than is known of any other prior improvements elsewhere, or of any made since, by other means than marling or liming. I have used, and in great quantities and with results entirely satisfactory, a body of marl which had barely 20 per cent. of calcareous earth, and the other remaining four-fifths of worthless sand. These statements, and the egotism, may be pardoned for the lesson which they convey, to all who hesitate to use marl because it is not richer than 30 or even 10 per cent.

The highest point of the ridge of high-land in Gloucester, is generally a loam of moderately close texture. The slopes are more sandy. All the high-land that came under my view, seemed to be of that defective natural constitution which makes marl necessary, and which will return the largest profits for its application. I saw only one farm where it had been applied generally, or to great extent, as well as to great advantage. This was Dr. Wm. C. Taliaferro's. But several other gentlemen, though later beginners, have also done much in marling on the high-lands.

It has been said that the variations of level, throughout the whole extent of low-ground, are scarcely distinguishable by the eye; and not at all, except to close inspection. The view extends without interruption for some twenty miles over the low-ground; which, so far as the eye would indicate, is one perfectly level and unbroken surface. Though almost every farm has more or less of wood-land, the proportion is small, to the quantity of open and arable land; and without intercepting much of the circle of vision, or range of view, the woods add greatly to the peculiar and striking beauties of the landscape. I never had exhibited to my sight more beautiful scenery, than from several different points on the brow of the hill, or long ridge of high land, which forms the land boundary, and every where overlooks the low-grounds. Among these positions, are the mansion house on Whitemarsh, that of Col. Thomas Smith, near Ware river, and Zion Hill, a neat little church which overlooks the winding North river and the numerous farms on its borders. The wide extent of fertile or apparently fertile land, seems perfectly level, and the surface unbroken except by the waters of the rivers, which, seen in various turns, and between different bodies of wood, or other obstructions to the view, appear like so many detached lakes of clear and placid water. To a farmer's eye, the agricultural beauty still more heightens that of the landscape. The fields are generally divided by very neat fences, which, as well as the numerous ditches, are so placed as to make the dividing lines straight, and generally at right-angles; and thousands of acres of such regularly-shaped fields are spread before the observer in all the variety of naked or newly ploughed dark soil, and the different shades of green of the fields of wheat, barley, oats, clover, and natural grass on the pastures. The waters and the woods fill the remainder of the picture, which is further heighened in beauty by the numerous mansions and other buildings, on neighboring low-ground farms; and to the prospect there is no limit, save that fixed by the feebleness and imperfection of the power of seeing. From the elevated site of the Whitemarsh mansion, these general and uniform features of the low-ground scenery are exhibited to great advantage. But in addition, there is also an unusually large proportion of black soil, and of luxuriant crops, in the fore-ground of the landscape; and the waters of two of the arms of the Mobjack bay, the Severn on the right and the Ware on the left, are in full view, and the waters of the wider parts of these bays are seen spread out in the distance, and over the tops of the intervening trees, and the whole so separated by land and by woods, as to appear like many lakes, varying from very small to very large size. From the same point of view, vessels may also be seen sailing on the North river, though the water is too far distant to be visible. When seen soon after sunrise, or before sunset, and in the position to show the ruddy glow of the sun's reflected splendor, each of these seeming lakes deserves to be compared to a "sheet of burnished gold," fully as much as Scott's Loch Katrine. There is another appearance of the sun-light on the water which was to me more novel, and therefore still more striking. Between 8 and 9 o'clock in the morning, when riding along the ridge of the high-land, I came in sight of the distant and wide waters of the Mobjack, or perhaps of the main Chesapeake beyond. These waters, thus seen over the tops of high woods, always presented, to the unaccustomed eye, the optical delusion of the water appearing full as high as the tops of the highest trees; and in addition, in this case, the water being directly beneath the sun's position, received from it no red or fiery reflection, but the white and dazzling brilliancy of snow, seen in bright sunshine.

There are other and great beauties of these winding and narrow sea-creeks or bays, which are improperly called rivers, and which misnomer serves to convey very false ideas of these waters. To me, and probably to most other inhabitants of lower Virginia, there are associated with a small tide-water river, the ideas of head-streams contributing irregularly, but largely, to the supply of always muddy water—muddy shores, and the margins bordered and deformed in many places by large miry marshes—and these visible characters inseparably connected with the stench of decaying vegetation, and the certain production of disease. But very different are the features of these arms of the Mobjack bay Except the Ware, none of them receive but a very small supply of fresh water from springs, streams or rains. They are filled with refluent sea-water, as clear as crystal, and pure except for saltness. There is very little marsh on either, and on North river, none; which, by giving clean and firm shores every where, renders that river and its margins more beautiful than any other. The general level of the low-ground region is supposed to be not more than six feet above the height of common high tide—and generally less; and as there is no sensible decline to the water's edge, the waters seem to fill their broad basins to the brims. The very winding courses of these waters present continued changes of prospect, and yet almost always that of lakes. Though every one of the numerous mansions on the North river farms, as on the other rivers, is placed close to the water's edge, still the crookedness of the course serves to scatter them over a wide space, and prevents that uniformity of appearance that would be expected from such an arrangement. The waters of North river, especially, confined by such banks, are beautiful; whether seen in calm repose, or enough affected by the wind to crest the sea-green waves with white foam. It is, with all its accompaniments, a scene, and a condition of things, more like romance than real life; and to a writer of romance, I would especially recommend the North river of Gloucester to furnish both scenery and subject matter. But it is full time to return from this digression from my proper subject.

It is not unlikely that the uniform level of this region may appear too monotonous, and become wearisome, when the novelty is over; and also that this feature is the more pleasing to me, from another early association of ideas, which is not always correctly applied here. Very low and level land, wherever I have known it before, is also very rich land; and this idea gives the more of agricultural beauty to this extensive flat, because the fertility of the whole, as seen indistinctly in the distance, is raised by the imagination much higher than would be found real, upon closer inspection, and longer acquaintance.

It is not my purpose here to describe the farming in general, or any of the practices with particularity. For this, I had neither sufficient time, nor opportunity, stranger as I was to every thing in the county. A very slight sketch is all that will be attempted.

The rotation most in use on the low-grounds, is the three-shift; of 1st, corn, 2d wheat, barley, or oats, 3d, *rest*, as it is called, which is grazing, either on clover, or without. The two-shift rotation, which is simply that of the first two years of the other, and, of course, without any rest from an annual crop of some kind of grain, was formerly general, and is even now still pursued by many. None but excellently constituted soil could have so long borne so scourging a course as even the mildest of these two; especially as very little manure was used, until recently, except on a few farms. Five years ago, clover was sown but on a few spots, and to a very limited extent, though now it is on almost every farm, and usually covers a large part of the field which is third in the course of crops. In addition to this late and vital improvement, I was told by several farmers that the whole quantity of manure now used in one year, is tenfold greater than a very few years ago; and that a strong and effective impulse has certainly been given to the general improvement of agriculture in the whole county. This impulse, in part, was said to have been received from the contents of the Farmers' Register. Of the correctness of this supposition it was not for me to judge; and if otherwise, it would have been too gratifying, to be much questioned, or severely scrutinized.

Besides the manures furnished by the offal of crops, passed through the farm-yard, or stable, as elsewhere, the improving farmers of the low-grounds have found and have used, and are yet in the course of using, great and valuable supplies, in the ancient accumulations of oyster-shells and rich earth, &c. made on all old settlements, either by the present inhabitants, or the aborigines. In some few places, the Indian banks of oyster-shells still cover acres of their former towns, and would furnish much of calcareous as well as of enriching manure. But the more recent accumulations are those mostly used, and these also were large, as the removal had been long neglected. Of the great body of marl, lying under all the low-grounds, but little has been used as manure, and there is too little confidence, in general, in its profit on the low-grounds, to induce the application. Some farmers, however, are zealously engaged in marling the low-grounds, and already consider their outlay well repaid. Capt. Tabb, on North river, is as yet the most extensive marler of low-ground; and he thinks that whoever has enough leaves or woods-litter, to apply with or after marl, can make his farm as rich as he may desire.

Though I would strongly urge the marling of *all* the low-grounds, (unless any part be already sufficiently calcareous,) and would expect great profit therefrom, considering the uncommon ease and cheapness with which the manure could be applied, still, I do not expect from it any thing like such large increased products to the acre, or per cent. on previous products, as is found on soils naturally poor, and of much less value than these. But much of this land could be marled so cheaply, that an increased clear product of only one bushel of wheat (at present prices) or 200 lbs. of clover-hay, would amount to near or quite 100 per cent. of annual and permanent profit on the investment. On the gray lands (unless marled from the black,) the expense would be greater, and likewise the product, as these lands evidently need marl to neutralize their acid quality, as well as to store up and fix putrescent matters. On the poor high-lands there are many farmers using marl; and what is the more gratifying, and the stronger evidence of the manifest profitable returns, I was told that it is mostly among the poorer class of farmers that these improvements are to be found. Marl is found in almost every ravine cutting through the high-land, and along the whole Chesapeake side of its steep slope. In the black low-grounds, the ordinary ditching, of two and a half feet depth, often reaches the marl, and sometimes it forms the bottom of a ditch for half a mile together. If all the ditches were deepened, the same operation would serve to drain the land better, of subterraneous spring water, (which operation is much needed,) and to furnish marl, in the cheapest manner, for all the adjacent ground. If there were any need to increase the already great facilities for water conveyance, level navigable canals, might be extended from any one river to another, or all the way from York river to the head of North river, by digging not more than from 6 to 10 and very rarely perhaps 14 feet, and the lower part would be in solid marl throughout; and, thus, if properly located, and on a general and uniform plan, the same excavations which would be profitably made for obtaining marl alone, would also furnish deep drains for the land, which would be very beneficial, and also might carry any desirable depth of tide water, and navigation, at the same time. I merely mention this as illustrating the remarkable natural facilities offered for these operations; and not to recommend their being thus combined. For though, even on such a combined plan, the marling here could be effected far cheaper than in most other places, where that is the sole object, yet it may be done here much cheaper still, by digging in the spots where the marl is nearest the surface, or nearest to the land on which it is to be applied. High as the stratum of marl lies, still it is beneath the surface and level of land naturally wet, and seldom sufficiently drained. Of course the marl is wet, and usually after being dug into, two or three feet, furnishes enough water for permanent wells. These difficulties are greatly and erroneously magnified by the imagination of those even who desire to use marl, or who have tried digging at "leisure times," (that is in winter, or wet weather, unfit for cultivating the soil,) and always without any proper plan for keeping water from impeding the work. It is always important, for saving labor, and for marling cheaply, and to any great extent, that wet diggings should be drained as effectually as the location admits; and, every where, that the marling should be carried on as a regular and continued work, throughout the year, or through all the best season of it. But no where would more advantage be gained by following these two rules than here; and by the neglect of both, in every case, great obstacles to the work have been created, and suffered to operate most injuriously. No general plan for excavating marl in such situations can be prescribed in advance of practice, and without some experience of the nature and circumstances of the bed; but I may venture to assert that the cost of pitting marl here would be reduced to half of that of any of the work already executed, by attending to the following general directions. First—to sink, from the intended pits, a ditch, to bring off the water, as low as an outlet can be well obtained; and that would generally be as low as the tide water. Secondly, to keep the area of excavation as well drained as possible. And thirdly, to keep at work regularly throughout the year, or to suspend operations only during the depth of winter, if that season should be attended with much increased difficulty. Without thus making it a regular and continuous job of work, I may venture to foretel that no man will do much at marling on the Gloucester low-grounds. The most that has yet been done, except on a very few farms, is in carting off the ditch-banks, to level them, as well as for manuring; and as many parts of these are mixed largely with marl, the earth gives calcareous, as well as enriching manure. In any such mixture, however, the share of benefit due to the marl alone cannot be exactly known; and it is therefore seldom fully appreciated. But, whether it is owing to this chance-made and little-valued admixture of marl, or otherwise, all persons are satisfied of the profit of using, as manure, rich banks of ditches, scrapings around old dwellings, (which here are always calcareous, with oyster-shells as well as ashes); and these manures have been used and are still in the course of application, to great extent. Many of these applications are, in fact, *marling*, or adding calcareous earth to the soil; though that, the most important action of the manure, is never duly appreciated, and sometimes perhaps not even known by the persons deriving the benefit.

Wheat is considered here a more uncertain crop than in general, and especially on the black lands. Indeed, one of the best cultivators and most successful and judicious farmers, the deceased Philip Tabb, pronounced that these black lands would not do for wheat-culture; and his opinions had so much weight, that it was one of the causes why barley was made, for a long time, almost exclusively the small-grain crop after corn. All this region is colder in spring than on the tide waters of James river, owing to the great exposure to easterly winds, and their prevalence. I suspect a still greater cause of injury to the wheat is the want of draining, notwithstanding all the labor and care used for that object; and the land being always, in winter and spring, injured by excess of water, either on the surface, from rains, or by sucking up moisture from the veins of springs below, and which may be reached by shallow digging every where. Both of these evils are perfectly within the farmer's power to remove; and with their removal, I think that much of the supposed unfitness of the black lands for wheat will disappear.

Next to corn, barley had here long been the most important market crop; and I have never heard of its being successfully raised elsewhere in Virginia, or even a single trial succeeding well enough to induce repetition, except on the similar black lands of Back river, where also it has been an important culture. Hence I infer that a soil of peculiar and uncommon constitution is necessary for barley, and that the peculiar quality required is a proportion of lime very unusual in the natural soils of Virginia.

But, some years ago, barley also became here a very precarious crop. The most promising crops were sometimes speedily and almost totally destroyed by myriads of caterpillars; and, in one season, by some other unexplained fatality, all the fields of barley failed. These disasters caused the sowing of this grain to be greatly reduced; and, though since increasing, the culture in general still remains but small. Another objection to this crop is the uncertainty of the market, and the great fluctuations of price. Barley is used in this country only for making malt liquors, and the demand is therefore necessarily small.

Corn is the great crop of Gloucester, and is always a sure product. To favor the cultivation of corn, it would appear, their mode of tillage is especially directed, and to great loss and inconvenience in the other crops of broad-cast grain and clover. The fields are universally kept in narrow beds, laid off generally precisely five feet in width, but sometimes an inch or two wider, and sometimes as little as four feet ten inches. The general width, however, is five feet. One object of these narrow beds is to save labor in tillage; as four furrows, thrown by a two-horse plough, serve to reverse these beds, by lapping the first two slices and covering over eighteen inches width, unbroken, in the old alley, or water-furrow; and four other furrows, with a one-horse plough, when the corn is well advanced in growth, will sweep out and cover the whole interval between the rows, throwing the slice towards, and up to the plants. But even if labor is saved in corn-tillage, (of which I am not convinced,) it is greatly increased by having such narrow beds for broad-cast crops of grain or grass. The sowing, and getting in the seed, must be much more troublesome, always imperfect compared to flat tillage, and the reaping or mowing as objectionable in both these respects. But so much do habit and long usage lessen our estimate of difficulties and losses, that none of the farmers with whom I talked thought these objections to narrow beds of much importance. My objections, however, are not wholly theoretical, but sufficiently confirmed also by the practice of several years, and on entire fields of a large farm.

But the most important object designed to be gained by this plan of narrow beds, is the better drainage of a flat surface; and it is an opinion here universally established, that by wide beds that object could not be so well attained. To prove this, the fact is adduced, that many persons tried throwing two beds into one (of 10 feet) when sowing wheat; and that the plan was found bad for drainage, by there remaining a sink in the middle of the new bed; and bad for the subsequent tillage of corn, when these wide beds were to be brought back to narrow ones. I admit fully these objections to this particular departure from the general plan, which is far from such as I would approve; but nevertheless hold to my objections to narrow bed culture, not only for the tillage considered alone, but as a means for surface-draining. As I consider the plan which I would propose to substitute as an important improvement, and of which I have practically and satisfactorily proved the value on my own lands, and as it seems peculiarly suited to the Gloucester low-grounds, I will state my views at length, and presume—ignorant and inexperienced as I am as to these lands—to offer advice as to their management, to those who have been long and well acquainted with them. Of course, such opinions and such advice will be considered of very little value, and deserving of but little notice.

Compared to the proper drainage of the surface, the mode of tillage is of but minor importance. So much more of the facility of cultivation and of the amount of product, would depend upon the drainage than upon any other part of the management, that I dismiss any objections to narrow beds on the score of waste of labor, or waste of product; and shall consider the shape given to the surface solely in connexion with its most important object, the relieving the surface of superfluous moisture.

It should be remembered that the surface of these low-grounds receives no rain-water except that which falls directly on them; and that all of that must be either absorbed by the deep soil, or the surplus part slowly conveyed to the ditches, by water-furrows and shallow cross-drains. No water can otherwise run off, because the surface has no descent; and none can sink, as on higher and more sandy and open soils, because the sub-soil is a compact and tough clay, impervious to water. Of course, the object of the cultivator should be so to slope the surface as in the best manner to effect and to hasten the departure of all the excess of rain-water, beyond the wants of the soil. This is said, by the Gloucester farmers, to be done by narrow beds; and I maintain that it would be much more effectually and cheaply done by very wide beds, if properly made and preserved.

In theory the narrow beds promise well; and I have noticed that their advocates always refer to them in a state of perfection, which is rarely found in practice; and which, if greatly departed from, seems to defeat their object. If the narrow beds are separated by open, clean water-furrows, (called alleys in Gloucester,) well graduated, and having unbroken, and therefore not very absorbent, bottoms, over which the water will pass to cross-drains and to ditches in the lower places—then there is in fact a small but open and effective ditch in every distance of five feet. But this perfect condition is seldom attained; and even if attained, by great care and pains, is lost, or greatly impaired, by every ploughing, or other tillage operation, when the field is in corn; and even by the growth of plants, (when they can be made to grow in the alleys), when under a broad-cast crop. When under a tillage crop, and the water-furrow is choked by ploughing or harrowing the beds, of course they will be cleaned out soon after. But if a heavy rain falls before that operation, the surface of the land is as little fitted to discharge superfluous water, as if no beds or alleys had been made. Indeed, in such cases, or when the beddding is badly executed, the water-furrows are no better than indentations which serve, not to discharge, but to receive and retain the excess of water.

But it is yielding too much to suppose any thing like the perfection of execution, at any time, described above, even when most perfect. Such a state is obviously impossible. In what is considered land well bedded and water-furrowed, the bottom of every furrow is but a succession of long shallow depressions, separated by slight bars of ground, more elevated naturally, or left so by more shallow cutting of the plough in such spots. Of course, all these depressions, when filled by rain, are so many little ponds; and even if not more than an inch deep, the water must stand in every one until evaporated, or slowly sucked up by the already over-gorged soil. As the soil of the black land is generally too deep to be cut through by the ploughing, and is moreover very absorbent, the disappearance of this water there must be more generally caused by absorption than by evaporation. The slight and numerous inequalities of depth, referred to, are such as it is impossible to avoid leaving on the most level land, in ploughing, and of which the depressions are too small and too numerous to be cut through and relieved by cross-drains, or grips, as they are called elsewhere. These cross-drains are now always made, and serve well, wherever there is any considerable natural depression (say even as little as 4 inches) stretching across the direction of the beds. But serviceable and well constructed as these may be, the number necessary to be made, and their being filled, and requiring opening, at every tillage process, are also serious difficulties. And when these cross-drains are caught, not properly opened, by heavy rain, the evil is so much the greater than in the case of alleys, because one of these grips is designed to receive, and discharge into ditches, the water from hundreds of beds. The grips are, and for convenience ought to be, but very little lower than the bottoms of the water-furrows; and therefore both are necessarily bottomed on the absorbent soil of the black land.

When there is more careless and slovenly ploughing, and surface-draining, all these objections are still greater. The beds under wheat have frequently an average though unequal width of a foot or more in the water-furrow, on which the plants have been entirely killed by standing water; the less, though still highly injurious, effects of which must have extended higher upon such narrow and necessarily low beds. On some land, the wheat plants stood throughout the furrows, and this was made a claim of merit in the system, and in the execution. But if the plants of wheat live in so low a place, through winter, as on the bottoms of the water-furrows, I infer either that the plants, though living, cannot be healthy and productive; or if productive, that the soil was, in fact, so dry as not to need a drain every five feet to keep it well drained. Upon the best executed bedding, surely the bottoms of the water-furrows must be more exposed to wet than would be the whole surface, if there were no water-furrows.

But, even on the plan of narrow beds, I do not consider it better that the whole alley should bear plants. I would prefer the entire absence of them on a narrow, but clean furrow, as best for both drainage and for immediate product.

Now for the proposed substitute.

Supposing the land to be already laid off accurately in five-feet beds, five of these should be thrown together, by a deep ploughing, so as to form beds of twenty-five feet. It should be done by beginning at, and lapping two furrow-slices on the crown of the middle bed of the five, and then continuing to plough "in-and-in" until the plough at some place touches the water-furrow in which the new one is to be left. Then the plough should stop, at the end of that furrow, and begin upon the intended crown of the next wide bed, and continue it in like manner until the line for a new water-furrow is again touched somewhere. The narrow strip left between the two new beds should then be ploughed deeply, "out-and-out," throwing the slices alternately to each bed, and closing with a furrow which will be easily sunk full six inches lower than the old alley in the same place. Still the new bed would be badly shaped, owing to the four closed old water-furrows not being enough filled; and moreover it would be generally too low, compared to its width. Hence a second ploughing would be necessary immediately, or before any heavy rain. The first furrows of this should be run as before, except that instead of meeting on the crowns of the beds, (where there would be already a list sufficiently high,) a width of about two feet on the crowns might be omitted, and the first slices thrown no closer than to the edges of that strip. When the plough again reaches the water-furrow, it will have, by the gathering of so wide a bed, more room than before, to sink the new water-furrow, deeper, and also to clean it out well. These two ploughings, if well executed, and followed by a harrowing, would leave the surface of the bed tolerably well graduated, and gently sloping from the crown to shoulder; and the water-furrows at least 9 inches deeper than the old ones; and not only deeper, but generally sunk into the clay sub-soil, so as to convey the water off through a close and impervious pipe, as it may be called, instead of over open and loose absorbent soil. The mere consideration of the difference between the wide and the narrow beds, and the five small and shallow draining furrows of the former, and the broad and deep one of the latter, would show that the latter is better for drainage. Every such water-furrow is, in fact, a ditch, and a capacious and excellent one; but which is made and kept open by the plough, and furnishes no impediment to the crossing of animals, or of half-loaded carts. The fully loaded should be drawn along the bed, and would have a far better road than on narrow beds.

Grips or cross-drains would still be needed, but not in half the present number; because the now deeper water-furrows would keep any shallow standing water fully nine inches lower than formerly, and therefore less, if at all hurtful. But wherever necessary to be made, the grips should now be increased in depth, of course, in proportion to the new water-furrows, from which they are to draw the excess of water.

The wide beds are never to be reversed entirely; that is, the water-furrow must always be kept in the same place, and made as deep, and as clean, as ploughing can effect. For one or two crops, or ploughings, after the first, it may be best to throw the slices still towards the crown of the bed, so as to raise it higher. But if so continued, the bed would soon become too high, and the top either too round, or angular. This is easy to prevent. If it is desired to depress the crown of the bed, but yet to raise the sides midway between the crowns and water-furrows, let the middle and higher strips of the bed be ploughed "out-and-out," like a "land" in common flush ploughing, and without caring to preserve any precise outlines.

When the middles of two beds are thus ploughed down, or reversed, then the portion between them will be also broken up, throwing the slices "out-and-out" and of course up the sides of the bed, until closing with the last furrow accurately in the water-furrow. If the whole surface of the bed should have been so raised by previous ploughing, as to require being flattened, then the first two or three furrows should be run in the water-furrow, so as merely to deepen and clean it, throwing the slices neatly up to the shoulder, or edge of the bed. This being done in two adjacent water-furrows, the intermediate space should be cloven, or reversed; that is, ploughed downward. In this case the lists, or meeting slices, will be at the shoulders of the beds, and the operation leaves the beds in beautiful form, and good order. In any mode of cleaving down the bed, the closing and deepest furrow is always on the crown, which being before the highest, prevents there being made too much depression. After running the harrow over, the mark of that furrow will scarcely be visible.

The corn-rows on these wide beds, are easily and accurately laid off. The ploughman will first run a furrow, as near as his eye will fix, at 3 feet from the middle of the water-furrow; and then another, in the same manner, on the other side of the bed. The intervening space he then splits, by a row on the middle of the bed, and then again splits the two side spaces. This will give 5 corn-rows on each bed, with equal intervals, except the water-furrow interval being about a foot wider than the others. This will be ploughed open by mould-board ploughs, and thus left deep and clean, at the last working; but this at other times, and the bed intervals always, may be tilled merely by cultivators, or any similarly operating implements, and with as little labor as on land tended entirely level. When small grain is sown, the seedsman takes a bed at two casts, and throws from the water-furrow always, unless he sows twice over the same ground. Thus, though two feet width in the middle of the water-furrow may be considered as given up, and lost to tillage, and direct product, still there is much saving of labor, of seed, and of crop, wasted before in five times as many water-furrows.

This plan I substituted for narrow beds, and to my entire satisfaction, on low-grounds entirely different from, and far less suitable, than those of Gloucester. The greater and peculiar fitness of the latter is found in the circumstances of the absence of all flooding, and surface spring-water, the great depth of soil, and the impervious texture of the sub-soil.

The plan of narrow beds being here universal, and also the opinion that such are absolutely necessary to keep the land as much as possible free of water, the fields furnished no subjects for comparison; except between land on which the operation was executed either well, or very imperfectly. In the latter case, as before observed, the water-furrows are made receptacles and retainers of water, instead of dischargers; and the land is as much affected and injured by water, though not so regularly, as if it had been ploughed flush, and designed for flat culture. But even where the beds had been well shaped, and the water-furrows as well opened into cross-grips as can be hoped for in extended culture, wherever the sub-soil was retentive, and no plainly visible descent in the direction of the beds, and whether on land in wheat, or in corn, there were numerous evidences to the eye that the land had suffered by the water in the water-furrows or alleys. It cannot be otherwise on such level land, and under the generally existing circumstances. On such land, and so shaped by ploughing, the water-furrows, which receive so much water, must necessarily be too wet through winter, and until late in the spring. But these excessively wet streaks, each say a foot wide, are not more than nine inches below the perpendicular height of the crowns of the beds, and only two feet distant from them, and generally in the same absorbent soil. Under these circumstances, it is obvious, that if any water be in the water-furrows, and whether standing, or flowing off very slowly, the absorbent higher soil of the beds must be sucking up the moisture like a sponge, and must be thereby injuriously affected. While such a contest is going on, in the spring, between the water in the water-furrows, and the drying sun and air, much of the land prepared for corn has a superficially dry streak, varying from one to three feet in width on the middle of each bed, and which may be perhaps mellow and in fine order; while the sides of every bed, as well as the water-furrows, are still too wet to plough, or for any operation of seeding or tillage. Of course nothing can be done on such narrow streaks, until all the space is dry enough. A similar effect in unequal drying is found also on the wide beds. But there, instead of impeding, it forwards the opportunities for preparation and tillage. In winter, or early spring, the middle of the bed, to the width of from eight to twenty feet, may be abundantly dry for ploughing, while the lower parts are still much too wet; and the water, perhaps, standing in every water-furrow. On these middles, the ploughing may go on with nearly as much convenience as in the ploughing of alternate lands on a flat surface; and thus half the field, or more, may be ploughed well, before returning to take the lower parts as they become dry. On this plan, it is essential that the water-furrows be kept clean, deep, and always in their original positions; but so this is done, the remainder of the bed may be ploughed flush, and in any manner that such and other circumstances may render most convenient or desirable. The extreme outlets of the water-furrows into ditches, being few in number (compared to narrow bedding,) and never changed, may be deeply and neatly shaped by the spade; and will seldom need to be repaired; and therefore are always ready to operate. The reversing of narrow beds destroys the old outlets, and requires immediately a very troublesome operation in opening new ones by hand, which is to be repeated every time the field is broken up; and until the new outlets are so made, the new ploughing has served to make the surface basin-shaped, and suited to retain, instead of venting, all the surplus water that may fall on it.

The system of draining in the low-grounds of Gloucester is entirely of the surface, and almost entirely to guard against rain-water. Every acre needs surface-draining, and is, for that purpose, thrown into beds and water-furrows, and whenever necessary, with shallow cross-grips, and deeper ditches for continually flowing, though very feebly supplied streams. But no inundating streams affect the land, and no superficial springs have to be intercepted, except along the foot of the hills, at the junction of the high and low land. Being so much secured from both these causes of wetness, which are such great evils elsewhere, the farmers here, who do not border on the highlands, have directed their operations exclusively to draining the surface, and seem to consider nothing else as wanting. My objections to their plan have been urged at length, in the foregoing remarks on bedding. But even if their plan of surface-draining were perfect, and though the land is in a great degree secured from subterraneous and spring water, still I think that the land would be much benefited by deeper ditching. Though there is scarcely a spring which rises to, and flows off at the surface, still, as before stated, wells every where reach veins of springs at only a few feet below the surface; the depths of which vary from $2\frac{1}{2}$ feet on the shallowest black, to 6, or at most 8 feet, on the deepest gray land. As the water, and a continued supply, may thus be found in every spot, it may be inferred that it is under the whole of the land. If the whole of the few feet of the earth, lying above the marl and the springs, were of an absorbent and pervious texture, there is no question but that the underground spring water, having no low and sufficient outlets, would be continually rising by the absorption of the soil, and would affect the surface injuriously. This rising of the water may be, and probably is, generally prevented here by the almost universal substratum of close and tenacious clay, which serves as a shield against the subterraneous water. But still, the absorption must be injurious, wherever the sub-soil is at all open, in fissures, or otherwise; and this I infer must be the case to some extent under most of the black soil. It is therefore probable that if the ditches, which are now seldom more than $2\frac{1}{2}$ feet deep, were sunk considerably deeper, they would cut into, and discharge at the lower level, much spring water, which now, though never visible, and its operation not even suspected, is slowly but continually rising into and injuring the land, and still more the crops. These remarks apply to ditches on all the low-grounds. But besides, along the base of the hill where ditches are now always kept to cut off the little spring water that is visible, it is likely that deeper ditches would serve to cut off a much greater quantity, which now flows in a level so low as not to be visible, or even suspected. Experiment could easily settle these questionable points.

My examination of the Gloucester lands, and a small part of Matthews, was commenced on my arrival on the 11th of May, and ended five days afterwards. Even this short time, which at best permitted but a superficial view, was made shorter, (in more senses than one,) by the urgent claims made on my time by the hospitable attentions of gentlemen to whom before I was personally unknown, and whose kind invitations and attentions there was no resisting. The hospitality of Gloucester has long been celebrated: and, as generally in former times through lower Virginia, is carried to an injurious and blameable extent; which however is now a fault in but few other places, because both the land and the owners are now too much impoverished to continue the exercise of old Virginian hospitality. That Gloucester is yet able to do so, and that so many of the land-holders are still rich, or in easy circumstances, is only to be accounted for by the general fertility of the land which they have to cultivate. But though, to a visiter and stranger, there is every thing to be gratified with, in the refined manners and social habits which prevail here, and though I had especial reason to be thankful for the kindest and most flattering attentions, still these were so many impediments to my progress through the county, and still greater to my leaving it. The Gloucester people welcome the coming, and feast the staying, but do not "speed the parting guest." Being fore-warned of these kindly-meant restraints, I tried at first to beg off from dinner parties and visits upon appointment: but with so little effect, that I soon found it necessary to cease opposition, and was scarcely a free agent during my stay in the county. But in other respects, every aid was given to my movements and observations, when permitted to be so engaged; and I was carried either through, or close by and in full view of, nearly all the farms from Severn to North river.

The only part of the low-ground district which I did not see, was the part called Guinea, near the lower part of York river. This is very low land; and in that respect very like that of Matthews. It is settled exclusively by a number of poor people, who live more by fishing than by tillage. The land, though rich, and firm, is so low as to be covered by the highest gust-tides, and therefore is the less safe, and productive. I saw such very low lands, which had sometimes been swept over, and the growing crops destroyed, by salt water, on the farms of J. Sinclair, esq. in Gloucester, and of Wm. H. Roy, esq. in Matthews. On the lowest of these lands at all fit for tillage, cotton is the safest crop. Salt is evidently a specific manure for that plant; as lime is for wheat, and gypsum for clover; and of course, must always be furnished, to bring the crop to the greatest perfection.

On North river lies what was the Toddsbury estate, formerly belonging to the late Philip Tabb, who was celebrated as one of the best managers and cultivators in lower Virginia, and one of the earliest who had any pretension to be considered a very good farmer. The estate is now cut up into a number of different properties, and the general condition, taken together, has fallen far below its former neat order and productive state. But the beauty of the old mansion and its location, are still striking, even among so many adjacent beautiful places, in better repair, or of more modern construction. The half of the estate owned by Capt. Tabb, a son of the former proprietor, is however in progress to a much higher state of improvement, by his use of marl, with which his father never even made an experiment, though it is on the land in great quantity, and of very rich quality. This is one of the most striking proofs of the universal ignorance among the best, as well as the worst farmers, not many years ago, of the value of this manure, and of the natural constitution, and the wants of soils, on which that value depends. But even the total neglect of marl by Mr. Tabb is not such strong evidence of this ignorance, as the contemptuous manner in which it is spoken of by another still more distinguished farmer and improver, John Taylor of Caroline; who gives his opinion in his 'Arator,' that if marl were worth using as manure, it could hardly be supposed that the Creator would have buried it so deeply in the earth. However, even this curious *à priori* argument against the value of the marl, has no ground to rest on in Gloucester.

From what I could hear, the high and well deserved reputation of Philip Tabb as a farmer, was founded upon his uncommon forecast, and excellent judgment, as a crop raiser, and his neat, admirable, and successful execution in cultivation, and in the management of whatever he undertook; and not upon his improvement of the fertility of the soil; although he did much, for his time, in applying putrescent manures. Upon soil so productive and so durable as his, good drainage, good cultivation, and general judicious and provident arrangement and management, were all that were necessary to render his farming profitable, and to maintain, and even for a long time to increase, the producing power of his land. But his farming, and his views, would not have served to make poor land rich, nor to have maintained an increased production on a soil less durable than that of his fine farm.

There was another former resident and cultivator of Gloucester, of whom I tried in vain to collect some information. This was Clayton, the learned botanical cultivator and author. Some remains of his garden were still visible a few years ago.

The seat of Warner Taliaferro, esq., is one of the most beautiful situations (where all are beautiful,) on North river. Like all the others, the surface of the grounds around the houses does not appear to be more than four feet higher than the adjacent water, at ordinary high tide; and as far as the sight can stretch over the lands of Matthews county, on the opposite side of the river, there is no greater elevation. The neighborhood here, (and it is so in a high degree throughout the county,) is delightful. Mr. Taliaferro told me that the houses of twelve of his neighbors, all resident proprietors of farms, were within three miles of his own; and I believe that every one is within a hundred yards, or less, of the edge of navigable water. The farms of this neighborhood were long ago estimated by old Mr. Philip Tabb as worth £10 the acre, ($33.33,) and that price has been generally maintained. Under peculiar circumstances, some have been sold for not half that price. Half the Elmington tract, 500 acres, without a house, or any thing but the land, was bought two or three years ago by Warner Taliaferro, esq. at $30 the acre, in cash, and at private sale. This may be therefore deemed to be the fair price of land alone.

A few minutes' passage, in a beautiful sailing boat, carried us across from the last-mentioned residence to that of Wm. H. Roy, esq. in Matthews. This farm, and the adjoining one, belonging to Dr. Tabb, were made the limit of my excursion. But so uniformly low and level are the lands of Matthews, that the small space which I saw, furnished, as I was told, a fair and sufficient specimen of the natural features of almost the whole county. But not so as to improvement and product; for both of which, these two farms stand much higher than the county in general, These are principally corn farms; as is the case through the whole county, as wheat is considered comparatively unproductive. But this is not caused by the too great sandiness of the soil, nor by wetness. The soil is a loam of medium texture, and though lying so low, is drier than most of the somewhat higher lands of Gloucester. The lands of Matthews were originally covered by a fine growth of white oak-trees, which would be sufficient to prove that the soil is not too light for good wheat. Until the woods were mostly cleared, the people were more engaged in cutting timber for sale, and in ship-building, than in cultivation; but recently, as the former pursuits have been necessarily abandoned, farming has greatly improved, in manner and in product.

Mr. Roy's farm has been improved, from a former very poor state, to a present product of corn varying in different fields from 5 to 7 bbls. per acre. Of course, I infer that the soil was originally good and productive, however much impoverished afterwards. The marl stratum extends also under his land; but is there reduced to a thickness of only about 18 inches, so that its digging can scarcely be profitable. The great improvement made on this farm is owing to the very large quantities of farm-yard and other putrescent manures made and applied; and which now extend over much the greater part of the field for corn in a three-shift rotation. Leaves from pine woods, in quantity, as well as all the offal of the crops, are used as litter; and through all summer, as well as winter, for littering standing cattle and hog-pens. No waste or other evil is found, as I had feared, from too rapid fermentation during summer.

I was surprised to find that the old-fashioned three several hand-hoeings, (or weedings, as called,) of corn, were still approved and practised on Mr. Roy's farm. But as I hope to receive from his own pen a more particular account of his farming, I shall present no more of my own hasty and imperfect observations.

Looking from the shore near Mr. Roy's house towards the Chesapeake, there is nothing but water and sky to bound the prospect; as it is a straight course through the capes of Virginia on to the ocean. It was a clear and bright morning, with a gentle wind from the east, which is the state of weather favorable to the optical illusion called "looming," and which I soon witnessed in a remarkable degree. Before suspecting the effect produced, or thinking of it, though not entirely inexperienced, I saw, towards the sea, at such apparent distance as to be not distinct except in shade and in outlines, a very high and large object, nearly square in form. Had I not known that no such thing existed, I should have guessed it to be a castle, or some other enormously large dark building, at more than 20 miles distance; and, as the nearest to such an appearance that any real object could present, I supposed it to be really a thick cluster of very tall pines, on some low island, or point, made very conspicuous at so great a distance by being seen against the clear sky beyond. Upon asking what the object was, I was told that it was a "ship's-head bunch," which is a little brush fastened down by a few low stakes, and which is made as a baiting place for angling for that kind of fish. The actual height above the water was not three feet, and the distance to the bunch was not exceeding three miles. The deception of the sight was not removed, and scarcely lessened, by being informed of the true size and distance; though doubtless those who are accustomed to the phenomenon, learn to judge much better than strangers, and therefore cannot be so much deceived. The cause of the deception is the peculiar state of the atmosphere, which makes a near object appear to be very distant; and as the angle, from the eye of the observer formed by lines to the opposite outlines of the object, continues to be determined by its true distance, the supposed size is just what the extension of those lines would inclose, when at the supposed great distance of the object. As we rode along, another equally large and equally deceptious object came in view. It was nothing larger than a "blind," made for baiting and shooting wild-ducks.

The roads in Matthews are the best in the world. This is owing to the almost perfect level of the surface, the absence of all streams, or other water, and to the firm, yet sufficiently open texture of the soil. Every road has good ditches on each side, which serve not only to prevent water affecting it, but also furnish earth to raise slightly the middle of the road.

The whole county of Matthews is so well furnished with tide-water rivers, and inlets, that it is believed that not a farmer in the county is more than three miles from navigable water, and most of them not one mile. Yet with all this, the county is remarkably exempt from the bilious diseases which are supposed to belong to the low country, and especially to the low borders of tide-water. The explanation is found in this fact—and it would be worth millions of property, and thousands of lives, to the country in general, if properly applied —that there is not one mill-pond in the county. One pond-mill only is on the dividing line between Gloucester and Matthews, which, as usual, secures its annual snug little harvest of disease and death; but beyond its influence, there exists that state of health, and its accompaniments of physical power, energy, and capacity for enjoyment, so as to prove clearly to any reasonable and thinking people, that not one mill-pond (of the usual variable height of water,) should be suffered to remain in all the lower and middle parts of Virginia. But the subject is too copious to treat here, and too important to be neglected; and therefore I will present these facts and my commentary thereon at another time. I will merely observe here that the uncommon exemption from autumnal diseases which are the fruit of malaria, on the low-grounds of Gloucester, in which respect that region comes next to Matthews, and from mill-ponds, the sources of these diseases, is a blessing which alone gives value to their fertile soil, productive and convenient waters, and refined and delightful society. Tide-mills and wind-mills are used in Matthews; and also, but to a less extent, in Gloucester; as most of the low-ground proprietors there are also not far distant from some pond-mill on the highlands, of which the owner risks poisoning his own family, and certainly brings disease or death to some of his neighbors, to gain a few hundred bushels of toll-corn, and that at an expense often exceeding its value. However, I cannot blame mill-owners for availing of the profit conferred on them by law, by infecting and killing their neighbors, (when it is indeed a profit,)—nor would I propose, as a general measure, to deprive them of any such existing advantage, except for full pecuniary, or other sufficient compensation, to be made in return. But I *do* blame the legislative body, which permits the continuance and increase of these enormous and wide-spread evils—and also the blind and besotted carelessness and contentment of the people, who suffer the heaviest of these inflictions, and who will neither learn the cause, nor seek for a remedy. To this subject I will return—and again and again, while there remains any hope of awakening proper action.

From each of the rivers of Gloucester, there is a vessel which runs every week, to and from Norfolk; and there is one also which goes as regularly to and from Baltimore. These packets belong to a number of the farmers of the neighborhood, and are intended, and effect the object, to carry their products to market, and bring back their purchased commodities, in the most convenient and cheap manner. The captain of the vessel is not only the carrier of the articles, but the general agent and salesman of all the shippers: and in this manner the trouble and expense of a Gloucester farmer, in sending any surplus products to market, are not as great as if he lived only a mile or two from the town to which they are sent. This is another great source of convenience and profit to this region so favored in its position; and conduces to the economizing and selling of many small surplus products, which would otherwise be wasted.

The productive value of the land in the Gloucester low-grounds, and there being almost none which is not fit for tillage, when cleared and drained, have caused clearings to be very general; and the scarcity of wood, both for fuel and fencing, is one of the greatest inconveniences suffered by the farmers. Pit-coal is already in regular use as fuel in some houses on North river. For fencing, chestnut, which fortunately was a plentiful growth of the high-lands, has been recently the main reliance for the low-ground farms, even at 7 or 8 miles distance by land-carriage, and the timber purchased at a high price. As rails of this timber are almost secure from rotting, when not in contact with the earth, these costly fences are still cheap improvements. But the chestnut timber is now very scarce, and can no longer be counted on as a sufficient source of supply. Ditches and banks, for which the land is so admirably adapted, will probably hereafter be made to serve for inclosures; and in aid of this important object, deep and wide ditches will have an important value, in addition to the several others already mentioned.

All the low-ground farmers are now suffering greatly by the depredations of cut-worms and bud-worms, or wire-worms, on the young corn. Some have been compelled to plough up, and plant again, many acres of their fields; and the land not so treated, in many cases, requires to have two-thirds of the places replanted; and the loss, to the future product, as well as in present labor, is enormous, this spring, throughout the low-grounds. The great number of these worms, I should have supposed, might be sufficiently accounted for in the usual practice of breaking up the land for corn, late in winter, or in spring. On clover-sod, especially, so treated, elsewhere, great injury from worms would be counted on. But here, there must be some other cause still more favoring their depredations; as I was told of parts of fields having been ploughed very early in winter, and on which, notwithstanding, the corn is as much injured as on much later ploughing. This has been an uncommonly cold and backward spring, and these lands are always kept colder in spring, as before stated, by the prevailing easterly winds. Until the 17th of May, the last day of my stay in the county, there was not one in which fires were not necessary for comfort. The cold, by retarding the growth of young corn, keeps it longer at the state in which the worms prey on and destroy the plants; and hence, the peculiar injury sustained this spring, and indeed, every spring, compared to warmer lands. But though the cold directly produced by the exposure to easterly winds, is an evil which cannot be avoided, still the ravages of insects would be doubtless much lessened by earlier ploughing, and still more by the more effectual drainage of the land. This last would not only permit the land to be ploughed earlier, and in better condition, but probably would lessen the coldness of the air, by avoiding the evaporation of so much excess of moisture as is now in the soil. The effect of evaporation in producing cold is a well known chemical fact; and there is probably more evaporation from one acre of ploughed and moist land, than from ten times the space of water. Thus, good drainage would serve not only to increase the productiveness of the soil, directly, but also indirectly, by forwarding and improving the ploughing, raising the temperature of the air, and by both means, helping to restrain the annual ravages of noxious insects.

One considerable off-set to the numerous advantages and delights of a residence on the low-grounds, is the bad quality of the drinking water. It was to me, however, less objectionable than I would have expected; though my sense of taste is not sufficiently acute to render me a proper judge of the quality of water. The wells almost always reach water in the marl, from which the foreign flavor is communicated. In the very few cases in which water is reached by wells before touching the bed of marl, it is said that it is very good. If, by boring, and putting down closely connected pipes, water should be drawn from beneath the bed of marl, (which has not yet been pierced through,) I think it very probable that it would be found pure and excellent. The water which percolates through marl, and supplies wells sunk therein, is bad in every known locality. On a very high and hilly farm, my residence some years ago, which was under-laid by marl throughout, the many springs, within convenient distance of the house, all furnished bad water. A well was commenced, though with but little expectation of obtaining different and better water, as these springs were nearly all around; and still less hope remained, as no water was found before penetrating the marl. Luckily this bed did not furnish so much water as to prevent continuing to dig, and getting quite through the marl to a soft sand below, from which rose an abundant supply of water, as pure and as cold as any known east of the falls of our rivers. The water rose to and stood at the height of 13 feet above the level where it was tapped. This one known result as well as theoretical opinions, would encourage me were I a resident on these low-grounds, to bore for pure water through the marl, if it should not prove to be too deep.

A young lady who had spent much of her childhood in this part of the country, once told me that the ice-houses were the most ornamental buildings in Gloucester; and though, for want of explanation, I could not imagine a ground for this opinion, I readily admitted its force as soon as the subjects came under my own view. As water lies so near the surface, and the soil is too close to permit water to sink through it, it is obvious that ice-houses cannot be made in pits, below the surface, as usual in the higher country. Hence, they are necessarily constructed on and above the surface of the ground. One plan of construction is general. A circular brick wall forms the body of the building, which of course is a regular cylinder, surmounted by a roof, which is, in shape, a flattened cone, the base of which is so wide as to form eaves projecting unusually far without the body of house. A mound of earth, circular at the base, regularly sloping as it rises, is thrown up all around and against the body, and conceals it to within two or three feet of the eaves of the roof. The mound of earth becomes covered with green turf. The summit of the conical roof is surmounted, in some cases, by a spire, in others by a ball, or small cupola. Altogether, in plan, proportions, and neat execution, these ice-houses are very pleasing to the eye, and add much to the beauty of the grounds around every mansion on the low-grounds.

[TO BE CONTINUED.]

LAW OF NEW-YORK IN REGARD TO TRESPASSING STOCK AND DIVISION FENCES.

To the Editor of the Farmers' Register.

* * * *

I have a friend who lives in the western part of the state of New York, now on a visit to me here, and in conversing with him on agricultural and other subjects, I have derived many useful facts—one of them I will detail to you, because it is of striking utility in my view, and on a subject upon which you have long interested yourself.

He informs me, that in the state of New York, the laws require every farmer to have such enclosures as will keep his own stock in—if he has none, he needs no enclosure, except on public highways. If then the stock of our neighbor encroaches on another, the one encroached on sends them to the nearest pound-master of the township, (and there are several in each,) who pounds them, and notifies the public of the fact, describing them, that the owner may come forward and claim them. The person trespassed upon then calls together three respectable, disinterested neighbors, who assess the amount of damage he has sustained by such intrusion, which the owner has to pay, together with all expenses of the pounder, &c. before the stock will be surrendered up to him; and in default of which, they are sold to make it good, and the surplus, if any, refunded to the owner.

This I consider an equitable and admirable regulation, and if adopted in this state, would save much trouble and discontent among neighbors. He also informs me of another equally just and necessary regulation. In all cases of *division fences* between neighbors, *each party* is *bound* to share equally the expense of such an enclosure as is usual in the vicinity, and in case of default of either, the amount is recoverable before a magistrate.

This strikes me as a most wise provision; for occasionally you meet with a selfish, perverse man, who will contribute nothing to such an enclosure, although equally benefited, because he knows the other party would sooner erect the *entire* fence, than be, without it, liable to constant annoyance: and in such cases this provision would apply most happily.

I have ventured, my dear sir, to give you these ideas, thinking you might choose to embody them in some publication of your own on the subject, if thought worth it; but not to be published as coming from me.

[The condition required by our correspondent in his last sentence, is complied with by our withholding his signature.—Ed. Far. Reg.]

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

Markets have undergone little variation this month. Tobacco continues in good demand at $4 to $11 per 100 lbs., including all sorts except fancy qualities for manufacturing. The quantity inspected greatly exceeds that of last year to same date, the price being an inducement to get it to market.

Cotton commands (in Petersburg) $8\frac{1}{2}$ to $9\frac{1}{2}$ cents, according to quality. The receipts at the various ports of shipment in the United States, are about 1,550,000 bales against 1,230,000 at same time last year. The demand for cotton goods in England being very dull, this excess of the raw material must cause prices to continue low for some time.

The growing crop of wheat is reported to look fine generally; but in some parts of the country, the insect called chinch-bug has attacked it and done considerable injury.

Internal exchanges are improving, but the difference between some places is still very great; as for instance, between New York and Natchez, 20 per cent., Mobile 12, New Orleans 8, Charleston 5, and Virginia 4. Bills on London are 10 per cent. premium in Richmond.

Since the resumption of specie payments in New York, there is little or no pressure on the money market, and stocks generally have advanced. The importations of specie have continued to a very large amount.

The last legislature of New York authorised the establishment of private banks to an unlimited extent. Those persons who engage in the business, are required to deposite with the comptroller of the state, the amount of capital on which they wish to operate, in such United States or state stocks bearing 5 per cent. interest, as he shall approve, and can receive from him an equal amount in bank notes properly countersigned, so that the issues of notes will be limited to the amount of security thus deposited, and made responsible for their redemption.

Should this system be found to work well, as is confidently believed it will, the example will doubtless be followed by other states, and it may introduce a system of banking less liable to abuse than that which now exists.

The facilities of communication on the main line of rail roads have been increased this month by the opening of one between Richmond and Petersburg, and by the completion of the bridge over the Roanoke at Gaston, and of a portion of the rail road south of that place. X.

May 23, 1838.

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THE FARMERS' REGISTER.

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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

REMARKS ON THE SOILS AND AGRICULTURE OF GLOUCESTER COUNTY.

By the Editor.

[Continued from page 178 of this volume.]

One of the most interesting objects which I visited in Gloucester, was Rosewell, the residence of the distinguished patriot John Page, Governor of Virginia, and of his family preceding and succeeding him. The house is situated on the border of York river, and commands an extensive view over the deep blue waters and the clean white beach of that most beautiful of all our wide waters. The land, though said to be good, and productive, as a farm, considering its long neglected state, presented nothing which attracted my notice, or diverted attention from the ancient and venerable building, to see which, was the object of my visit. The walls of the mansion-house form a cube of 60 feet. The roof is flat and covered with lead, except the central and more elevated parts, which are so low, however, as to be hidden from the outer view by the surrounding parapet wall of about 3 or 4 feet high. The style of building is plain and simple. Though the materials were of the best kind, and the construction and decoration such as must have been very costly, still the whole appearance is as plain, as if embellishment and display were not only not sought, but despised by the builder. It is said that the massive walls contain about a million of bricks; most of which, according to the fashion of old times, were brought from England. The interior walls of all but the upper apartments are wainscoted with black-walnut to the ceiling, and the balustrade of the great staircase is of mahogany, richly carved. All appears simple and severe, and yet grand, and nothing seems designed for ornament, or ostentation. The chimneys, which so much disfigure all modern buildings, are here so massive that they seem more like the turrets of the ancient structures of the feudal age; and the resemblance is further increased by two small circular erections in the roof; one of which is the upper end of the flight of stairs, and the other a sort of observatory, where the extensive prospect and refreshing sea-breeze might be enjoyed in the greatest perfection. Altogether, the Rosewell house bears not a very faint resemblance to an ancient baronial castle; and, except the ivy-capped ruins of the old Jamestown church, (under whose shade these lines are pencilled,) I have never seen any structure so venerable in its form, and in its progress to decay. Both these buildings, and some others on hallowed spots, ought to be made public property, by purchase, and preserved, both from decay, and from any repairs except such as might be necessary to preserve the present appearance. Rosewell house overlooks a wide expanse, rich and beautiful by nature, and now deformed and impoverished by both the abuse and neglect of man; and it stands alone, in solemn grandeur, though undervalued and in decay, an emblem of the old aristocracy of Virginia, of which, with all its virtues and vices, its wealth, refinement, and wastefulness, there is now so little left, and that little fast fading away.

But though in comparison to its former state, the Rosewell house may now be considered in a state of dilapidation, still, as a residence, for the present, it has not greatly suffered by decay. The principal injury sustained, and which threatens future destruction to the interior of the building, if not soon guarded against, is the partial sinking of the ceiling of the great hall, on the lower floor, and which takes away the support of the second and third floors above the place of failure. A timely support by a central pillar would prevent the further progress of this injury. The present owner, and recent purchaser of this estate, Mr. Booth, besides the convenience of keeping his own residence in comfortable repair, doubtless feels the inclination to preserve this noble monument of ancient times. But the expense necessary for this purpose would exceed the cost and present valuation of the whole estate; and there are few individuals, in this utilitarian age, who would be willing to bear this burden. The estate, containing more than 1000 acres of land, was sold at auction a few years ago, for $11,000; and was bought by Mr. Booth, for a small advance on that price. This is not more than the bricks of the mansion house alone would cost; and the probable future destiny of this building, will be, after falling into complete decay, to be demolished, for the use of the remaining materials. Such has already been the end of another building, not far distant, which not many years ago was not less an interesting object as a venerable ruin, than hallowed by historical events. This was the once splendid mansion of the old Secretary Nelson, uncle to the patriotic Governor Nelson, in Yorktown, which in the beginning of the siege was the quarters of Lord Cornwallis and his principal officers. The walls were perforated in many places by the cannon balls from the batteries of the besiegers; which in part were so directed by the special orders of Governor Nelson, then commanding the Virginia militia, and who dealt the same measure to his own dwelling-house, though that was better protected by distance, and its more humble size; and it still stands, the best remaining building in the decayed and almost deserted village of Yorktown. Secretary Nelson was then confined by disease to his house, which stood in an angle of the British interior intrenchment, and directly in the most important line of defence, and attack, and therefore peculiarly exposed. His three sons, as well as his nephew the governor, were in arms among the besiegers; and he was at last permitted to take refuge in the American camp, on a flag of truce being sent for that purpose by Washington, and borne by one of the Secretary's sons. Before his removal, one of his servants, in the same apartment with his master, and while speaking to him, was killed by a ball from the besiegers' cannon. Though the house was made a ruin by the fire of the American batteries during the siege, it long remained one of the objects of highest interest on this ground, which is altogether so interesting as the closing scene of the war of the American revolution; and twenty-seven years ago, when I first saw it, the greater part of the outer walls and three of the chimneys were still standing. All has since been demolished, merely for the use of the materials; and the site is distinguished only by a greater quantity of rubbish, scattered by the side of the British line of defence.

The present owner of Rosewell was not at home; but still I was obliged by the kind welcome which he had prepared for my expected visit. If it was not so much out of the way of travellers, I doubt not but that Rosewell would be considered an object of interest, which would probably expose the owner to many such intrusions as mine, and which would become, by their number, more annoying than welcome.

Gloucester-town, (which has not the semblance of a town,) lies immediately opposite Yorktown; and the former as well as the latter place was fortified by part of the British army under Cornwallis, and invested by a part of the American forces. The remains of four redoubts, which defended the point of land, still are seen, in quadrangular mounds of about 8 feet elevation; and these, like the intrenchments of both besieged and besiegers surrounding Yorktown on the opposite side of the river, and even the large holes in the ground which were made by exploding bomb-shells, will probably continue visible until Yorktown itself shall have reached the end of the decay and ruin to which it has long been making progress. Another redoubt, standing alone, is on the road, about a mile from Gloucester Point. This probably was an outpost of the investing force. The mound furnishes an agricultural lesson to those who maintain that any barren sub-soil, brought up by deep ploughing, will become fertilized by exposure. The sandy sub-soil, thrown up in erecting this work fifty-seven years ago, is still bare of vegetation.

The most valuable thing now in Yorktown, (supposing antiquities and historical memorials to be worth nothing,) is the body of rich marl which under-lies the town, and is exposed on the river side. It is perfectly dry, and of a texture more like very soft rock, than shell-marl or earth. It is in this that the artificial cavern was made which is called Cornwallis' cave, and which tradition tells was his lordship's quarters after Secretary Nelson's house was no longer habitable. But like most other traditionary accounts, the fact is disputed. When I first saw the cave, in my boyhood, it was entered by a doorway of small size, and consisted of a square apartment, from which another door led to a second room of smaller size. The walls and ceilings were shaped well and neatly; and the firmness of both showed that the excavation might be continued safely, to any extent, without any other props than walls of the marl itself. This quality, and its great richness, would make the bed valuable for shipping marl for sale; which has already been done, without the need of excavating, from a place a few miles lower down. But until within late years, I think it most probable that nobody in York county knew any thing of the composition or value of the earth in question; and still, judging from their works, but little value is yet attached by them to the use of the manure. When I last entered Cornwallis' cave, one of the apartments was nearly filled with fodder, and the other was converted to a hog-sty, which, in the darkness, I could not know by sight, but was soon informed, by the grunting and the stench, of the presence of the successor of Lord Cornwallis.

STATEMENT OF SUCCESSFUL FARMING, ON A SMALL SCALE, ON GLOUCESTER LOW-GROUND.

By the Editor.

The farm of Jefferson B. Sinclair was referred to in the preceding article (at page 181, No. 3,) and the more important of the peculiar circumstances, and qualities of the soil described generally. In addition to what is there stated, as part of a general sketch of the soils and agriculture of Gloucester, and to which I beg to refer, as prefatory to this statement, I will here report more particularly on the labors expended on, and profits derived from, the cultivation of the farm. The choice of this farm for more particular notice, is not directed by any of the considerations which might be supposed usually to operate; and whether it is well or ill-directed, it will at least be manifest to those best acquainted in the county, that the choice of the writer is not directed by considerations of self-interest, or by a desire to pay court to those enjoying high station, or exercising extensive influence. Mr. Sinclair, notwithstanding his considerable gains, is not yet one of the rich men of Gloucester, nor one who makes any pretension to fashionable, expensive, or "stylish" living; neither has his system, or general plan of farming, any thing commendable, nor is its execution of that neat and perfect kind to please the eye, and command admiration. He was quite a poor man, who, by unremitting industry and care, and by making good use of some of the peculiar advantages of his land, has greatly improved both his income and his farm, and who now shows very heavy crops, and derives large profits. Others, in the county, with greater advantages of spare capital, and more extended agricultural information, have performed operations in cultivating or improving their lands far more likely to attract and gratify the observer, and to command his applause. But the past and present circumstances of this farm will better serve to show, by example, the capacity for improvement and increased product of the land, and the profit which may be counted on to reward steady industry and economy. Whatever has been done here is the result of labor, almost alone, at first; and since, of labor united with the capital produced by the earlier bestowed labor.

This farm, as in the foregoing article stated, lies on the shore of Mobjack bay, and, with two or three adjacent farms, forms the "neck" or point between the mouths of Ware and Severn rivers. The greater part of the neck, as well as the greater part of Mr. Sinclair's arable part of it, is so little above the level of the sea, that it has been sometimes, though rarely, covered by storm or gust-tides. The greater part is probably not more than three feet above ordinary high tide.

The father of the present owner was a regular seaman, and in command of a vessel in the merchant service. He came from a very different kind of farming land, (near James river,) from this, which he settled on in the latter part of his life. No one could be more unfitted to manage the land, by his previous different pursuits, and want of knowledge; to which was added growing blindness, which soon become total. The management of the farm was necessarily left to the entire direction of the overseers; who, instead of extending cultivation over the waste but highly fertile wet land, actually retreated before the invasions of the tilled surface, by water on the lower, and by wire-grass on the drier parts, until nearly the whole had become unproductive and waste. It was in this state that the present owner received his portion, 13 years ago, without a house upon it, and with scarcely any moveable or working capital, except three negroes capable of aiding him by labor. I do not remember positively, but infer, from the great subsequent increase of slaves, that there were also young negro children; but these of course at first were sources of expense and not of income.

The land, then, exclusive of marsh subject to be covered by ordinary tides, was 433 acres. Since, two different adjoining pieces, of the best (chocolate) soil, but excessively worn and abused, have been added by purchase—the first at $12.25 and the second at $20 the acre. These purchases have increased the tract to 500 acres, or a little more. Of this about 150 acres are of the chocolate soil, lying on rich marl, rising so near the surface as often to be touched by deep ploughing; and 350 of gray land, of the ordinary kind of the most worn and reduced in the county—and some of which, even now, is very bare, and appears very mean.

Under all the existing disadvantages, it may be thought that with 433 acres of land, of which 75 were rich and of admirable soil, the owner was well furnished at least with *landed* capital. But this capital was dead, until it could be improved by labor, of which there was very little; or by money, of which there was none at all, until after it had been earned. In addition to the other necessary expenses, the mother of Mr. Sinclair had a life-interest in the land, which he bought for an annuity of $100; which annual charge is still paid. All the then dry and rich land was under the strong wire-grass sod, to the mastery of which the preceding indolent and careless management had yielded the land. The first thing to be done, was to attack and subdue this powerful enemy to cultivation; and without success in which, nothing of value could be effected on the land. The whole team in possession was a horse, a mule, and a pair of oxen; and it was necessary for all four to be hitched to one plough to break up the land under wire-grass. With this large and oddly combined team, and with a boy as driver to aid the ploughmen, no more than four of the five-feet beds could be ploughed in a day. Nevertheless, this slow labor was persevered in until it was rewarded by ultimate success. Now, the land is so free from wire-grass, that a farmer who had suffered from the pest elsewhere, would find it difficult to believe that this land had ever been so completely sodded with its growth. By the frequent cropping of the land, since the breaking up, much has been done for this result; and, as Mr. Sinclair thinks, much more by summer-fallowing (for wheat) at the time when the wire-grass was in bloom—which he considers as his only means for success, and one which may be relied on in general. It is a new and important suggestion. But I still doubt much whether that means, or any other, available as part of a proper rotation, would have been effectual on a more sandy soil, which is much more favorable to wire-grass than a clay loam, like this chocolate soil. The quantity of calcareous matter in this soil, and its fertility, were favorable enough to this growth to make it cover the land, almost exclusively. But it would have had a still greater degree of vigor, and vitality, if the soil had been also sandy. It is proper here to state, that Mr. Sinclair, when suffering most from this growth, visited Weyanoke, to see the very laborious operations of Mr. Fielding Lewis for restraining (for he could not eradicate,) this pest—which were described in the first number of the Farmers' Register. Having learned the whole practice, and paying implicit respect to the authority of Mr. Lewis as a farmer, and to his experience as a wire-grass farmer, Mr. Sinclair returned home and tried sufficiently the same tedious and costly labor, of digging out and removing the roots. But there was so little benefit found from the experiment, that he never repeated it. He therefore thinks that neither to this mode, nor to frequent tillage, but entirely to his ploughing when the grass was in blossom, is he indebted for the destruction of the growth.

The pair of oxen which composed half of the team of the plough used in the first breaking of the wire-grass land, at other times had to draw all the fuel for the family, rails for fencing, and also the materials for building the dwelling-house. They were 6 years old when bought, at $45; and after being regularly at work for about 6 years more, they were allowed to have a summer's grass, at rest, and were then sold, as beef, for $10 more than the pair cost at first.

The shelly land, which was formerly a wide-spread swamp and pond, the resort and shelter of wild-ducks, is now well drained, and part under heavy growths of wheat and clover, and the balance in fine and mellow tilth, under a young but promising growth of corn. The unusually perfect drainage of this very low surface, I have before ascribed to the open and loose layer of broken shells, which forms the under-stratum, and serves in effect as a complete under-draining of the whole surface soil.

The manuring with the natural compost, or mixture of calcareous and putrescent matter,) which every ditch furnishes, both when first dug, and whenever afterwards cleared out, has been quite extensive. Much manuring has also been done from the farm-yards, and otherwise by the dung of stock. There still remain to be availed of, and which have scarcely been commenced on, for want of labor, not only the rich and unmixed marl lying under the whole of the chocolate soil, and generally within a foot of the surface, (and which the gray land greatly needs as manure,) but also inexhaustible supplies of putrescent matter, in the "sea-ore," or sea-weeds flung by the waves upon the shores, and in pine-leaves from the low sea-pine land, which, though firm, is too low, and too much exposed to the tide, for safe tillage.

If the means for using them were not wanting, there are resources here for durably enriching every poor acre of the farm in two years. And much has certainly been done towards its fertilization, considering the existing obstacles; although much more remains to be done, and which, for the doing, promises sure and high profits.

What are known as salt-water pines, are the almost entire growth of the still lower land lying between the fields and the bay shore. These pines seemed, to my eye, to be the same kind as the common woods-pine, (short-leaved) of the higher country; but these appear more dwarfish and stinted, as if on a very unkind soil; and they are of remarkably slow growth compared to the pines of the poor upper country. A beneficial effect of this slow growth, is the large proportion of heart-wood, and the longer durability of fences made of this timber. It is thought that the salt drawn up in the growth of the trees conduces to the durability of the dead timber. It is certain that the sap-wood of these, or of any more perishable pines, is made more durable in fences, by having been first left covered in the salt tide-water for six months or more. This is a common practice in this part of the country; and the rails in the fences are so thickly stuck over with attached shells of barnacles, as to show the long continuance of their salt-water immersion.

The belt of pine-forest, though probably not so designed, must be of much benefit to the arable land, by sheltering the crops from the cold and violence of the east winds, coming from the Chesapeake and the Atlantic. The soil on which the pines grow, low as is its level, is of the gray kind; and though, like all the rest, under-laid by the great bed of marl, is sufficiently thick above it, and (judging by the growth) sufficiently acid and poor, to furnish the proper food for pines, unadulterated by the neutralizing quality of the subjacent calcareous earth. It is, however, a singular location for a pine-forest; and, like some other still stronger apparent contradictions, would cause many to doubt the doctrine of calcareous soil being incapable of sustaining pines, and some other common acid plants.

There has been no regular course of crops on this farm, nor any approach, in practice, to what would deserve the name of a rotation. The proprietor, being constrained, in a great measure, by the former foul state of the rich land, which demanded repeated hoed crops—and tempted to draw from it heavily, both by its power to produce, and his own need for the returns—the general course of cultivation has been irregular, severe, and also totally opposed to the established general rules of good husbandry. Still, circumstances well justified this departure from sound theoretical and general rules; and, on the whole, it has probably conduced much to the profit of the farm, and also to its general improvement; for quicker and greater profits served to furnish more labor for improvement, as well as for more effective tillage; for both of which so much labor was wanting. But the time and the circumstances have now arrived, which will make a more regular and meliorating rotation the most profitable here, as well as in most other situations.

Until about seven years ago, Mr. Sinclair had not sown clover, nor had he been induced to desire to commence its culture, from any witnessed prior trials of others in his county. His commencement was determined, not by design, but by accident, or rather by a ridiculous blunder. He had requested the captain of a northern vessel to bring him a peck of flax-seed. By a fortunate mistake of the captain, he brought, instead, as much clover-seed; which was sown, merely because on hand. The product, however, was so good as to induce the continuation and increase of the annual sowing, until the last amounted to 8½ bushels of seed, and the present clover crop covers 60 acres.

But though his clover-culture has been entirely satisfactory in products and in the conjectured clear profits, it has, as yet, furnished almost nothing to the scythe, either for green-food or for hay, nor as green or vegetable manure to the land—except for the latter, so far as may go the mere roots, and the little of the stalks remaining after grazing. Besides the grazing of other farm-stock, there is a large number of hogs fed on clover, from the time it is 6 inches high; and as I heard a neighbor of Mr. Sinclair's charge him with, in some jocular censures of his management, he does not even give his clover a chance to get into blossom. The hogs are not, however, turned upon the whole field, but upon a part separately inclosed by a temporary or moveable fence; and from that they are changed to another, and so on, so as for them to graze all the allotted space in succession.

If about 100 hogs are desired for annual slaughter, then 20 female pigs are left as breeders, and three or four male pigs. It is so arranged that all the pigs are littered in April or early in May, soon after the hogs have been all put upon the young clover. The births are easily thus timed, as the practice is to castrate all the boars soon after the sows are pregnant, and to fatten and kill them, and all the sows also that have had pigs once, the next winter. Thus there is an annual succession of very young breeders, male and female, and no hog ever remains to be as old as two years. Of course there are but the 20 sows, all pregnant, to feed, from killing time to the beginning of grazing on clover, after which, they have no other food, except the gleanings of the wheat and other small-grain-fields after harvest, until put up to fatten in autumn. For five years there had been killed from 75 to 108 hogs annually; not large, of course, but fat, and of good size for family bacon. The annual sales of pork add largely to the income of the farm. In 1835, the fresh pork sold brought $1200, and the weight of the hogs averaged 133 lbs.

Mr. Sinclair made an experiment last winter and spring with his winter-kept hogs, or breeders, which, so far as one experiment may be relied on, seems decisive against letting hogs run at large in woods and marshes, to aid in supporting themselves. In the beginning of winter, the hogs were divided into two parts, as nearly equal as possible, in numbers, sizes, and condition. Those of one division, were suffered to run at large, in the sea-pine woods, and having access to the close adjacent bay shore, and 300 acres of firm marsh; and received every morning, each, one ear of corn, and another at night; or, when shattered corn was used, as much morning and evening as was supposed to be equal to one ear to each hog for each meal. The hogs of the other division were confined to a well littered pen, in which was a close and dry house or shelter, which they could enter at pleasure, and be perfectly protected from wet and cold. These could get no food except what was given to them; and that was the same as was given to the others, that is, one ear of corn to each, twice a day. They probably helped their food somewhat from the litter of corn-stalks and wheat-straw, which I suppose were the kinds furnished in part or in whole. The result was, that in spring, when the clover was fit to receive them, the pen-fed hogs were in much the best condition. Some of the others, running at large, had actually died, and al lthat lived were poor and lousy.

Now it must be admitted that the want of precision in fixing the quantities of food given, (though *designed* to be equal, and supposed to be as nearly so as such mode of estimating permitted,) detracts much from the otherwise very important value of this experiment. Still, it can scarcely be supposed that one who is so careful, and so successful, in his general management of hogs, could have been much deceived in the details of this experiment, in which, and in the apparent result of which, he has entire confidence. It should be further considered, that if cooked, varied and mixed food, of roots and other vegetables, as well as grain, had been given to the confined hogs, that there is no question but their health and flesh would have been better sustained, at equal or less cost, than by corn alone.

The hogs are all of a cross of the "no-bone" breed upon the common kind; about half-blood of each, which is deemed preferable to the pure no-bone stock. The front edge of the cartilage with which hogs root into the ground, is trimmed off, which entirely stops their rooting.

Having heard the products of this farm last year (1837) spoken of as very considerable, by a neighbor of Mr. Sinclair's, I inquired of him particularly as to the amount made. The grain crops were as follows:

1621 bushels of wheat, made on 80 acres, which is at the rate of $20\frac{1}{4}$ bushels to the acre: sold at $1 65 the bushel, (and counting reserved seed at same,) amounted to -	$2674 65
600 barrels of corn, from 75 acres, or 8 barrels to the acre, (of which 300 barrels were sold,) say at $3 25 (I forgot to ask the actual price obtained,) -	1950 00
350 dollars worth of pork, lard, and bacon, were also sold; but as the hogs were partly fed on the corn above estimated, I will count half their product as due to the corn, and the other half to the clover, gleanings of wheat field, and the waste corn, not estimated above—which is, - - - - - -	175 00
The smaller articles of product were not noted; but the following, were supposed to be within the amounts actually sold:	
Butter - - - - - - -	90 00
50 lambs at $2 50 - - - -	125 00
13 grass mutton at $3 - - -	39 00
Whole value	$5053 65

This is exclusive of sundry smaller products sold, as poultry, &c. of which no estimate is made; and of large ones, which though consumed at home, are not less of value as products; as the fodder and other offal parts of corn and other crops. Also the wool and cotton, produced at home, and from which all the slaves are clothed, by spinning and weaving only in weather and times unfit for field labor. This usually very costly part of farm management (or its substitute, buying all the clothing,) is gotten over easily and cheaply; but the credit for this, as well as for much else of value in domestic economy, is entirely due to Mrs. Sinclair, whose aid has been throughout of very great importance in improving the income of the farm. This I may be excused for saying, as it is the report of her neighbors.

There were no calves sold for veal, last year, as usual, (all being kept to increase the stock,) which lessens the amount unfairly, as this is one of the usual products of the farm. The year before, 1836, 15 calves were sold, at $5 each.

Much the greater part of the above amount is composed of sums received for sales actually made; and the much smaller part, only, was of things consumed at home. The results will therefore appear more striking, if the net amount of actual sales is presented alone, as follows:

Deduct for seed, suppose 100 bushels of wheat, at $1 65, leaves for market - -	$2482 65
300 barrels of corn sold, (at price supposed) 3 25 - - - - -	975 00
Pork, bacon, and lard sold - -	350 00
Butter, lambs, and mutton, as stated above - - - - - -	254 00
	$4061 65

If it is further considered that there is nothing to be taken from this sum to buy clothing for the slaves, now increased, by purchase and births, to 40 in number, the net returns will appear still more important.

The laboring force on the farm is now that of 12 slaves. There are now 50 head of cattle, and 107 sheep.

In all things essential to product, or for improvement, the operations of Mr. Sinclair are well executed; but in things not essential, and in every thing having regard merely to appearance, it must be confessed that he is a very careless and slovenly farmer. Nevertheless, in most of these omissions, held so important by all *martinet* farmers, I doubt not that he has been justified, by the sure test of the amount of *net product*. Still, some very manifest exceptions are to be seen, in which neither economy nor convenience have been properly consulted.

To the Editor of the Farmers' Register.

TROPICAL FIBROUS-LEAVED PLANTS.

Washington, D. C., 8th May, 1838.

I have the pleasure to acknowledge the receipt of No. 2 of your periodical of the 1st inst., and hasten to send you some very small samples of foliaceous fibres, or substitutes for common flax and hemp, with the hope that they may excite your minute attention towards the articles and plates on the fibrous-leaved plants. Should you visit Washington during the present session of Congress, and examine the full specimens, now in the committee-room at the capitol, and soon to be in the agricultural department of the patent-office, I entertain the respectful hope, that you, in common with all intelligent gentlemen who have seen them and studied their history, would coincide with both committees in their estimate of the future importance of the fibrous-leaved plants, to all the worst soils between the Potomac and the Mississippi. Every member of the senate and of the house of representatives, who has visited the committee-room and given the specimens an examination of 5 to 10 minutes' duration, has expressed his sense of their high importance, and his approbation of the reports of the committees. But such visits have been so "few and far between," that it would require two or three years to elapse before the specimens would be seen by a majority of the members of the Congress, although the whole time necessary for a visit from either chamber would not exceed ten minutes. To enable you to form distinct ideas of the origin of the foliaceous fibres sent to you, I refer to plate 1, figs. A, B, C; and of the mode of separating them, to plate 2, figs. A1, A2, N and T. By a further reference to the printed articles in the latter part of the report of the house of representatives, under the heads of *agave sisalana*, *musa abaca*, and *bromelia pita*, a few brief notices of each will be seen.

In your editorial remarks, whose general correctness I acknowledge, there appear one or two statements apparently founded on misconceptions. For example, in speaking of the reports, you say, "but both of them are but second editions, revised, corrected and enlarged, of prior publications made in like manner by order of Congress." The fact is, that in the house report, there are but 26 or 28 pages to which that statement is applicable, and in the senate report, not a single page; and the latter report is merely supplementary to the former report. If you have had much experience in committees of legislative bodies, especially where the committees are composed of numerous members, you will appreciate the difficulty of obtaining a unanimous report, either in matter or manner such as the subject may seem to require. Indeed, the documents annexed to each report, are neither the kind that I would have voluntarily selected myself, nor have they the boundaries I should have given to them, nor have they even the arrangement which the order of dates alone would require. Besides, there are subsequent difficulties, to which I cannot now conveniently allude. With respect to your suggestion, that the business of petitioning annually would be more profitable, if I could get half as much as the clear profits of the printers of the documents, the idea might have been better expressed by saying it would be less ruinous to my interests. Since the 11th February, 1837, when I arrived at New Orleans, to the present period, employed solely in promoting the business of my petition, my cash expenditures have far exceeded the value of any township of land in South Florida, if not the whole cost of printing the reports. And as I have no income independent of my professional labors, the cessation of them doubles my losses.

* * *

H. PERRINE.

P. S. Inclosed are four seeds or beans of the *dolichos tuberosus*, or turnip-bean, or bean-turnip of Yucatan, which produced good edible roots in Baltimore in 1834, although planted as late as the 1st of June.

[With the foregoing letter we received specimens of the prepared foliaceous fibres of the *agave sisalana*, forming the coarse but strong Sisal hemp, those of the *musa abaca*, or finer Manilla hemp, and the still finer and softer pine-apple flax, or prepared fibres of the *bromelia pita*. Of the last, a notice was published in this journal, copied from a late English publication. The sight of these beautiful specimens caused to be formed a much higher estimate of the value of these products, than mere description could have done. We wish success to Dr. Perrine's application to Congress, and to its general objects. We can well sympathize with a man of enthusiastic zeal, who has been for years laboring, without encouragement or success, to serve the cause of public improvement.

The seeds of the turnip-bean have been placed in the hands of a gentleman who will do justice to the experiment of their cultivation.]—ED. FAR. REG.

ANALYSIS OF THE SANTEE MARL.

In the latter part of our fifth volume, (page 693,) there was published a letter from F. H. Elmore, esq. describing the marl found in South Carolina on the banks of the Santee, and which accompanied a specimen of the marl in question. We then, upon very slight examination, merely reported that the marl was very rich; and promised a careful analysis, and a report of the results, at a time of more leisure. We are now enabled to state, from recent examination, that the specimen sent was almost a pure carbonate of lime, as it contained more than 98 per cent. The small residue is of very fine clay and vegetable matter, with a minute proportion of silicious sand. The lump was almost as white, and very similar in other respects, (as it was entirely in chemical composition,) to English chalk; the only certain difference being that the American earth is not fit to mark with, like the English. No true chalk has yet been discovered in this country. From the unexampled richness of this specimen, if considered as *marl*, we strongly suspect that there was sent to Mr. Elmore a specimen of the richest parts, and not one selected fairly to show an average quality. We therefore, without further light on the subject, would place more confidence on the analysis reported by our correspondent J. D., on page 173 of last number, as showing a usual or average strength. That marl was from the same part of the country, and doubtless was part of the same deposite, and contained 88 per cent. of carbonate of lime; which is rich enough to induce even the most lethargic of the South Carolinian land-holders to commence its use. We rejoice to learn, from the statement of J. D., that the reproach which, in this respect, has lain on the otherwise energetic and enthusiastic people of South Carolina—and which we have not been backward in urging against them—is now in course of being removed. For, sure we are, that if marling is once tried there, and the effects seen, it is impossible but its use will be rapidly extended. Absence from home prevented our seeing the letter of J. D. until it had been printed; or these remarks would have been made at the time of its publication.

FROM THE PROCEEDINGS OF THE PLANTERS' SOCIETY OF MONTICELLO, S. C.

Report of the Petitioning Committee.

To the Monticello Planters' Society—

At your last meeting, a committee was appointed to petition the Legislature, on behalf of this Society, that it be incorporated, and such other encouragement given, as the State Assembly, in its wisdom, might deem proper. It surely is within the ordinary range of legislative business, to grant Acts of Incorporation: but what is meant when the planter asks for legislative encouragement? On this point, your committee, acting in perfect accordance with your expressed wishes, prayed the state to adopt some course, which would advance the agricultural interests of the whole community—such a course too, as in its results, could not have been construed into an act of partial legislation. We petitioned that body more particularly to appoint a state agricultural surveyor, who should be required to survey our territory, that its entire geological and mineralogical resources might thus be developed; and also asked that agriculture should form a necessary branch of education in our schools and colleges. The committee were well aware, that this society, of itself, required no legislative aid, farther than the mere act of incorporation would imply: it will be seen by the last "acts of assembly," this request has been granted, but nothing beyond that was accomplished. The agricultural movements of South Carolina, in her legislative capacity, are unquestionably to be regarded in any other light than creditable, or, we might add, even respectable.

In similar instances, what has been the action of a few of the other states of the confederacy? In 1836, Maine *imported* 150,000 bbls. of flour: her legislature votes a bounty to the wheat-grower; and the consequence is, her barren lands yield a doubled produce for domestic consumption, *with a large surplus for exportation.* Connecticut has also been benefited in her agriculture, through her legislators *acting* as if they thought the planter within the pale of some legislative protection or cognizance. Massachusetts, within the last two years, has ordered a general agricultural survey of her domain. North Carolina, "according to the report of the civil engineer in 1826," had a vast quantity of lands "covered with waters," and susceptible of being reclaimed: recently, she has voted upwards of $200,000, to be expended in draining off these waters, that lands so fertile might be thrown into cultivation. The Editor of the Farmers' Register (from whose periodical much of the detail in this report is collected) has been using no ordinary zeal and ability to bring this subject in its proper bearing before the Virginia assembly; but Virginia as yet has done possibly less in this way, than South Carolina

Not twelve years ago, "the Agricultural Society of South Carolina" was founded: it promised exceeding fair things, though like many other bubble societies, it scarcely outlived its organization. About the same time, Dr. Cooper presented a document to the legislature, in which he very forcibly urged the expediency of establishing an agricultural professorship in the college over which he then presided: the subject-matter of that document, we presume, was perhaps too utilitarian for the consideration of legislators, whose tenure of office was held at the pleasure of those very planters, whose social and political condition the report was designed no doubt to reach and improve. If there was a necessity *then* for an amelioration of the planter's pursuit, your committee would suppose the occasion more imperatively demands it *now*, when our lands are impoverished, and our population absolutely driven, by state policy, to seek their fortunes in the fields of the west. When Washington recommended an American agricultural board on the English plan, he in all likelihood could have little dreamed that the almost unbounded territory, to which he gave birth, would in less than a century be importing breadstuffs, to support a comparatively sparse population; yet such is the fact, disgraceful as it may seem. It is proper, it is obligatory on the states within their own limits, to apply the remedy to counteract this or any like evil: and so far as South Carolina is concerned, your committee conceive that, as she takes the usual care to collect the landholder's tax, she should be willing to return some sort of equivalent.

All which is respectfully submitted.

B. F. DAVIS, *Chairman, pro tem.*

March 7th, 1838.

CORRECTION OF A MISTAKE. CROPS ON THE RIVANNA.

To the Editor of the Farmers' Register.

May 16th, 1838.

On a late visit from an old and highly esteemed friend of the county of Culpeper, who, from the situation and character of my farm, was led to enquire into the authorship of a piece signed "Rivanna," appearing in the January No., 1836, of your Register—I was induced to correct a false impression which I learned had been made in his section of country, as to the produce in corn of a certain field, the subject of the above communication. This impression was derived from a difference in the mode, not of measuring, but of *counting* measure, in the two countries—in his, by bushels, in ours, by barrels—where, as in Culpeper, we allow five bushels of shelled corn, and twice that quantity of ears, to the barrel. The specification *ears*, was used merely in exclusion of nubbings, of which there was the usual proportion (not counted) in this crop.

In making this explanation, I am constrained by a sense of the importance of particularity in all such communications—considering a departure from it the height of injustice to our fraternity, and to the cause of agricultural improvement—

to correct a trifling error which in some way had crept into the calculation of product of the field alluded to. As some salvo, however, to the pride of veracity and of *counting* of "Rivanna," he has at command data which establish the yield per acre on a fraction less than sixty, to have been twelve barrels, one bushel, and one peck—making the whole quantity, as before reported, 740 barrels of shelled corn. This result was ascertained by a gentleman of high character and acquirements, from the most accurate measurement of square pens containing about 200 barrels each, built with workmanlike precision of straight pine poles; and calculated according to the most approved mode of gauging; which, after corn has *settled*, (particularly in large pens,) will overrun considerably on being measured out by the *tub*.

You will, I hope, Mr. Editor, excuse my having *raked* up an old subject, which might have been allowed, like its own stubble, to die a natural death; but having given to it in the first instance "a local habitation," I feel in the spirit which then prompted me to obtrude it on your readers, a resolute determination to aid in rescuing this portion, at least, of the state in which I live, from an opprobrium that has for more than half a century rested on it—by showing that luxuriant crops of all kinds may be reared on the roots of *huckle*-berry, running-brier, and *persimmon*—meaning no *personality* to some of my brethren of the plough and pen, and to say nothing of *sheep-sorrel, et multis aliis*, of the pests which infest our land.

Most gladly would I redeem the annoyance that this long vaunted crop must have cost yourself and readers, by the promise of another equally good on the same field and with the same work; but this can hardly be hoped for in so unpropitious a season. The cold and dry weather retarding vegetation, and, in doing so, favoring the ravages of innumerable worms, insects and birds on the seed and plants of this crop, and thus throwing together the working of *it* with the preparation for and planting of tobacco, as well as other business of a farm, on which, under good management, *each* should have its allotted time, must embarrass exceedingly the *mixed* operations of farming and planting, which belong peculiarly to our middle region. RIVANNA.

From the Farmer and Gardener.

PATENT BANKING AND DITCHING MACHINE.

We had an opportunity of seeing on Monday, in full operation, a machine for digging ditches, and at the same time making embankments or dikes, which surpasses any thing of which we had formed any conception. The contrivance consists of a wooden foundation of about twelve feet in length, at one extremity of which are two uprights. In these uprights an axle revolves, on which are two arms of cast iron, having at the extremity of each a cross-piece furnished with four or five teeth, as they may be termed. Inside of these cross-pieces are buckets that receive the earth loosened by the teeth, and, as the axis revolves, deposit their contents on an inclined platform, from which the earth passes and forms an embankment on one side of the ditch. The axle is made to revolve by means of cog-wheels connecting it with the gearing. This gearing consists in part of an iron shaft that passes horizontally and a little obliquely in front, and is turned by a capstan. The capstan is provided with a long horizontal arm to which the horse, by which the whole machine is set in motion, is attached. In acting upon this arm the horse walks around the capstan and crosses of course the line of the ditch, but in advance of it. In order to give direction to the machine and prevent it from being drawn aside, there are two guide wheels with sharp edges in the forward portion of the foundation, that cut the sod to the depth of about eight inches. The ditch on which the machine was employed when we saw it, was three feet deep, and three feet and a half wide at the top. It was excavated in an uncommonly hard virgin clay soil, such as is found on the high ground between Fell's Point and the Canton race course.

We were much surprised at the rapidity and perfection with which the excavation was formed, one foot of finished ditch of the breadth and depth mentioned, together with the dike, being formed in a minute, or sixty feet in an hour. It is calculated that a single horse of ordinary strength can propel the machine during ten hours of each day, consequently the extent of trench formed would be six hundred feet. To give an accurate description of this surprising process within the limits of a paragraph, cannot be done, and we must therefore request such as may wish to form a just conception, to witness the performance. In ditching and draining low lands, or dividing prairies where wood is scarce and the soil light or moist, the machine will prove invaluable. The inventor is Mr. George Page, of Keene, N. H. who, as we are informed, undertook to make something answer the purpose at the suggestion of a gentleman at Washington, whose residence is where much draining is required, and but little wood grows. Mr. Edwards, agent for the Sandwich and Boston Glass Company, will furnish any information required.

The above machine has been made for Col. S. D. Wilkens of this city, for the Territory of Wisconsin, in the prairie parts of which it must prove invaluable.

From the Genesee Farmer.

MANUFACTURE OF BEET SUGAR.

The German improvement over the French method of making beet sugar, a patent affair in Europe, consists *simply in drying the beets*, which are then reduced to a powder by grinding, and changed into a decoction by adding water. The experiment has been thoroughly tried by Mr. Zachariah Wilder, of this town, which resulted in *complete success*. Mr. W. by this process, which, we understand, is as simple as that of making a cup of tea from aromatic herbs, has succeeded in extracting *ten per cent. of sugar from the crude beet*—and he is confident that at least *twelve per cent.* can be obtained at another experiment. For his efforts in prosecuting his experiments to signal success, Mr. Wilder deserves the unqualified thanks of the agricultural world. The result of his labors will give an impetus to the culture of beets in Hampshire county, which cannot fail to be productive of lasting good. But to the process again. The dried powder of the beet was found to yield its saccharine immediately, as the decoction was found to be as sweet as boiled maple sirup, the moment the water was added to the powder. The means used for the clarification of the decoction were very simple. Animal charcoal and lime were the only agents employed. This eminently successful experiment proves the fact, that the immensely important article of sugar can be manufactured by any intelligent farmer's household, as easily as bread, pies or cakes, can be made and baked. A rich garden spot of a quarter of an acre, can produce beets enough to make a thousand pounds of sugar; no heavy capital or incorporated company is required to carry on the business. Every individual can make a pound of sugar as cheaply and as easily as he can make a pound of Indian meal. This important fact has just been proved. Now let us look at the amount of sugar brought into Northampton last year. Why, it amounted to *one hundred and seven thousand pounds*, which, together with molasses consumed, would cost over $10,000. This is no inconsiderable sum to be expended by our citizens annually. A dozen resolute farmers, by their *influence* and labors combined, can create that sum from their lands this summer in the culture of the beet. At least, so we think.

PROGRESS OF THE MANUFACTURE OF POUDRETTE IN THE CITY OF NEW YORK.

To the Editor of the Farmers' Register.

New York, May 14th, 1838.

You have probably noticed in the New York Farmer, that I have been engaged for some time past in introducing an improvement in "*city economy*," by which the contents of privies (an article of great value to agriculture, now thrown away, and *worse* than that, as they are *deposited in the rivers around the city*, instead of being, as I trust hereafter they) are to be converted into an inoffensive and portable manure.

The subject was brought to my attention by a French gentleman who is familiar with the process in his native country, and who is now engaged with me in the operation here. We have had many prejudices to combat, on account of the nature of the business, and many difficulties to encounter, in consequence of the general derangement of business, which have delayed our operations; yet we are now preparing about 60 bushels of poudrette daily, and have a prospect of doing much more after a short time, when other business will have resumed its accustomed activity, so that a few additional shares of our stock may be paid for, which will enable us to increase the number of teams required to "remove the deposites." Of the value of poudrette as a manure, no person of my acquaintance, familiar with its preparation, entertains a doubt; yet there are few persons in this country who are sufficiently acquainted with its use to appreciate duly the benefits which will surely result from the labors of those who shall introduce a mode of preparation by which the immense amount of valuable material, now thrown into our rivers, and of course a *nuisance* to all classes of the community, shall be converted into an inoffensive, portable and highly valuable manure. The process of preparation, in my opinion, does not materially, if at all, deteriorate its value, as I will satisfy you when you will visit our works. That you may be better acquainted with the article, and have an opportunity to test its value, as well as its inoffensive character and portability, I send you a barrel, and shall be much obliged by your using it for any kind of vegetables, or grain, or on grass, as may be convenient for you, and noting its effects as compared with other manures. I cannot give practical instruction as to the best mode of application, but will observe that I am using it in my garden for experimental purposes, by putting some in the hill, some in drills, and spreading some broad-cast and raking it in.

I estimate its strength, or value, in the proportion of one bushel of *poudrette*, to eight or ten bushels of good stable or barn-yard manure, and equal bushel for bushel to bone dust. We have not yet, for want of means to extend our works, been able to furnish a bushel to any person except those who have taken a share or shares of our stock, although numerous applications have been made for it in small and large quantities, as well by gentlemen in neighboring states, as by those in this vicinity. To those who pay in $100, or take a share, we furnish *two hundred* bushels of poudrette as their annual dividend, within *three* and *six months* from the time of payment, which is equivalent to *sixty* per cent. on their investment, as we can receive thirty cents at the works for every bushel we can make.

We hope soon to be able to extend our works largely in order to increase the quantity prepared, so as in some measure to supply the demand for the poudrette.

I am in hopes that important benefits will result from this new source of improvement to agriculture. I say *new* source—it is new in *this* country, at least to much extent. The inquiry is "*how*," and "*how much*," to use—not is it *useful*; as every person, at all conversant with such matters, understands the value of the *raw material*, as well as the difficulty of its application.

I hope to hear from the *effects* of the barrel sent to you.

With much respect, I am very truly yours,

D. K. Minor.

From the Genesee Farmer.

RAISING CLOVER SEED.

In raising clover for seed, in order to procure a good crop, it is first requisite that the land be fertile: that it be well prepared before sowing; and that a sufficient quantity be sown to yield a full and even crop.

The second and most difficult object to attain, is to secure the crop when ripe, so as to save the largest portion possible of the seed. To do this, it must be cut at a proper season. As the seed ripen at different periods, if the crop is cut too soon, there will be a loss sustained from the immaturity of the seed. If cut too late, those seed first ripe will be liable to be entirely lost by being shattered off in the field. Hence there is a certain medium to be observed, to prevent these two evils, which is, to cut the crop when about two-thirds of the heads have become black; a large portion of the remainder will ripen by the nourishment they obtain from the straw during the drying process. Where the clover is not lodged, it is much the best to cut it with a cradle, laying all of it in double swaths; and securing the heads from falling through the fingers of the cradle by stitching a piece of linen cloth upon them.

After the crop is cut, it must be suffered to remain in the field long enough to become dry; this, if the weather is good, will be in a very few days. It must then, when the dew is upon it, be raked into small bunches, (such as would be a convenient load for a fork,) and when sufficiently dry, placed carefully upon a sled or wagon, and drawn into the barn. If the weather is unfavorable, it becomes necessary to turn these bunches repeatedly, to prevent their being injured by the moisture. Indeed, this should be done even in fair weather, if they remain out longer than two or three days. When drawn into the barn, the crop may be either stowed away in mows, or else thrashed out immediately, and the heads and chaff placed in a room for the purpose, for ultimate cleaning. This may most generally be done best in winter.

If farmers could always raise their own seed, and in sufficient abundance, it would be much better to sow it in the chaff, as it is generally found to be more certain to grow. The only advantages of cleaning are, the more exact determination of the *quantity* to be sown, and the more equal distribution of the seed; and where it is raised for sale cleaning is of course requisite. When sown in chaff, the difficulty with regard to quantity and distribution may be obviated by sowing sufficient to insure the desired thickness on every part of the ground.

By far the best method of cleaning is by means of a machine; but as this is not always to be had, the practice of treading it out by horses is then to be resorted to, though it is tedious and unpleasant. It is thus performed. The barn floor is covered with chaff about a foot in thickness, and the horses are driven upon it one day. The next morning it is to be passed through a fanning mill, and the chaff and dust which has been beaten off will be blown away; the clean seed will pass through the screen; while a third and larger portion, containing the seed yet in the chaff, will drop in the rear of the fanning mill. This is to be spread a second time upon the floor, mixed with a fresh portion of unseparated chaff, and again trodden by the horses; the second morning repeat the same operation, and a much larger portion of clean seed will be obtained. The operation is thus to be repeated until the whole of the chaff is separated.

In order to clean the seed properly for market, it is necessary first to run it through a sieve of just such a degree of fineness as to permit the clover seed to pass through, but retain all large substances. It must then be passed through a sieve just fine enough to retain the clover seed, but to suffer all smaller seeds to pass through. In this way it is effectually cleaned.

By proper attention and care, three or four bushels may be easily obtained from an acre of land.

J. J. T.

THE ADVANTAGE OF USING SUB-CARBONATE OF SODA IN WASHING CLOTHES.

[The following short article was before published in the Farmers' Register, nearly three years ago; and the since well-tested value of the practice induces us, contrary to our usage, to re-insert the directions, for the benefit of the many later subscribers, as well as the many older ones, who passed over the former publication without notice. The saving of labor by using this plan, is thought to be so great by some of the ladies of our acquaintance, that if nothing else had been gained by their husbands from the Farmers' Register, they think that for this little article alone they might well afford to pay a subscription for life.

As it may not always be convenient, in country places, to obtain lime-water, cheap as it is, it is proper to say that that ingredient may be omitted without sensible injury to the process. The sub-carbonate of soda is now getting into extreme use for this purpose, and may be bought at any apothecary's shop, at 12½ cents the pound.—ED. FAR. REG.

[From the Essex North Register.]

In this day of improvements, few have been suggested of more importance, especially to females, than the new mode of washing clothes, which has been introduced into this town [Newburyport] through the agency of two benevolent individuals, now residing at a distance from us. It has been tried by quite a number of females with complete success, and those who have tried it are desirous of communicating it extensively, that others may reap the same benefit which has accrued to them. It is to be used only for white clothes. It does not answer the purpose in case of calicoes and woollens.

1. *Mixture*—Five gallons soft water, add half a gallon of lime water, a pint and a half of soft soap, or a pound of hard soap, and two ounces of carbonate of soda.

2. *Method of washing*—Soak the clothes over night if very dirty, at any rate wet them thoroughly before putting them into the mixture. When the above mixture is at *boiling heat*, put in the clothes that have been soaked or wet, merely rubbing those parts with a little soap that are unusually soiled. Boil them *one hour*. They are then to be taken out and drained, and thoroughly rinsed in warm water, then in the indigo water as usual, and they are fit for drying. The lime water may be prepared and kept on hand—the soda, sub-carbonate, (be sure to get the right kind) may be procured cheap, by purchasing it in a large quantity. Let all who feel that washing-day is a day of hard work and weariness, cease to complain, until they are willing to try this safe, easy and expeditious mode of lightening their burdens.

From the Franklin Farmer.

BLUE GRASS.

This grass, which constitutes the glory of Kentucky pastures, is esteemed superior to all others for grazing. It flourishes only on calcareous soils. Opinions and practice vary here, as to the best time of sowing it—some preferring September, for the same reasons, chiefly, which relate to timothy or other grasses, others preferring February or March, to obviate the danger of the tender roots being winter killed. It is sown either on woodland or open ground—in the latter case most generally after a succession of exhausting crops in old fields. If sown on woodland, the leaves, brush and trash must be raked off or burnt. It is particularly important to burn the leaves, else the seed may be blown away with them by the wind, or if not blown away, the leaves may prevent the seed reaching the earth and thus defeat their germination. Many of those who sow in winter, prefer casting the seed on the snow, as it enables them to effect the operation with more neatness and uniformity. In woodlands, the grass must not be grazed the first year, or at all events till after the seeds have matured. In open land, the practice has been adopted by some, of mixing timothy and clover with blue grass, in which case, half a bushel of the latter seed to the acre, is sufficient. The advantage resulting from this is, that it secures at once, a well covered pasture that will bear considerable grazing the first year. The blue grass, in a few years, expels the other grasses, and takes entire possession of the field. On open ground, it is frequently sown in March upon wheat, rye or oats. If the season is favorable, it may be sown in April; but should the weather prove dry, a great portion of the seed will be lost. It is the practice, we believe, of most graziers, to put upon a given pasture, as much stock as it will maintain, without shifting them during the season, as, besides saving labor, it renders the cattle more quiet and contented. Others, however, fence off their pastures into separate divisions, to undergo a regular succession of periodical grazings. This plan secures a constant supply of fresh grass, very grateful to the animals, and is believed to be more economical, as much less is trampled and rejected by the cattle. The number of animals to the acre, must depend upon their size and the quality and quantity of grass. The grass on open ground is much more abundant, sweet and nutritious, than on woodland, and consequently will maintain much more stock, perhaps nearly twice as much; while open woodland will produce much more and better grass than that which is deeply shaded. The best graziers extirpate, as fast as possible, every tree not valuable for timber or wanted for fuel, and some even prune the branches of those which are allowed to remain. But we shall soon, we hope, be able to present this subject more at large, in some numbers which are preparing, on the grazing and stock-feeding systems of Kentucky, which we trust will prove interesting to all our readers and particularly instructive to the farmers in the southern portion of the state and Tennessee. Although we wish well to the tobacco growers on Green river, and would cheerfully lend our aid to promote their particular interests in that pursuit, we wish they could be persuaded to adopt, in its stead, the grazing business; for we are confident it is a much more productive, and certainly a more agreeable and less laborious one.

From the Genesee Farmer.

BEST TIMBER FOR PUMP LOGS.

Friend Tucker—It may be thought too aspiring by some, for an old man of 82 years of age, to begin to write for newspaper inquiries; but seeing some inquiries and communications in several of the numbers of this year's Genesee Farmer, respecting the best method of conducting water in logs to the place desired, I would inform friend Southhill, as I have had some experience in conducting the water to my house from a distance, near forty years, in logs, of the sort of timber I used, and the manner of laying the logs, in as concise a manner as I can, and the length of time they have been in operation, from actual experience. The timbers used were all poplar (or what is called the tulip tree), except three logs, two of which were white oak, the other of chestnut—all green, with the bark on, of the size of from one foot to fifteen inches in the but-end, and not less than eight inches in the top-end. They were bored with an augur of two and a quarter inches, and put together similar to a pump, but without any iron bands. They were put in a trench three feet deep, in the year 1797, the 8th month. They answered every purpose I could expect, until 1830, at which time some of the joints began to leak. In the year 1835, I had them taken up, as they were not likely to convey a sufficient quantity of water. The distance from the spring-house to the head of the spring, was 33 poles, and the descent three feet. The end of the pipe in the spring-house was 18 inches higher than the rest, until within three or four poles of the spring-head, for the purpose of keeping the air out, to prevent it from rotting. The logs were from fifteen to twenty-eight feet long. When taken up, it appeared that the deficiency was at the joints, the hole being worn to the size of four, and some five inches, which originally was but two and a quarter inches. A number of the joints were worn entirely through, the small end having been tapered to join them together. I had the pipes laid the second time, with timber similar to the first, one half new logs, the other half were of the best and largest of the old logs that had been in 38 years, and appeared to be in good condition.

I had them laid in a different manner. All the logs were cut square at the ends, and were joined together by a band or ring of iron from seven to eight inches in the clear, three inches broad and one-eighth thick, sharpened at both edges and drove in between the ends of the logs so as to leave an opening between of half an inch, which was filled with slacked lime before covering, to prevent the iron from rust. In order to have the bands extend equally in both logs, I had a chisel made the same circle of the bands, three inches wide, and drove in each end of the log one inch, previous to putting them together. There has not been the least appearance of any deficiency at this time.

A PENNSYLVANIA FARMER.

Wood Lawn, 4th mo. 10th, 1838.

From the Genesee Farmer.

BARLEY.

The increasing attention which is paid to the culture of barley—the profits of the crop—its value as a preparative for wheat—and the favor which it finds as a substitute for wheat in making bread, are entitling it to a high rank among the grains cultivated in this country.

According to Loudon, there are six species and sub-species of this grain in cultivation, besides varieties.

Hordeum vulgare, or spring barley, is distinguished by its double row of beards or awns, standing erect, and its thin husk, which renders it favorable for malting. This is the sort commonly grown in the southern and eastern districts of both England and Scotland.

Hordeum cœleste, or Siberian barley, is a variety of early or spring barley, much grown in the north of Europe, having broader leaves, and reckoned more productive than the other.

Hordeum hexastichon, winter barley, or as it is called in Scotland, square barley, is a variety known by having six rows of grains, large and thick-skinned, and for that reason not considered as favorable for malting.

Barley bigg, is a variety of winter barley, known by its always having six rows of grains, by the grains being small and thick-skinned, and being earlier than the preceding or parent variety. It is hardy, and chiefly grown in Scotland.

Hordeum distichon, common, or long-eared barley, is known by its long spike or ear flatted transversely, and its long awns. It yields well, though some object to it, because the ears being long and heavy, they think it apt to lodge.

Hordeum distichon nudum, or naked barley, is known by the awns falling easily, and when ripe, almost of themselves from the chaff, when the ear somewhat resembles wheat, and by some is called wheat barley. It is spoken highly of in the British Husbandry, as being hardy in growth, strong in the stem, tillering with great vigor, and producing abundant crops of fine grain. By some, this variety is considered the same as spelt wheat, which indeed it strongly resembles. It is six rowed.

Hordeum zeocriton, sprat or battledore barley, is known by its low stature, coarse straw, short broad ears, and long awns. It is but little cultivated.

New varieties of barley are produced in the same manner as in wheat, by crossing, and some of the most celebrated kinds, such as the chevalier, annat, &c. have originated in this way.

In this country but two varieties are sown, and these are familiarly distinguished as the two and the six-rowed. They are always sown in the spring; no kind in the United States being able to endure the severity of our winters, or at least we know of no variety which has been attempted here as a winter or fall-sown grain. The comparative value of the two varieties does not seem to have been fully decided by our farmers, some preferring one kind and some the other. That the two-rowed will make the most flour from a given number of pounds—that its thin skin renders it more suitable for malting—and that it is rather less liable to be affected by smut than the six-rowed, seems to be generally conceded; but its productiveness is much disputed, and it would seem with some reason, as the greater length of the ear in the two-rowed, would hardly compensate for the greater number of rows in the other variety. So far as we are able to judge, however, from the opinions of experienced farmers, the preference, for the reasons assigned, is becoming more decided in favor of the two-rowed.

Barley of every variety requires a rich, friable and mellow soil, which retains a moderate quantity of moisture, but without approaching to that which may be denominated wet; as for instance, land which contains from 50 to 65 per cent. of sand, and the remainder chiefly clay, though in situations where the climate is usually moist during the summer, it may be grown where sand is in the soil in a larger proportion. It succeeds best in what farmers term a rich deep loam, and with too much sand, or too much clay, will not produce good crops. With the single exception, that it will succeed with less lime than wheat, soils that will produce good wheat, will also grow barley to advantage.

It is probable that more barley is grown in the state of New York than in all the rest of the United States, and the section in which it is produced in the greatest abundance and perfection, is the northern slope of western New York. The ranges of towns which mark the geological separation of the argillaceous and limestone districts, have hitherto yielded the greatest quantities of barley, and in them the culture is still rapidly extending. On this slope, it is found that soils on which winter wheat without extra care in cultivation, is very liable to freeze out in the spring, will produce heavy crops of barley, and hence clover and barley on many farms have taken the place of clover and wheat, affording about the same profit in the crop and at a less expense of labor. This is particularly the case in the country reaching from the Oneida to the Canandaigua lakes, including a part of Madison, Onondaga, Cayuga, Seneca, Yates and Ontario counties. On what is called the great limestone region of west New York, wheat will undoubtedly be preferred to barley as an article of culture; and it may be remarked as a general rule, that on all soils where good barley can be grown, the suitable application of lime will ensure the success of wheat.

Perhaps there is no crop which demands and repays thorough working of the soil better than barley. The surface when fitted for the reception of the seed, can hardly be made too fine; and the excellence of the crop is greatly dependent on this point. A crop that occupies the ground so short a time as barley, spring wheat or oats, can hardly be benefited by manure applied directly to them, unless in a thoroughly decomposed state; and hence it has been found by experience, that these crops succeed better after hoed or root crops to which the manure has been applied, or on turf lands that have received a top-dressing of manure, and been carefully turned over in the fall of the year. The practice, somewhat extensively followed, of sowing winter wheat after barley, has led to the application of the manure to the barley crop; and perhaps where hoed crops cannot precede, this is the preferable way, though there is a great risk of too much straw, and the consequent lodging of the barley before ripening.

Barley should be sown in all cases, as soon as the ground is sufficiently dried and warmed to allow the seeds to germinate freely, and place them beyond the danger of injury from frost. Early frosts are more fatal to barley than to spring wheat or oats, and more injurious on wet or low lands than on dry or elevated ones. Particular attention must be paid to the dryness of the soil at the time of sowing, especially if naturally inclining to wet, as on such soils a wet spring will starve and destroy the plants. "Steeping the seed for twenty-four hours in soft water, will cause the grain to germinate at the same time; and this, if it is sown at a late period, is of more importance than may be generally imagined, as it is otherwise apt to ripen unequally." (Brit. Hus.) The finest, heaviest samples of all grains are usually obtained from early sown fields; and the difference in weight in barley and oats, is from one-fifth to one-third in favor of early sowing. The smut is the only disease to which barley is subject, and this is rarely a serious injury, where the crop is grown on favorable soils, or the seed is put in in good order. The worm which has proved so destructive to wheat in the eastern counties, has also injured the barley in a considerable degree; but in west New York, we have neither seen nor heard of its appearance in this grain. The wire-worm is sometimes very destructive to the crop when young; and in some seasons, the meadow mole, so called, when the grain approaches maturity, makes sad havoc by cutting down the plant to get at the ears; an effect more often observed when the barley is sown on turf leys, as they will rarely lie so close as not to leave numberless hiding-places to the animal.

In sowing barley, as in most other crops, the universal experience of English farmers, and the directions of the best works on agriculture, go to establish the fact, that less seed is required on rich lands than on poor, and that the quantity of seed used should be increased in proportion to the lateness of the sowing. In European countries, from ten to eighteen pecks per acre is used; sixteen being the quantity usually recommended; in this country from two to three bushels is considered sufficient for the acre. The two-rowed requires less than the six-rowed, as it tillers more vigorously; and if sown too thick, the plants will be weak and ripen irregularly.

Both the quantity and quality of the product depend on the soil, and the variety of the grain sown. In this country, the average crop may be stated from thirty to thirty-five bushels per acre; in England, the average produce is estimated at thirty-two bushels. Middleton says, the crop in that country varies from fifteen to seventy-five bushels an acre. The greatest crop we have seen mentioned in this country was sixty-five bushels per acre, and that was grown on land from which several crops had been taken in succession. In an experiment made by the East Lothian Agricultural Society upon the chevalier, and a common sort of barley, both sown on a light gravelly soil, the produce of each per imperial acre, was—chevalier, 65 bushels 2 pecks of grain, weighing $56\frac{3}{4}$ lbs. per bushel. Common barley gave 61 bushels 2 pecks of grain, and weighed $54\frac{3}{4}$ lbs. per bushel.

Good qualities of the two-rowed, will average about 52 or 53 lbs. per bushel; but the winter, or six-rowed varieties, will not exceed 43 to 46 lbs. The difference in malting is great; the experiments of Dr. Smith, showing that a Winchester quarter of the several varieties, when malted, would produce the following quantities of proof spirits, viz:

English barley	about	$21\frac{1}{4}$	gallons,
Scotch barley	"	$19\frac{1}{4}$	"
Scotch bigg	"	$16\frac{1}{4}$	"

Or that English barley was 11 per cent. superior to Scotch, and full 12 per cent. above Scotch bigg, or winter barley.

The value of the several kinds of grain as an article of food, may be estimated from the following table; the quality of the flour being good household or family flour.

Wheat, if weighing	60 lbs. of flour	48 lbs. of bread	64 lbs.
Rye,	54	42	56
Barley,	48	$37\frac{1}{2}$	50
Oats,	40	$22\frac{1}{2}$	30

(*Brit. Hus.*)

The analysis of barley by Sir H. Davy, gives as contained in 100 parts:

79 per cent. of mucilage or starch,
7 of saccharine matter,
6 of gluten or albumen.

Owing to the deficiency of this latter substance, or gluten, barley flour, like that of oats, buckwheat or potatoes, cannot be made into bread alone, but is mxied with wheat flour, or eaten in the form of cakes, when it is very wholesome and palatable.

Barley is perhaps one of the most difficult of the grains to secure in good condition; as, if suffered to stand until the berry is perfectly dry and hard, the head will frequently drop down, owing to the brittleness of the straw; and if cut too early, the grain will shrink and lose in weight; and as it cannot when cut in an unripe state be put into barns or stacks without certain injury by heating, so in unfavorable weather it is very apt to become of a black color, and lose the clear yellowish-white tinge so characteristic of good and well-cured barley. The usually fine state of our atmosphere, and the clear dry air of our summers, render the proper curing of barley a much less difficult task here, than in the moist climate and cloudy skies of Great Britain.

Before the introduction of threshing machines, barley, though easily threshed by horses or by hand, was with great difficulty prepared for market, owing to the obstacles offered in separating the awn from the kernel; and at the present time in many districts of England, and most parts of the continent, the *hummeling*, or freeing the berry from the beard, is one of the most laborious and difficult processes in the culture of barley.

Barley is extensively used in the fattening of pork, for which purpose it is admirably adapted when prepared by steaming or grinding; and in the districts where it is grown, is an excellent substitute for the corn crop, which for a few years past has been a partial failure. It is also used in large quantities in our breweries, and in too many instances takes the place of rye in the manufacture of whiskey. As a feed for horses it is not generally approved, but for fattening cattle, hogs and poultry, it is highly prized. Before the system of cutting straw, or manger-feeding was generally adopted in Great Britain, barley straw, owing perhaps to its being cut early, was used as food for cattle in preference to others, as cattle could eat it uncut more readily than the harder straws. Wheat or oat straw is now preferred when it is to be converted into chaff, or cut fine for mixing with hay or roots. There are varieties of barley found in the shops, pearl and Scotch, both of which are prepared by divesting the kernel of its husk in mills, resembling in some degree the rice-mills of the south; and in the case of the pearl barley, the grinding or rubbing is continued until the berry assumes a smooth round form. Few articles are more nutritious, or better adapted to the stomachs of the weak or the valetudinarian.

From the London and Edinburgh Philosophical Magazine.

ON THE FORMATION OF MOULD.

By Charles Darwin, Esq., F. G. S.

The author commenced by remarking on two of the most striking characters by which the superficial layer of earth, or, as it is commonly called, vegetable mould, is distinguished. These are its nearly homogeneous nature, although overlying different kinds of subsoil, and the uniform fineness of its particles. The latter fact may be well observed in any gravelly country, where, although in a ploughed field, a large proportion of the soil consists of small stones, yet in old pasture-land not a single pebble will be found within some inches of the surface. The author's attention was called to this subject by Mr. Wedgwood, of Maer Hall, in Staffordshire, who showed him several fields, some of which, a few years before, had been covered with lime, and others with burnt marl and cinders. These substances, in every case, are now buried to the depth of some inches beneath the turf. Three fields were examined with care. The first consisted of good pasture land, which had been limed, without having been ploughed, about twelve years and a half before: the turf was about half an inch thick; and two inches and a half beneath it was a layer, or row, of small aggregated lumps of the lime, forming, at an equal depth, a well-marked white line. The soil beneath this was of a gravelly nature, and differed very considerably from the mould nearer the surface. About three years since cinders were likewise spread on this field. These are now buried at the depth of one inch, forming a line of black spots parallel to, and above, the white layer of lime. Some other cinders, which had been scattered in another part of the same field, were either still lying on the surface, or entangled in the roots of the grass. The second field examined was remarkable only from the cinders being now buried in a layer, nearly an inch thick, three inches beneath the surface. This layer was in parts so continuous, that the superficial mould was only attached to the sub-soil of red clay by the longer roots of the grass.

The history of the third field is more complete. Previously to fifteen years since it was waste land; but at that time it was drained, harrowed, ploughed, and well covered with burnt marl and cinders. It has not since been disturbed, and now supports a tolerably good pasture. The section here was, turf half an inch, mould two inches and a half; a layer one and a half inch thick, composed of fragments of burnt marl (conspicuous from their bright red color, and some of considerable size, namely, one inch, by a half broad, and a quarter thick,) of cinders, and a few quartz pebbles mingled with earth; lastly, about four inches and a half beneath the surface was the original, black, peaty soil. Thus beneath a layer (nearly four inches thick) of fine particles of earth, mixed with some vegetable matter, those substances now occurred, which, fifteen years before, had been spread on the *surface*. Mr. Darwin stated that the appearance in all cases was as if the fragments had, as the farmers believe, worked themselves down. It does not, however, appear at all possible, that either the powdered lime or the fragments of burnt marl and the pebbles could sink through compact earth to some inches beneath the surface and still remain in a continuous layer. Nor is it probable that the decay of the grass, although adding to the surface some of the constituent parts of the mould, should separate, in so short a time, the fine from the coarse earth, and accumulate the former on those objects which so lately were strewed on the surface. Mr. Darwin also remarked, that near towns, in fields which did not appear to have been ploughed, he had often been surprised by finding pieces of pottery and bones some inches below the turf. In a similar manner on the mountains of Chili he had been perplexed by noticing elevated marine shells, covered by earth, in situations where rain could not have washed it on them.

The explanation of these circumstances, which occurred to Mr. Wedgwood, although it may, at first, appear trivial, the author did not doubt is the correct one, namely, that the whole is due to the digestive process, by which the common earth-worm is supported. On carefully examining between the blades of grass in the fields above described, the author found, that there was scarcely a space of two inches square without a little heap of the cylindrical castings of worms. It is well known that worms swallow earthy matter, and that having separated the serviceable portion, they eject, at the mouth of their burrows, the remainder in little intestine-shaped heaps. The worm is unable to swallow coarse particles, and as it would naturally avoid pure lime, the fine earth lying beneath either the cinders and burnt marl, or the powdered lime, would, by a slow process, be removed, and thrown up to the surface. This supposition is not imaginary, for in the field in which cinders had been spread out only half a year before, Mr. Darwin actually saw the castings of the worms heaped on the smaller fragments. Nor is the agency so trivial as it, at first, might be thought; the great number of earth-worms (as every one must be aware, who has ever dug in a grass-field) making up for the insignificant quantity of work each performs.

On the above hypothesis, the great advantage of old pasture land, which farmers are always particularly averse from breaking up, is explained, for the worms must require a considerable length of time to prepare a thick stratum of mould, by thoroughly mingling the original constituent parts of the soil, as well as the manures added by man In the peaty field, in fifteen years, about three inches and a half had been well digested. It is probable however, that the process is continued, though at a slow rate, to a much greater depth; for as often as a worm is compelled by dry weather, or any other cause, to descend deep, it must bring to the surface, when it empties the contents of its body, a few particles of earth. The author observed, that the digestive process of animals is a geological power which acts in another sphere on a greater scale. In recent coral formations, the quantity of stone converted into the most impalpable mud, by the excavation of boring shells and of nereidous animals, is very great. Numerous large fishes (of the genus *Sparus*) likewise subsist by browsing on the living branches of coral. Mr. Darwin believes, that a large portion of the chalk of Europe was produced from coral, by the digestive action of marine animals, in the same manner as mould has been prepared by the earth-worm on disintegrated rock. The author concluded by remarking, that it is probable that every particle of earth in old pasture land has passed through the intestines of worms, and hence, that in some senses, the term "animal mould" would be more appropriate than "vegetable mould." The agriculturist in ploughing the ground follows a method strictly natural; and he only imitates in a rude manner, without being able either to bury the pebbles or to sift the fine from the coarse soil, the work which nature is daily performing by the agency of the earth-worm.*

DISEASE AMONG THE SHELL-FISH.

"One of the most curious phenomena of the year (1836) has been the fatal effect of an epidemic disease among the molluscous animals or shell-fish of the Muskingum river, (Ohio.) It commenced in April and continued until June, destroying millions of that quiet, retiring race, which people the beds of streams. As the animal died, the valves of the shell opened, and, decomposition commencing, the muscular adhesions gave way, and the fleshy portion rose to the surface of the water, leaving the shell in the bed of the stream. As these dead bodies floated down the current, the heads of islands, masses of fixed drift-wood, and the shores in many places, were covered with them, tainting the air in the vicinity with putrid effluvia. The cause of the disease amongst the shelly race, remains as much a mystery as that of the Asiatic cholera amongst the human family."—*Dr. S. P. Hildreth, Journal of Science.*

* Since the paper was read, Mr. Darwin has received from Staffordshire the two following statements:—1. In the spring of 1835 a boggy field was so thickly covered with sand that the surface appeared of a red color; but the sand is now overlaid by three-quarters of an inch of soil. 2. About eighty years ago a field was manured with marl; and it has been since ploughed, but it is not known at what exact period. An imperfect layer of the marl now exists at a depth, very carefully measured from the surface, of twelve inches in some places, and fourteen in others, the difference corresponding to the top and hollows of the ridges or butts. It is certain that the marl was buried before the field was ploughed, because the fragments are not scattered through the soil, but constitute a layer, which is horizontal, and therefore not parallel to the undulations of the ploughed surface. No plough, moreover, could reach the marl in its present position, as the furrows in this neighborhood are never more than eight inches in depth. In the above paper it is shown, that three inches and a half of mould had been accumulated in fifteen years; and in this case, within eighty years (that is, on the supposition, rendered probable from the agricultural state of this part of the country, that the field had never before been marled) the earth-worms have covered the marl with a bed of earth averaging thirteen inches in thickness.

From the Genesee Farmer.

GERMINATION OF THE ACACIA OR LOCUST SEED.

Mr. Loudon, in his Magazine of Natural History, states that Sir John Herschel lately sent some seeds of the acacia from the Cape of Good Hope, with directions to scald them to ensure their growth. Mr. L. having received some of them, subjected them to the following experiments:—two were placed in boiling water, and left to soak for an hour, until the water had become cool; two were kept at the boiling temperature for one and a half minutes. Some were sown immediately under a hand-glass in the open border; and the rest were kept for three or four days and then sown in a hotbed. The following are the results:—

Under the hand-glass.

1 boiled	$1\frac{1}{2}$	minutes failed.		
1 do.	3	do. came up in	14	days.
1 do.	6	" "	13	"
1 not steeped at all did not germinate.				

In the hotbed.

1 boiled	$1\frac{1}{2}$	minutes came up in	8	days.
1 "	3	" "	7	"
1 "	6	" "	7	"
1 "	15	" "	13	"
2 in boiling water left to cool			9	"
2 not steeped came up in			21	"

Nothing can more forcibly show the hardness of the envelopes, or the tenacity of life in the acacia, than the germination of the seed after boiling 15 minutes. We have a number of times scalded the locust seed to produce germination, no other mode being so speedy or effectual.

From the Southern Agriculturist.

SUN-FLOWER CULTURE.

Effingham County, Geo. Feb. 10, 1838.

Mr. Editor,—In your last September number, I saw a communication relative to the sun-flower, and as you seem willing to "gather up the fragments, that nothing be lost," I take the liberty of saying, that I have been in the habit of planting the sun-flower a number of years, to a limited extent.

There are several fences, which lead from my yard fence, to the surrounding woods—the weeds and grass growing up in the fence corners, formed ready ways for snakes to visit the yard. To prevent this, the hoe is used to keep these ways clean, and so prevent the temptation to their visits.

Now, while all this operation is going on, I have two hills of sun-flowers growing in every fence corner; two stocks (or say three or four) in a hill, planted early in the spring. About the time that my long forage gives out, these begin to bloom. As the blossoms begin to appear, I cut them off about a foot from the ground, and give to my horses, which eat them very readily,—leaves, buds, stocks, and all. This I consider a very wholesome, as well as nutritious food. Thus the ground that has to be kept clean, to prevent unwelcome visiters, is made in the mean time to yield profitably.

If, in your judgment, you think proper to introduce this scrap to the company of your more useful communications, it is at your service.

A SMALL GOSHEN FARMER.

REMARKS ON, AND SOME OBJECTIONS TO, THE ESSAY ON "AGRICULTURAL HOBBIES AND HUMBUGS."

To the Editor of the Farmers' Register.

May 15th, 1838.

I have been so much amused with your article on agricultural hobbies and humbugs, (p. 47, vol. VI.) and think most of your remarks so perfectly just, that I could hardly prevail on myself to express my dissent from such as I cannot concur in: nor would I do it, but for your often-avowed desire to have all your opinions freely canvassed, where any good to our cause might possibly result from it, in the opinion of those who may differ from you. I have very rarely been among that number; and where I have, it has been, in each case, with much distrust of my own opinion, and not a little fear, that my readers might so far mistake the motives of my communications, as to ascribe them, rather to the silly vanity of seeing myself in print, than to their real cause—which has ever been, the hope of promoting, in some degree, the great object of your paper. With this anchor thrown out to windward, I shall commence my objections.

The first is—for your apparent preference to corn with the largest cobs, of which you say, it "is evidently and mathematically true, if the grains are of equal size, there will be more encircling a *large* than a *small* cob." Now to me it appears "evidently and mathematically true," that this depends upon the grains being of equal *width*, and *not* on their equality of size; for a *broad* grain may be of equal size with a *long* one, although the latter will certainly out-number the former, although the length and diameter of their respective cobs be precisely the same. Again, it "is evidently and mathematically true," that although *one large single ear* with a *large* cob, will have more grain than any *single ear* with a *small* cob; yet, if the small cob variety produces several more ears, under similar circumstances, on a single stalk, of which there are many unquestionable proofs, in regard to the twin-corn, than the large-cob varieties, the former will, with mathematical certainty, produce the most grain. In the case of the twin-corn, fairly and accurately compared with two other very popular varieties, both having very large cobs, I have ascertained by actual measurement, the difference in favor of the twin-corn was as nine to seven.

Your second opinion from which I dissent, is that wherein you say, that "you have no faith either in the reasonings or the supposed results of choosing seed-wheat," either for the large size of the grain, the large number of grains in the head, or the large number of stalks and quantity of grain from a single seed. This seems tantamount to a belief, that the only circumstance worthy of attention in the choice of seed-wheat, or indeed of any other seed, is, to be sure it will vegetate. In other words, that none are susceptible of any improvement worth regarding, merely by selecting that which appears to possess most of those qualities almost universally believed to be essential to the perfection of all seed. I say almost universal, for I do not recollect ever to have met with but one person who entertained the opinion I understand you to express on this highly interesting subject. Possibly, however, I may misunderstand you; and since nothing is farther from my wishes, let me repeat what you seem to me to have said. First, in regard to seed-wheat, that you disbelieve the common notion, that more product can be secured from the land by choosing seed, either for its size, the large number of grains in the head, or the large number of stalks and quantity of grain from a single seed. Secondly, in regard to seed-corn, or any other seed, I understand you to say, that you have not the slightest faith, "that larger crops can be obtained by choosing seed on account of *the form, size, or number of grains, or the size or number of ears, &c.*" Now this "*et cætera,*" I must presume, comprehends all the other qualities usually attributed to, and sought after in seed; in all which, you say, that "*you have not the slightest faith.*" But if none of them are worth regarding, does it not follow, undeniably, that the sole ground of preference left is, that *one* sample will vegetate better than *another?* It is true that you qualify, in some degree, your sweeping anathema against the common creed and practice, by saying—you do not deny—that particular varieties of plants *may be somewhat more productive* than others which are equally suitable to the same soil and climate; yet this is but cold encouragement, and is a very different thing from admitting the fact. Indeed, it seems nearly the same as declaring that you do not fully believe it; although you give us the result of no experiments made by yourself or others to confirm this strongly-implied scepticism. You have classed both the creed and the practice which you condemn, among "*hobbies and humbugs;*" and there is nothing of which your "good-enough" farmers, (by far the most numerous class among us,) have such a mortal dread, as the ridicule attached to hobby-riding.

In another place, speaking of varieties of corn, your infidelity as to their relative productiveness, is not left to implication, for you positively avow that "your views are utterly opposed to the belief, that either the Maryland twin-corn, the Baden-corn, or the Dutton-corn, are more productive in a very great degree, than other varieties in *any* situation;" although it does not appear that you yourself have ever made, even a single comparative trial, to ascertain whether the opinion be true or false. Now, if you admit a difference of somewhat more than 15 per cent., to constitute a very great degree, as most corn-makers would probably deem it, your own paper, I think, has furnished a sufficient number of facts (unless you discredit them,) to conquer your incredulity—at least, as to the twin-corn; for several of your correspondents have stated to you something much more credible than mere "*supposed results.*" But the utmost difference in productiveness you seem willing to admit possible, either between varieties of corn, or of any other plants, is marked by the very qualified and discouraging expression, "*somewhat more productive.*" This indicates so little difference, that were the opinion to become general, it would very soon, I think, effectually prevent all trials whatever between varieties of plants, unless made for some other purpose than to ascertain which would produce most.

In commenting upon Mr. Carmichael's opinion, that more than 15 per cent. difference may be expected from twin-corn in fertile land, you remark, that "this amount of increase, if actually ascertained, is sufficiently great to induce the trial of this corn, on soils recommended as suitable, and in a latitude not very different from that of Queen Ann's county, Md. But this increase is far short of what the sanguine expect; and the writer entirely objects to planting it on any but the very small portion of *rich lands.*" Now, I do not thus understand him; for his words, as you give them, are—"my experience induces me to think, that no great advantage is derived if this corn is planted on lands naturally poor, or exhausted by cultivation." This certainly admits *some advantage*, even on such lands, and is very different from an entire objection; although to plant any one thing in preference to another, in a naturally poor or exhausted soil, would hardly be deemed of much advantage by any one who had ever tried, even without Mr. Carmichael's caution. What "the sanguine may expect" from cultivating the twin-corn, I have no means of knowing; but I can very confidently assert, that there is no authority, either in print or manuscript—at least none that I have ever seen or heard of—to justify them in expecting much, if any more, than Mr. Carmichael has stated.

In the first part of your remark just quoted, you speak of "*latitude,*" as the chief circumstance to be regarded in choosing among the varieties of corn; and in a few lines below you add: "This corn is a *forward* kind, even in Maryland—of course, it is too forward for our location." Of its forwardness, I can assert, from three years' trial, that the difference in comparison with our common corn, does not exceed ten or twelve days; and in regard to your conclusion, that it is "too forward for our location," I must call it a *non sequitur;* at least, if the opinion of Monsieur de Candolle, one of the greatest botanists who ever lived, be correct. This gentleman spent six entire years in prosecuting, through the different departments of France, such investigations as were calculated to determine, with all attainable precision, the general laws by which the geography of plants is regulated. The very numerous facts collected by him during this highly interesting research, proved conclusively, *that although temperature, arising from climate or elevation, light, moisture and aspect, exercise each a considerable influence over the growth and productiveness of vegetables, the distribution of heat,* in the different seasons of the year, *has more power than any other cause whatever.* Now, here is an opinion opposed to yours, and founded on a multitude of facts which the author was six whole years in collecting—confirmed, too, by the general fact known to us all, that in European latitudes corresponding with ours, many plants grow in the open air, which here require the protection of green-houses for more than half the year. On the other hand, your opinion as to the effect of much less than two degrees difference of latitude, (for the middle of Virginia is in 38°, the middle of Maryland in 39°,) is unsustained by any facts or experiments whatever—at least you mention none. But as a farther proof that the twin-corn is *not too forward* for our location, I have authentic information from several gentlemen residing in different and distant parts of our state, (one as far south as Mecklenburg,) who speak very favorably of this corn in comparison with all the other varieties which they have heretofore tried. The only gainsayer whom I have seen in print, is your correspondent, Mr. Andrew Nicol, who has gone so far as to say —"*the bread made from it appears to me less sweet, also drier and harsher to the taste, than that made from our common corn;*" and this, too, in addition to condemning it as less productive than the common corn of his neighborhood. Upon this anathema against twin-corn bread, it has been remarked, that "Mr. Nicol's mouth must have got most marvellously out of taste, when he uttered this sentence." But I, who have always maintained both the truth and justice of the old adage, "*de gustibus nil disputandum,*" have insisted on his right to avow any taste he pleases, notwithstanding, in this case, it is unique, and directly opposed to that of some hundreds of persons, who have declared that twin-corn made the best and sweetest bread they ever ate.

Having at last reached a kind of resting-place in my voluntary and unsolicited labors, I have deemed it best to look back before I proceed farther. This retrospect has elicited a "thinks I to myself," how friend Ruffin and my other readers, (should I get any,) chuckle and exclaim—"what a self-comforting side our friend J. M. G. has given himself on his twin-corn hobby, flattering himself all the while, credulous soul! that he is edifying *us*, rather than gratifying his *own passion* for prosing, in which he indulges somewhat too freely, although we are willing to allow him good motives." I have a strong presentiment that some such reflections will certainly be made, although they may not possibly find utterance in words. Yet, notwithstanding I may increase the risk of exciting a laugh against myself, I must add a few more words in explanation of what I have written.

The facts stated in regard to twin-corn, and the conclusions I have drawn from them, are applicable to every variety of cultivated plant; and my only reason for confining them to one variety of a particular species, is, that I have made more experiments with *that* than with any other. I have *no pets* among any of them; my sole object being to ascertain, as far as I can, which are best in every respect to promote human comfort and general prosperity. As a proof of it in regard to corn, I am now making an experiment with six varieties; and should the twin-corn prove best, it certainly shall not be, from the least imaginable advantage derived from my management of the trial, which shall be as fair as I can possibly make it. But to proceed with my explanations. When I read your excellent article on agricultural hobbies and humbugs, of which I think precisely as you do, it seemed to me that you had gone so far in denouncing and ridiculing them, as probably to discourage all experiments made to ascertain the comparative superiority of the different varieties of plants of the same species. I therefore deemed it important to our cause, at least to endeavor to qualify, in some degree, your general denunciation, and to prove, as far as I could, not only that *all* plants heretofore tried, might be greatly improved in almost every respect, by the careful selection of their seed, but that there was so great a natural difference in productiveness between the different varieties of the same species, as to make it a matter of great importance to ascertain how far that difference might be augmented. If *you*, my good friend, are right, none but the over-sanguine will ever make experiments of any kind on this highly interesting subject. But should the doctrine *I* maintain be right, although hundreds and thousands of hobbies be mounted and broken down in the pursuit, yet, should a few only prove sound, they may amply remunerate both their riders and the public, for all the losses from the hobby-horsical experiments that fail.

It has been said that great inventors seldom become rich; but may not that enthusiasm which is so essential to success in prosecuting useful inventions, and which is the only quality strong enough to combat the ridicule always directed against every thing new, be incompatible with such a degree of economy as would enable them to accumulate wealth? Such, I am persuaded, is the fact; and that the money-making and saving talent is quite a different sort of thing from *that* which has so eminently distinguished the most remarkable inventors among mankind: *so different indeed*, as never to be found in the same individual. The hobby of the *one* is *money—money—money, for its own dear sake;* the hobby of the other, something that will hand down his name to the latest posterity, as entitled to rank among the benefactors of mankind. *His* passion is social, philanthropic, coextensive with the wants of his species; the passion of *the other*, begins and ends in self—self—self. If any great inventor has ever grown rich, I have never seen nor heard of him. But if this be true, some portion of what may be called *the hobby-horsical organ*, (if the craniologists will pardon my infringing their right to christen all the imaginary divisions and subdivisions of our skulls,) although too often injurious to the individuals whose noddles are bumpified by it, is quite as beneficial, upon the whole, to the general interests of agriculture, as it can be to the general interests of any other class whatever. *Ergo*, hobby-horses and hobby-horse-riders, are very useful things in a general point of view, although many of both may be often rendered worthless—the riders too much *galled* to ride any more, and the horses become utterly good for nothing by splints, spavins, ring-bone, and foundering, both in the legs and chest. The latter kind of foundering, if by *chest* be meant the *money-chest*, is so utterly ruinous to our class, that the fear of it too often deters all the half-way experimenters from attempting *any thing*, while it furnishes the "*good-enoughs*" with an everlasting pretext for attempting *nothing*.

The two positions I have sought to establish, which I understand you deny, are, first, that *all* plants heretofore cultivated, in any kind of soil or climate, wherein they will apparently flourish, are improvable, to a great degree, simply by regarding, in the selection of seed, the circumstances which you appear to think of little or no importance. Secondly—that among the varieties of the same species of plants, there is *naturally* a great difference in productiveness, which an all-bounteous Creator has enabled man to make still greater by judicious selection and culture. The universal practice of those who save seed either to sell, or solely for their own use, would seem to sanction my first position, although I admit there are many exceptions to the old saying, that "*what every one says must be true.*" But there is something more than mere practice in favor of this position. We have the testimony of very many credible persons, that they have much increased their crops, especially of corn, by always selecting their seed from stalks of the same variety which produced the greatest number of ears. Three of these individuals I know personally, and a fourth, Mr. Joseph Cowper of New Jersey, is known by reputation to all the reading agriculturists of the United States. Now, these persons did not state it as *mere matter of opinion*, but of *actual experience* during several years' experiments; and I have been willing to believe them; not only because my own experience confirms theirs, but because they ask no money for their disclosures on the subject; and that being the case, could have had no possible motive for humbugging their fellow-citizens.

My second position has in its favor, not only the testimony of many such men as your intelligent correspondent, Mr. Carmichael of St. Mary's, Maryland, but ocular demonstration for all who are willing to sacrifice their hobbies of opinion to visual evidence. For instance, no man can look through an apple-orchard in full bearing, without being forcibly struck with the very great difference in productiveness between the different varieties of apple, amounting often to nearly double. A similar difference may be noticed among several varieties of other fruits and vegetables, all going to prove that there *is* so great a natural superiority in productiveness among them, as to render it a matter of very great importance to those who cultivate them, either for use or sale, that they should choose among the grains, at least, only those varieties which produce most. To ascertain this, as I before remarked, is richly worth the breaking down of ten times as many hobbies, as the most fanciful and sanguine of all our hobby-horsical brethren put together have ever taken into training, from the days of Trismegistus to the present time. If I am right in my estimate of our state character, hobby-horsical planters and farmers are nearly as scarce with us as hen's teeth. The passion which makes such equestrians, is not among the besetting sins of the ancient dominion folks. *They* answer much better John Randolph's graphic description of them, who compared them to terrapins that would never move, after drawing their heads within their shells, until they felt the fire on their backs. In most matters, but especially in all that relate to husbandry, we want, *not the check-rein*, but *the spur and the lash;* not sedative, but *highly stimulating medicine;* if mental stimuli can properly be compared to corporeal, and the former can be both prepared and administered to us far more easily than many imagine. You have only to call us "*the sovereign people;*" to translate for us the old Latin blasphemy, "*vox populi est vox Dei;*" to swear, at the same time, that it is literally true, and you may lead us "into the cannon's mouth." Then huzza! for us Virginia boys: who but *we!* although we may actually have sunk ourselves by our supineness as to all state concerns, and other political sins, to the very lowest grade in our great confederacy. But throw cold water on us, especially on *us* of the agricultural brotherhood, who are as cold generally as frogs, and you level us nearly to the "*caput mortuum*" of earth, into which, alas! our own prodigal waste and abuse of nature's bounties has converted a very large portion of the arable lands of our native state. Rely upon it, my good friend, that we Virginia agriculturists want, most grievously, all sorts of legitimate mental excitement, that can be applied with the least probability of success in promoting our cause. We have always too little, rather than too much steam, *party politics* always excepted. Our danger, meaning thereby the danger of our class, is caused by *too much* torpor; too much of *the good-enough malady*, and not by *the hobby-horsical extreme.* Pardon me, therefore, for saying, that you appear to me inclined to use the lancet, and its almost inseparable companion, calomel, (if such a figure be allowable,) somewhat more than is good for us. We of the clod-hopping genus have had quite enough, and to spare, of *depletion*, in all the modes wherein empiricism could injure us, either in religion, morals, politics, or husbandry—nay, in *body, and soul, and estate;* and what we most want now, is an abundance of that good old-fashioned sort of thing called *kitchen-physic.* But to procure it, although it be the staff of life, we, the said clodhoppers, require the excitement of censure and ridicule, for our numerous sins of omission, with unceasing commendations and praise, for every evidence of an inclination to quit the old beaten track, in which so many of us have nearly starved, for the purpose of trying, so far as our means will justify, all well-authenticated experiments that hold out a tolerably fair prospect of bettering our fortunes. Be it well understood, however, that I utterly exclude all *humbugs*, properly so called, from even the slightest claim to toleration. In plain English, they are, on the part of the contrivers, downright frauds to cheat the ignorant and credulous out of their money; and most heartily will I join you in a war of extermination against them, fearful as the odds may be against us. But for the hobby-riders, one and all, much as I often join in the laugh against them, I confess my sympathy is "pretty considerable," as brother Jonathan says. For this, *you* probably, as well as *some* of my other readers, will think I have good cause, if near relations ought to sympathise with each other. Be this, however, as it may, there is certainly more color of excuse for those poor fellows in Virginia, than in any other state in the Union: for *our* agriculture is literally "*sick almost unto death;*" and you know that "a willingness, nay, an anxious desire, to be cured of any dangerous and alarming disease, is perfectly natural; and the danger usually leads those who are threatened by it, to catch at all sorts of proposed remedies."

Thus endeth my long, and I fear, tedious homily, in regard to which, let me conclude by begging you to correct me, if I have so far misunderstood your opinions as to misrepresent them. Should we really differ materially, and any good to our cause grow out of the public expression of that difference, I confidently trust that neither of us will feel any such foolish pride of opinion as will prevent him from heartily rejoicing at the general result, even should the verdict of our brethren be given against him. Discussion, full, free and friendly discussion, of all important agricultural subjects, and willing, unprejudiced readers, are what our cause in Virginia most grievously wants; for our everlasting political party quarrels have nearly banished the language of gentlemen from all argument, whether oral or printed; while to read any thing in relation to husbandry, is deemed such up-hill work, such a waste of time, by most of our brethren, that all imaginable pains should be taken to change, if possible, so paralyzing, so stultifying a habit. That your highly laudable efforts to do it may be crowned with entire success, is the constant and earnest wish of

Your old friend and fellow-laborer,

J. M. G.

REPLY TO THE FOREGOING, AND SOME OTHER OBJECTIONS.

We have been singularly unfortunate in conveying the meaning designed in some of the passages of the article commented on above; which appears, not only from some of the objections urged by our present correspondent, but from several others. This misapprehension is doubtless caused by the hasty and careless mode of expression used; and therefore we readily lay the blame at our own door. But, the general positions there assumed, (and by which the words of particular illustrations and examples should be construed,) still seem, to our understanding, so plain, that we fear that any additional explanation will scarcely dispel the existing obscurity. To avoid repetition now, we would request of readers to refer to the article in question, (especially the portion on pages 48 and 49,) for examination of the grounds assumed or denied.

We were far from meaning to deny the importance to the product of crops, of a *proper* selection of seeds. On the contrary, (putting aside many and strong expressions of ours in other editorial articles, which we cannot expect readers to remember,) in this piece in question, the advantage of such selection is fully and directly admitted in particular passages, as well as fairly to be inferred from the general context. It is there said, that "it is highly important to adapt the kind of seed to the soil, climate and usual seasons; and the *want of such adaptation may reduce a crop to less than half of what might have been obtained from other seed.*" This surely was saying, though generally and indirectly, yet strongly and explicitly, that by a proper choice of seed, a crop may be, in some cases, even doubled in amount. This greater productive power of one variety of a particular grain over another, was ascribed, not to qualities such as are usually recommended, and sought for in "hobbies," or new pet grains, but to the suitableness of the plant to the circumstances under which it is to be placed, and its fitness, from any peculiarity of character, to resist the disasters to which the crop is to be particularly exposed. "But," continues the passage, "we have not the slightest faith in any of the many prevailing opinions, that larger crops are to be obtained by choosing seed *on account of the form, size, or number of grains, or the size or number of ears, &c.*" In this last position, only as we understand, and according to the meaning before intended to be conveyed, we are directly opposed to our friend and correspondent J. M. G.; and it is a question to be settled not by argument, but by proper, varied, and sufficient experiments; and we are willing to abide by that test, when enough of such experiments are reported.

As all the particular objections are embraced in the general disclaimer just made of denying the efficacy and profit of proper selections of seeds, it is unnecessary to reply to them separately and in detail. One only will be mentioned, because it is founded on another misapprehension of our meaning. This is our inferred "apparent preference for corn with the largest cobs." If any such ground for preference had been expressed, it would have been obnoxious to much stronger objection than what is urged by our correspondent; for it would have been directly opposed to the general principle which we had assumed as correct. We were quoting the opinions and grounds of preferences of others, and accompanied with intimations of dissent, if not of derision, on our part. The "mathematical truth," also, in regard to which we differ, (and mathematical truths, real or supposed, rarely permit a difference in argument,) was stated simply as an illustration of Col. Taylor's ground of choice. Also, in stating a mathematical truth, we ought to have been more strict in terms and definitions; and for want of that strictness of language, our correspondent has certainly succeeded in picking a hole in our "mathematical truth." While admitting, and submitting to the correction, we beg leave to supply the omission of what was meant to be affirmed of ears of corn, and to repeat, that it "is evidently and mathematically true, that if the grains are of equal size, [*and also of like form,*] there will be more of them encircling a large than a small cob."

Another correspondent, in number 3, (at page 178) supposes that we meant to class the ruta-baga, or Swedish turnips, among the family of humbugs. Not so, by any means. On the contrary, they were spoken of as long known in England and "valued for their real advantages," and treated of in English books, before introduced in this country as "Russian turnips," and spread as a novel product of rare and superlative value. This introduction, and the means used to recommend and extend the general culture, was a humbug, though the plant is highly valuable, and its culture profitable, in all suitable climates and circumstances. As fanaticism and quackery are often exercised in the spreading, or ostensible design of spreading, the beneficial influence of true religion and morals, so the true doctrines and valuable products of agriculture may be so recommended by interested falsehood, so as to become humbugs, in the light in which they were there presented.

Neither was it our design to repress or to moderate the ardor of any to try new things. Precisely the contrary was stated expressly, and fair trials strongly recommended.

Still less did we intend to denounce as humbugs the act of *hobby-riding*, or to cast any censure on the enthusiastic individuals who form that class. As our friend J. M. G. intimates, we are among the last who have any right to undervalue that class, of which both he and ourselves have long been, and will doubtless always continue to be members. But though there is nothing to censure, and much to approve, and for the community to be grateful for, in the acts of the riders of hobbies, still it must be admitted that there is also much of extravagance to laugh at; and as we are willing to bear our share of this infliction from others, we have considered that we had a good right to laugh at the follies of some of our brotherhood in return; still claiming for the whole class, and valuing not slightly our own share of the claim, that sanguine experimenters, or hobby-riders, are among the benefactors of mankind, and generally to their own loss, even in their successful labors. Our censure was not thrown on the riders, but upon the grooms and jockies who trained and brought out the steeds, to serve their own interested purposes.

We have to add a word in defence of an expression, not of our own, but of a correspondent whose statements are entitled to high respect. This is the opinion that the bread made of the twin-corn was not so palatable as that of our common corn. This opinion may be correct; or precisely the reverse of it, as stated by our correspondent, may be true. It is a matter of taste, which is not to be settled by argument or evidence. But without joining in this opinion, we know the fact that this supposed inferiority of the twin-corn has been charged by another individual, who did not know of any such opinion having been previously expressed. For our own part, we believe that there is no material difference; as none was perceived, when we changed, without knowing it, from using the bread of one kind to that of the other corn.

ED. FAR. REG.

From the Genesee Farmer.

QUALITY OF MILK.

Further experiments appear to be needed relative to the quality of milk, for the different purposes of cheese and butter-making. It is well known that the *quantity* of milk alone, yielded by a cow, is not a sufficient test of her excellence. The *quality* is of such importance, that many animals furnishing but comparatively little, are, on account of its richness, truly valuable. The following extract from Moubray may serve well to introduce this subject to the attention of farmers, and to throw some light upon it. It is an account of the product of one cow, for one year, and shows in a strong point of view, the superiority of the milk over that of our common animals. This cow was of the Sussex breed.

"Mr. Cramp's cow was seven years old, had produced five calves, and had been two years in his possession. She was fed in *summer* on clover, rye-grass, lucern, and carrots, three or four times a day. In *winter*, with hay, bran, and grains, and often fed, particularly when milking. The manger kept clean, and no sour grains, rotten or mouldy vegetables given, on any account, and the cow never suffered to overcharge her stomach, but to be well filled, and kept with a good healthy appetite. Always when milked, stripped clean to the last drop. Being so well kept, she went dry only seventeen days before calving.

Quantities of milk and butter produced by Mr. Cramp's cow, between April 1807, *and April* 1808.

From 6th to 20th April—milk 8 quarts per day, butter 6lbs. per week. From April 21st to June 2d—milk 22 quarts a day, butter 18 lbs. per week. From June 2d to October 5th, milk 20 quarts per day, butter 16 lbs. per week. From Oct. 6th to November 30th—milk 15 quarts per day, butter 13 lbs. per week. From December 1st to February 8th 1808, milk 13 quarts per day, butter 11 lbs. per week. From February 9th to March 14th—milk 10 quarts per day, butter 8 lbs. per week. From March 15th to April 4th—milk 7 quarts per day, butter 5 lbs. per week,—dry for calving.

Sale of the year's produce and expenses.

	£	s.	d.
Sale of calf 14 days old—butter at 1s. 4*d*.—skim milk at 1*d* per quart—dung, valued at £3, in all, - - - -	76	7	3
Total expenses, including £1 5s. for 10 sacks malt combs, and a farrier's bill 12s. 6*d*. - - - - - -	24	14	3
A year's net profit on a single cow,	£51	13	0"

It will be perceived that the quantity of milk yielded by the above-mentioned cow did not much exceed some of the best of our common animals, but in the quantity of butter she greatly surpassed them.

The following remarks by John Hare Powell, published some years since, on the qualities of the improved short horns, furnish some hints on a branch of this subject, which is of great importance, but has been hitherto but little investigated. In allusion to a sale of some of these celebrated cattle he says,

"There are about twenty or thirty head of the full blood, besides nearly as many of the common and mixed blood. Among the former is the celebrated Bellina, the famous butter cow. In her appearance, she is far below many of her companions, though when critically examined her *points* are all good. The straight back—the perfect level of the spinal column from the horns to the tail,—the square sides, the wide hips, the full brisket, the intelligent countenance, and wide spreading bag, are all there; *but she makes a pound of butter at every milking*, and hence she has not the sleek fat sides, and the filling up so necessary to a finished and beautiful subject. She illustrates the idea perfectly, which we have so often inculcated, that a deep milker or a great butter yielder cannot easily be kept fat. She illustrates another position we have advanced, that milk from different cows, apparently of equal richness, is very differently constituted. *In some, cheesy matter and whey prevail, in others cheesy matter and oil, and in others oil and whey prevail with but a slight quantity of cheesy matter.* The first is common milk, affording a small quantity of cream, and poor skim milk; the second affords a medium quantity of cream, and makes good cheese, and good skim milk; the last affords a very large quantity of cream, no cheese scarcely, and very poor skim milk—so poor indeed, that it is scarcely fit for use. This latter is the case with Bellina; when her milk has stood the proper length of time, the cream, (the milk being three or four inches deep,) is nearly half an inch thick, *and so firm that it will almost bear lifting like a buckwheat cake*, the skim milk being very inferior. Mrs. Barnitz took about half a pint of her cream in a bowl, and in a few minutes produced six ounces of the finest butter we ever tasted, by simply stirring it with a tea-spoon. The butter-milk produced was less than a small wine glass full, and that quite of a poor quality. This cow, unlike the generality of her breed, has coarse hair, and is of ordinary size, and as before remarked, would be taken for an ordinary animal, except upon critical examination by a very good judge."

To be able to ascertain readily, by simple experiment, the character and quality of milk, would be to dairy farmers of the first importance. It would be bad policy to attempt to make butter from milk affording cheesy matter alone, or to manufacture cheese from milk abounding only in oil. The distinguishing characteristics of milk in relation to these points, whether by specific gravity, color, or other particulars, should claim particular attention.

It has been recommended as the best means of determining easily the richness of milk and the quantity of butter it contains, to fill a number of broad, graduated glass tubes, with milk of different kinds, and after the cream has risen, to observe its relative thickness at the top of each. But this, although ingenious and apparently correct at first glance, has been found fallacious. Neither is the *color* of the milk a true test. A few observations, hastily made last autumn by the writer, prove further experiments necessary. One cow gave from ten to twelve quarts daily; the milk was paler than usual, and the cream lighter colored; but with one exception she was the best butter cow in the yard; the cream, though not equal in thickness on the surface to some, was uncommonly *firm and tenacious*, resembling that described in the last quotation above; leaving but little butter-milk, and apparently consisting almost wholly of butter. She produced from six to seven pounds of excellent butter per week. Another cow yielded milk of a richer yellow, which produced a thicker coat of cream; but this was lighter and more spongy, and a less quantity of butter was afforded.

It would be well worth the time and labor of scientific farmers, who can constantly superintend their dairies in person, to give particular attention to this subject, and to endeavor to ascertain by well conducted and accurate experiments, ready and correct tests for the character of milk, or whether best adapted to cheese or to butter-making, and the quantity of each afforded; and also to determine the best mode of causing their complete separation from the whey. Butter-makers should know the precise temperature needed for the proper separation of cream from milk, and the butter from the cream, and the *time* required for each process to be effected in the best manner. No dairy room should ever be without a thermometer.

Proper and profitable selection and purchase of cows for a dairy, would be greatly facilitated by the knowledge of such tests. A single fact may show in a slight degree, the advantage of selection. Cows were purchased for the farm of the writer, for making butter, and the character of good butter-makers sought, so far as a very imperfect knowledge could direct. The animals were no better in appearance than common, but in less than three months in autumn, during a part of which they had greatly diminished in milk, *four* of them* furnished three hundred pounds of excellent butter. These did not include one of the best butter-makers.

J. J. T.

From the Gentleman's Magazine, for 1766.

THE ADVANTAGES OF PEAT-ASHES IN DRESSING LAND, AND THE METHOD OF PREPARING COAL-ASHES FOR THE SAME PURPOSE.

Peat-ashes, properly burnt for a manure, are noble improvers both of corn and grass-land; but the substance from which they should be got, is an under stratum of the peat, where the fibres and roots of the earth, &c. are well decayed. Indeed the very best are procured from the lowest stratum of all. This will yield a large quantity of very strong ashes, in color (when first burnt) like vermilion, and in taste very salt and pungent. Great care and caution should be used in burning these ashes, and also in preserving them afterwards. The method of burning them is much the same as burning charcoal. The peat must be collected into a large heap, and covered so as not to flame out, but suffered to consume slowly, till the whole substance is burnt to an ash. The ashes thus burnt, are held in most esteem; but the peat-ashes burnt in common firing, are, in many places, used for the same purposes, and sold at the same prices.

Peat-ashes are found excellent in sweetening sour meadow-land, destroying rushes, and other bad kinds of grass, and, in their stead, producing great quantities of natural grass.

They burn great quantities of peat-ashes in some parts of Berkshire and Lancashire, and esteem them one of the best dressings for their spring crops.

A very great improvement may likewise be made, and at a moderate expense, with coal-ashes; which, when properly preserved, are also an excellent tillage. The improvement is, putting a bushel of lime, in its hottest state, into every cart-load of coal-ashes, when carried out upon the land; covering it up in the middle of the heap for about 12 hours, till the lime is entirely fallen, and then incorporating them well together, by turning them over two or three times; by which the cinders, or half burnt parts of the coals, which are noxious to the ground, instead of being useful, will be reduced to as fine a powder as the lime itself. The coal-ashes should be carefully kept dry. Coal-ashes, thus prepared, are the quickest breakers and improvers of moorish and benty land.

* One of these yielded *nine* pounds of butter per week. They had common pasture only.

From the Gentleman's Magazine, for 1766.

AN ACCOUNT OF THE INTRODUCTION OF RICE AND TAR INTO OUR COLONIES.

John Houghton, a sensible writer on trade and husbandry, Vol. II. page 298. enumerates the commodities imported into England; among which he mentions rice, and gives the following account of it, probably from the custom-house books or bills of entry.

Rice imported in the year 1694.

From the Straits,	1545 cwt.
From Spain,	120 ditto
From Holland,	330 qrs.

But as he takes no notice of rice from Carolina, it is probable it was not then planted there, which will appear with still stronger evidence by the following account.

In the year 1696, my sagacious friend, Charles Dubois, then treasurer to the East India Company, told me often with pleasure, that he first put the Carolinians on the culture of rice.

He happened one day, in that year, to meet Thomas Marsh, a Carolina merchant, at the coffee-house, to whom he said, I have been thinking, from the situation, nature of the soil, and climate, that rice may be produced to great advantage in Carolina: but, says Marsh, how shall we get some to try? Why, says Dubois, I will inquire for it amongst our India captains. Accordingly, a money-bag full of East India rice was given to Marsh, and he sent it to South Carolina; and in the year 1698, he told his friend Dubois, that it had succeeded very well.

But, from so small an original, it required a long time to spread to advantage; besides, the people being unacquainted with the manner of cultivating rice, many difficulties attended the first planting and preparing it, as a vendible commodity, so that little progress was made for the first nine or ten years, when the quantity produced was not sufficient for home consumption.

About this time, a Portuguese vessel arrived, with slaves from the east, with a considerable quantity of rice, being the ship's provision; this rice the Carolinians gladly took in exchange for a supply of their own produce. This unexpected cargo was distributed, which gave new spirit to the undertaking, but was not sufficient to supply the demand of all those that would have procured it to plant.

Therefore the Assembly of South Carolina, taking into consideration the importance of the culture of rice, very prudently voted a bounty to encourage its importation, that there might be a supply of feed for every undertaker.

My ingenious friend, Tho. Lambol, esq. now living, informs me, that in the year 1704, being then a lad, going to school at some distance from Charles-Town, he took notice of some planters, who were essaying to make rice grow.

In the year 1712, the same gentleman was an apprentice to a principal merchant in Charles-Town, who was appointed public treasurer; and he well remembers that a bounty (granted by the Assembly) was then paid to a captain, who brought in the first cargo of rice, after the bounty was ordered: this cargo came from the Straits, probably from Egypt, or the Milanese.

In the year 1713, another ship arrived, and the captain made the like demand, and received the bounty for bringing a cargo of rice and slaves from Madagascar.

From these particulars it appears, that the progress of raising rice in any considerable quantity, was very slow; and I can find no account of any being exported for the first fifteen years. But it is reasonable to conclude, that after the arrival of these two cargoes of rice, for sowing, the planters were amply furnished, to extend its culture; and being a yearly production, it soon became a staple commodity; it is therefore very probable, that in the years 1715 or 1716, a quantity was raised sufficient for exportation, which continued to increase till the year 1726, and then it became a great article of commerce. For my correspondent, Sam. Eveligh, a merchant residing in Charles-Town, writes to me that, from the year

		Barrels of rice.
1726 to 1727	were exported	40,000
1729 to 1730	exported	41,957
1740 to 1741	exported	80,000
1755 to 1756	exported	60,000
1757 to 1758	exported	67,040
1760 to 1761	exported	100,024
*1761 to 1762	exported	34,972
	half barrels	3,600

The Carolina Gazette of June 12, 1762, says, the crops of rice are so great that we expect to make 150,000 barrels.

I cannot express the satisfaction I feel, in reflecting on the wonderful increase of so valuable a commodity, from so small a beginning, in about, or little more than, half a century.

May 26, 1766. P. COLLINSON.

After having given all the intelligence I could collect relating to the culture of rice, it may not be unacceptable to give some light into the original of tar and pitch in our colonies.

Before this, we were beholden to the northern powers for all the tar and pitch consumed in England, which were imported from Sweden and Norway, and for which vast sums were annually paid.

I was long acquainted with Captain Coram, institutor of the Foundling Hospital, and from him I had the following relation: That he was master of a vessel in the Baltic trade; that great part of his lading was tar and pitch, by which he became acquainted with the value of those commodities. He was much incensed at the extortion of the Swedes and Danes, in raising a barrel of tar to the exhorbitant price of fifty shillings; but as we had then no other markets to go to (for Russia had no ports in the Baltic) we were obliged to give it: but the next voyage he made to Sweden, he took an opportunity to observe their method of making tar and pitch.

He concluded, that there was no way so effectual to bring down the price of those commodities, as by the making them in our own colonies; and as he was fully persuaded of the practicability of it, he determined, next voyage to New England, to make the experiment; it succeeded; and he made the first barrel of tar in the year 1698, and brought it over, to show that it had all the qualities of the Swedish tar. After proper examination of it, its goodness was allowed, and he then petitioned the parliament to promote the making tar and pitch in our colonies, by giving a bounty on their importation.

With this encouragement, tar-making soon spread over the colonies; for my friend Lambol, of South Carolina, writes, that in the year 1704, he well remembers hearing some planters felicitating each other on the easy raising of tar and pitch, *instead of indigo*, which they had attempted unsuccessfully.

This public-spirited man, Captain Coram, happily lived to see his single barrel of tar the original of many thousands annually imported; as well as my benevolent friend, Charles Dubois, who often expressed the pleasure it gave him, that he first advised the culture of rice in Carolina, and that his little bag was the original of many thousands that he saw brought over before he died, which happened in 1740. It is remarkable, that these two valuable articles of commerce were introduced much about the same time. If I am rightly informed the making of indigo was revived very successfully in South Carolina in the year 1740. It is an article of such importance, that it deserves the greatest diligence and attention to make it of the best quality, that we and our colonists may have the benefit, and not our rivals, the French and Spaniards, to whom such great sums were yearly paid, for a commodity that may be so easily raised in our southern provinces; the consumption is so great, that we do not at present import sufficient to supply our wants. As rice seems to be overdone, it is to be hoped, that the planters in Carolina and Georgia will turn their hands more to making indigo, as the demand is so great, and the bounty so encouraging.

After many fruitless attempts, the making potash in our colonies has at last happily succeeded in New England; the first fruits of its produce were sent over in the years 1764 and 1765, which proves so good, that it is said to excel the Russian pot-ash; it will therefore prove a very great advantage to that colony, where returns of their own raising are so much wanted.

* Probably this year they turned their hands to making indigo, of which they made 239,629 pounds.

AGRICULTURAL PAPER IN WISCONSIN.

We received lately the first numbers of a new agricultural paper, published at the unheard-of town of Milwaukee, which is farther north-west (as it would seem from the title,) than the art of spelling has yet travelled. It is called the 'Wisconsin Culturist, and *Gardner's* Magazine.' The No. of April 17, contains the list of prices-current which is copied below entire, as a curiosity. It appears, from this list, that every thing to eat in Milwaukee bears a very high price; but on the other hand, agricultural information rates as low in the market there, as if the editor's and publisher's profits were lower than the wages of common laborers; which, however, is often the case, in places where labor is much cheaper than it is in Milwaukee. This paper (in small quarto,) is published once a month, for $1 a year; and it would be inconceivable how it could be afforded so low, in such a place, if the mystery were not explained by the advertisements showing that the paper is an appendage to a seed-store, and nursery, according to the usage of some other and older parts of our country.

"*Milwaukee price current*, [*April* 17, 1838.]

Beans, white field,	bush.	$3 50 *a*	4 00
Peas, blue imperial marrowfat,	bush.	3 50 *a*	4 00
Beef cattle, on the hoof,	100 lbs.	8 00	
Flour, best,	bbl.	10 00 *a*	12 00
Grain, wheat, common spring,	bush.	2 00 *a*	3 00
Italian,		2 75 *a*	3 25
Oats,		75 *a*	1 00
Corn,		2 00	
Corn for seed,		3 50 *a*	4 00
Corn Meal,		2 00	
Bacon, Hams,	lb.	16 *a*	18
Shoulders,		15 *a*	16
Lard,		15 *a*	16
Butter by the keg,		25	
Cheese,		16 *a*	18
Eggs,	doz.	31 *a*	38
Cows, new milch,	each	30 00 *a*	35 00
Grass-seeds, red clover,	bush.	16 00	
Timothy,		3 25	
Hay,	ton	10 00 *a*	12 00
Pork, prime,	bbl.	21 00 *a*	25 00
Mess,		26 00 *a*	30 00
Lime,		1 25 *a*	1 50
Wood,	cord	2 00 *a*	3 00
Sugar, maple,	lb.	12 *a*	15
Laborers' Wages,	month	15 00 *a*	20 00"

A NEW WATER-FILTER.

Some six or seven weeks ago, when the water of the Schuylkill was so yellow and turbid, and all the conduits from Fairmount ran discolored streams, the following discovery, which we find in the London Morning Chronicle, would have been a blessing, as it may always be henceforth. A Mr. James Richards, of Dumbleton, writing to the editor, observes: "I have discovered a cheap filter to cleanse river water, which you will oblige me to communicate to the public, as it may be useful to the inhabitants of London, Westminster, and other districts where clean soft water is preferred to dirty or hard water. It is nothing more than a bag made of unbleached calico, in the form of an inverted cone, attached to a small wooden hoop, and in this country called a dropping bag. It is first saturated with water, afterwards pulverised charcoal is thinly spread over the inside of it with a dredging-box used by cooks. At first, a part of the charcoal will pass through the pores of the bag with the water, but by continuing to fill it *full* with the same water, and adding charcoal, in a few minutes it will become as clear as spring-water. To prevent the charcoal being washed from the pores of the bag in filling it, place another bag inside it, and dredge a small quantity of pulverised charcoal into it. The cost of both bags is under one shilling, and the two I send you will cleanse from fifty to sixty gallons daily, if it be supplied with water from a pipe and regulated by a stop-cock, and more in proportion to the size and in number as may be required. I have used these filters the last month, and hope the use of them may add to the comfort of others."

This plan, it will be seen, is extremely simple, and within the means of every citizen. Why should it not be generally adopted in Philadelphia?—*Philadelphia Gazette.*

ON THE SOURCES OF MALARIA, OR AUTUMNAL DISEASES, IN VIRGINIA, AND THE MEANS OF REMEDY AND PREVENTION.

By the Editor.

Throughout the course of publication of the Farmers' Register, it has been one of the main objects of the editor to attract attention to the causes and effects of malaria, or unhealthy marsh-effluvia, and to enforce his views as to the means of restraining or preventing this greatest of the evils under which the eastern half of Virginia suffers. To forward this end, every fit opportunity has been availed of; and the subject has been treated, directly and at length, or incidentally and slightly, in various articles in these volumes. But there has been found but little if any encouragement to persevere in this course. The editor has, alone, and without any certain evidence of approval of his views and his course, and certainly without any practical adoption of his recommendations, labored in this cause, which, to his understanding, demands the support of all, on considerations of economy and agricultural improvement and profit, as well as on the more important grounds of the strength or frailty of the tenure by which the people of half of our entire territory possess and enjoy health, happiness, and even life. It is under such impressions of the high importance of the whole subject, that the readers of this journal are again invited to its consideration; and, probably, for the last time, by the present writer, if there continues to be no more interest excited, and action produced, in regard to the evils existing, and which are multiplied ten-fold in power by the ignorant and careless legislation of this commonwealth.

The views of the writer on this subject were presented generally, and at some length, in an editorial article (pp. 41 to 43) in Vol. V, on the causes of, and means for preventing, the formation and the effects of malaria in eastern Virginia; and also in sundry shorter incidental passages in each of all the volumes, in connexion with articles on marshes, mill-ponds, and canals, &c. &c. But as it would be requiring too much of readers that they should either remember, or carefully refer to these various articles, a general, though slight view of the whole subject will be here presented, sustained by additional facts, which have been recently learned by personal inquiry and observation.

That the common autumnal or bilious diseases of eastern Virginia, and especially of the tide-water portion, which is most subjected to them, are principally caused by the effluvia rising from wet lands, is a matter in which all concur. The general difference between the presence of these disorders, in low, wet, or marshy countries, and their absence, or scarcity, in mountainous and dry regions, is so great, that none can mistake, or differ about, the *general* causes and effects. But from this general opinion, which is true in the main, (though having numerous and important exceptions,) there is deduced the erroneous conclusion, that these opposite general effects produced on health, in extensive regions either generally low and wet, or generally hilly and dry, are produced by these opposite natural features, and cannot be very materially altered by art; as art cannot materially alter the natural character of the land. Or, in other words, that nature has made one great region low and sickly, and another high and healthy; and that man cannot do much to counteract the law of nature in either case. Perhaps none may maintain this position, in argument, without admitting partial exceptions in numerous particular cases and localities. Indeed, every man will say that care may lessen the causes and mitigate the operation of malaria, in a sickly region, or increase both in a healthy one. But, judging from the action of both the people and their laws, which speaks more strongly than words, it may be inferred that it is a general belief that such bendings of nature from her course can be but slight, in particular cases, and scarcely worth estimating on a broad scale, or through an extensive country. In entire conformity with this supposition, it is a notorious fact that very few individuals in Virginia have done any thing considerable, or on system, to protect their dwelling places from malaria; and the government has not only done nothing for general protection, but has actually caused the worst of the existing evils, and is encouraging their continued increase and aggravation, by the fixed legal policy of the country; which permits the raising of mill-ponds, which are productive of little else than malaria and disease; and indirectly, but effectually, forbids the drainage of extensive swamps. The production and deadly effects of malaria, in eastern Virginia, for the greater part, is to be charged, not to the laws of God, but to the laws of man; which, in this respect, operate to put away or sacrifice some of the most precious of God's blessings, offered to all, to gratify the whims, or the blind and often mistaken avarice of a few individuals. There are, doubtless, great *natural* differences as to the sickliness of differently situated regions; as between the low tide-water region of Virginia, the central or hilly, and also the mountainous region. But, in their natural state, before damaged by mill-ponds and other of man's miscalled improvements, the low-country was probably less afflicted by malaria, than the hilly parts now are, or may be rendered by the full extension of these injurious operations of man. This is a matter of mere supposition, and cannot possibly be subjected to the rigid test of proof by known facts. But, from reasoning, and inferences from such facts as are known, it seems most probable that some of the now most sickly counties on tide-water were, at the first settlement of the country, less sickly than the hilly and originally very healthy county of Brunswick, for example, has become in latter years.

Even the very important fact of increased and increasing sickliness in this country, is entirely without support from any known written authority; and the whole subject has been so little examined, or thought of, that to most readers the position here assumed may be entirely new. There are no statistics of health to which we can refer for proof. But general and historical facts, few as they are, if fairly considered, will suffice to place the question beyond dispute.

Before proceeding further in this part of the argument, let me remark, that I am opposed in the outset, and shall be opposed throughout, by the reluctance felt by every individual to believe, or if believing, to admit, that his particular property, or place of residence, is more sickly than others, or has become more so than in former times. This self-delusion, and consequent, though perhaps undesigned effort to deceive others, is almost universal. Each man claims for his own place more healthiness than in truth ought to be admitted; and the combined effect of all these individual claims, is to maintain that the whole country is more healthy than is true, and more so than each individual would have claimed for it, with the exception of his own farm and his own neighborhood. It is against this universal prejudice and obstruction that I have had to contend in seeking for facts, and shall have to contend in argument; and, with such opposition, there is but small hope of maintaining my ground, or producing conviction of the soundness of my views, in the minds of those who have so prejudged the case.

One of the strongest proofs of the greater former healthiness of the low country, was the settlement of our English ancestors having been made and continued at Jamestown. It was on May 13th, when they landed; and now, a residence on that spot, or in that region, continued for five months after that time of the year, would be fatal to half of the strangers from a northern climate, even though provided with all the comforts and necessaries which a long-settled country affords, and all of which the first settlers most deplorably needed. It is true, that for some years after the first settlement, there was much sickness, and numerous deaths; and that in fact the infant colony was more than once on the point of extinction. But these diseases and deaths do not seem, from the direct and the still stronger indirect testimony of history, to have been attributed by the sufferers to an unhealthy location; and there were sufficient other causes for all that was suffered, in the usual and unavoidable privations of the first colonists of a new and savage country, added to the extreme improvidence and mismanagement of these settlers, and their government, as detailed in history. Even after several years had passed, and though cultivating a very fertile soil, and aided by annual supplies of food from England, and with all the resources of trade with the savages, hunting, and fishing, still, want of food was one of the greatest causes of disease and death. Of course, there must have been, under any circumstances, more or less of disease caused by malaria; and although any predisposition to such disease, naturally induced, must have been violently urged to action, and aggravated to ten-fold malignity, by hunger, intemperance, exposure of every kind, depression of spirits, and every other painful emotion of the minds of men in such desperate straits—still, even with all these aids, the prevalence of autumnal diseases, the effect of malaria, was not so conspicuous as to stamp the character of sickliness on the location, nor to induce even the proposition to remove the colony, or afterwards its seat of government, to a much higher or more healthy situation. The unavoidable inference seems to be, that the great sickliness of the early settlers was not attributed by themselves, to the climate. Yet, this was a question on which they could not possibly have been deceived. And even if most others had been deceived, by ignorance, and the want of experience of the effects of malaria, this could not have been the case with Smith, the most efficient director, and the true founder of the colony; who would have known better, not only by his general intelligence, but also by his experience of such effects, gained in his campaigns against the Turks. It may be alledged, that fear of the savages, stronger than the dread of disease, caused the choice of, and after-continuance on, an unhealthy spot, because it was more easily guarded on the land-side, and perfectly accessible to ships. But spots equally favorable for defence, and on deep water, might have been selected at first, much higher up the river; and yet Jamestown and its immediate neighborhood continued to be the chief place in Virginia, after the power of the savages had been crushed, and settlements had been extended to distant and inland places. The proof of my position would be sufficiently proved by any attempt made now to settle Englishmen, just arrived, on the border of almost any of our tide-waters, and especially about the junction of the salt and fresh waters. Several such trials have been made with foreign laborers; but the first autumn was enough to put an end to each experiment, by inflicting so much disease and death as to prevent any of the foreigners remaining through another season, who could possibly move away.

There can be but little doubt also, but there was much less of autumnal diseases, or at least of violent and fatal diseases, before the revolutionary war than now. There was no such thing then, as the healthy residents leaving home in summer, as is so usual now, to spend the sickly season among the mountains, or at the north; nor, does it appear, that there was much suffering for want of such resources, although, the climate must even then have become very far more unhealthy than in the early times of the colony.

Another striking proof of the increased tendency of the country to produce disease, even within the last sixty years, is presented by history, in the circumstances of the occupation of Yorktown by the British army in 1781, and the siege carried on by the American army; and especially in regard to the hastily-levied militia from the mountains, and other high and healthy parts of Virginia. Cornwallis chose his position first in Portsmouth, and afterwards in Yorktown, with a view to health, as well as defence, to await the arrival of reinforcements from New York. His army was concentrated at Yorktown, August 22. Washington reached Williamsburg, September 14, and the American army moved on thence to invest Yorktown, Sept. 30, and the surrender of the British army was made on Oct. 19th. Thus, both armies were exposed to the worst part of the malaria season, and the British army to the whole of it. Among the besiegers, were raw militia just raised for the occasion, from Rockbridge county, (of which portion I have been more particularly informed,) and probably from sundry others of the mountain-counties. There was certainly much sickness, and especially among the British troops; but not more than is usual in camps and especially in besieged camps, suffering all the privations incidental to the confined situation. It does not appear, from the very slight notices in history, that there was more sickness than might have been expected if the same circumstances had occurred in the hilly middle region of Virginia. Yet, if the like circumstances could occur now, it can scarcely be doubted but that every soldier, not already acclimated, and accustomed to malaria, would be made sick; and that probably half of those just brought from breathing the pure mountain-air, would never return home.

Another indirect proof is presented in the great and deplorable decline of most of the lower counties of Virginia in wealth, and in the usual accompaniments of wealth, which formerly made a residence delightful in many neighborhoods in which there is nothing now left to invite any one to remain. It is true that other causes, political and economical, have concurred to produce this result. But the most potent of the several causes, was the slow and silent, but continual and increasing warfare on the health of body and mind, made by the action of malaria. By its operation, when scarcely amounting in effect to positive and known disease, the mind is sickened even more than the body. The buoyant spirits are tamed—energy is relaxed—the keen appetite for enjoyment, (which is the greater part of happiness,) is lost; and the victims of malaria cease to strive, or to enjoy; and either sink into apathy and listlessness, or urged by discontent, more than by any remains of energy, take the final step of emigration to the western wilderness.

But the upper country furnishes still stronger evidence, because of positive and unquestionable facts, to prove an increase of the product and effect of malaria. The hilly country between the falls of the rivers and the nearast mountain-range, with the exception of some comparatively small spots, on swamps and rivers, was formerly as free from this scourge as is now the mountain region. But the number and the extent of the unhealthy places have greatly increased, within the memory of those now living; and some large districts have been, in particular seasons, as subject to bilious diseases, and still more to violent ones, than the tide-water region. Indeed, in very many places, universally believed (unless by the mill-owners,) to be injuriously affected by the neighborhood of mill-ponds, these effects of malaria are of as regular recurrence in autumn, as on places near to any of the marshes of the low country; and are much more dangerous.

The third and highest region seems destined, notwithstanding its better defence in mountain sides and peaks, and the rarity of flat surface on which to form wide and shallow ponds, to take its turn next, as the victim of malaria. Already, in that part of the mountain-region in and about Frederick county, there have been particular autumns which seemed almost pestilential. And though such cases of general and virulent disease are rare, particular cases of autumnal diseases are now frequent in many such places where they were rarely heard of thirty years ago.

These statements may be considered by some as exaggerated or unfounded—and, by others, if admitted to be true, considered as showing the want of both patriotism and policy, in the writer's thus exposing the enormous existing and still growing evils under which the country suffers. In regard to the former point, I admit, in advance, the scarcity of particular and positive facts, to serve as proofs, which is found throughout the whole subject; and that among the existing difficulties of obtaining such facts, (and still more by a single and unaided individual, who has had little opportunity to make proper researches.) I have to rely mostly upon general and loose opinions, and deductions from general facts. Hence, there is much liability of mistake. But if the public can in any way be driven to the examination of this subject, and numerous individuals be excited to search for facts, whether to sustain or to oppose my views, the arrangement and presentation of such facts will serve as materials, which are now almost totally wanting, and will enable this all-important question to be hereafter properly discussed, and correctly determined.

If there were no hope for relief, there would certainly be no use in exposing or dwelling upon these distresses of our people. But, though nothing yet has been done for relief, nor does it seem to have entered the imagination of our legislators—and though all they have yet done has been to add strength to the evil—still it is my confident opinion, that relief may be furnished for this sorest evil of the land, and furnished easily and profitably; and that it is perfectly within the power of man to dry up the most fruitful sources of malaria, and to bring the whole, or very nearly the whole of Virginia, to a state as healthy as that of any other country in the world. If such a result is indeed attainable, it is worth making every possible exertion for; and nothing will induce the smallest exertion, either by the people or the government, except a full exposure of the enormity of the evil which presses upon the country.

It is not my purpose to attempt to investigate the cause and trace the mode of operation of malaria. Though worthy of every care and labor, as a scientific question, it is one which as yet has entirely baffled every attempt at exposition. But though it is as yet unknown what is the chemical character of this subtle fluid, and what are the precise circumstances under which it is evolved, and what is the manner in which it exerts its baneful influence—still the main and most important points admit of no question. Thus, and in general, all persons, from the most ignorant to the most learned, agree that there is *something* which rises into the atmosphere, in hot weather, from marshy ground and stagnant waters, which tends to produce the common autumnal fevers in those who are much exposed to breathing the air contaminated by this admixture.

Though I speak of malaria as an aëriform fluid, or gaseous product, it is not designed to found my argument upon the truth of that opinion. Though, for convenience, as well as because inclining to the belief, malaria is here spoken of as a material aëriform product; yet, it may be also used as a term to designate the particular *condition of circumstances* produced by certain causes, which condition operates to produce and strengthen autumnal diseases. Still less do I mean to maintain that malaria, even if material, is of any one kind of gas, or any particular combination of several kinds. Besides these, there are many other common points on which the learned investigators of malaria totally disagree; and so much does each one insist upon deducing general principles from his own particular facts, (or supposed facts,) and so slightly and incorrectly have such facts been observed, that the general reader becomes lost in the contradictory positions of different instructers. Thus, judging from particular and isolated observations, with some writers, there is no condition of circumstances, which will not sometimes, in a warm climate, produce malaria; and with others, upon equally partial and imperfect observation of other facts, the production is denied to be usually caused by any of the circumstances which are generally deemed the most certain and fruitful sources. One writer, perhaps, has known an exemption from disease in those who lived close to a stinking marsh, or a stagnant pond; and hence he denies that these are sources of malaria, and accordingly searches for them in other circumstances. Another has known the effects of malaria on troops encamped in a high defile in the mountains of Spain, where the soil was dry and stony, and no water except rapidly flowing rivulets, and the place some miles distant from the nearest marsh or lake. Hence he concludes, that even such a locality as this, in certain (unknown) circumstances, throws out abundance of malaria. Considering the circumstances under which most of the works on malaria have been written, it would be strange if they were not quite contradictory. The authors of most of them were army-surgeons and physicians, who observed the effects of malaria, in some deadly region, upon soldiers not at all acclimated. Perhaps the author was confined to a garrison, or at least limited in his observations to the line of march of an invading army; and in a country to which he was totally a stranger, and among a hostile people, whose opinions he could not learn, and whose language he probably did not understand. If a physician of Lord Cornwallis' army, who had merely accompanied his march through Virginia, and been cooped up in Yorktown during the siege, had written a treatise on the diseases of the country, he would have been better prepared to treat of them than most of those who have essayed such tasks; and he probably would have considered as a regular disease of the country the fatal "jail-fever," which swept off in numbers the absconding slaves who had joined the British army, and were crowded together in Yorktown, until the surrender, and which form of disease has never been known there, before, or since.

All agree that decaying and putrefying vegetable matter is one of the greatest, if not the only source of malaria. Of course, then, in addition to the sufficient abundance of the material, the circumstances most conducive to its putrefaction, must be the most favorable to the production of malaria.

The presence of moisture, a certain degree of heat, and the access of air, are circumstances *essential* to fermentation, and of course to the production of malaria; and neither can take place without the aid of all three of these things. Much moisture would be less favorable than a less quantity; and entire covering by water would, by excluding air, prevent fermentation, and its consequence the formation and escape of malaria.

It is also one of the few settled points, among scientific investigators, that malaria is very light, at least when warmed by the sun; and hence the fact known to many in this country, that those who live on the borders of marshes, and of mill-ponds, sometimes escape all injury from their exhalations, when others, who live on high hills, and at much greater distances from the sources, suffer greatly by the disease produced. Facts of this kind are numerous, and of regular annual occurrence, in Gloucester county. The whole of the wide and very level low-grounds furnish residences very healthy, compared to the tide-water region in general; though intersected in every direction by tide-waters, and though there still remains much swamp land unreclaimed, such as the whole body of low-ground was when in a state of nature. But the high, dry and hilly land, which forms the ridge of the county, is less healthy; and the highly elevated and beautiful sites of mansion-houses overlooking the low-grounds, are universally sickly in autumn.

If all the facts in regard to the action of malaria, were as regular and uniform as this one, just stated, is in Gloucester, there would be far less doubt on the subject. It is the uniform character of the country, in its high-land, low-ground, and also the water, and the long extent of each, which causes these effects to be so uniform there. Owing to causes stated in the description of the low-grounds of Gloucester, (page 178,) there is but little malaria evolved there; and if that, as supposed, rises by its greater levity, the regular daily sea-breeze must cause it to float towards the highlands; and the long and regular line of ridge cannot fail to receive it, and in not very different proportions. But in most other situations, even though malaria should be produced in great quantity and with direful effects, yet these effects are so extremely irregular, in the places, the times, and the intensity of their operation, that they cannot be certainly traced to their true source; and therefore, that source may remain scarcely suspected, while it is dealing out death somewhere in almost every season. Away from the vicinity of the sea, nothing can be more irregular than the winds; yet, supposing a mill-pond to produce a regular and large supply of malaria every autumn, (though that supply is itself extremely irregular,) it depends upon the direction, force, and continuance of every change of wind, whether and where, and to what extent, the malaria will produce disease. It is therefore not at all strange, nor opposed, as is thought by some, to the regular annual production of malaria or causes of sickness, by each mill-pond, that the visitations of sickness, at any one place, should be very irregular, and the difference be often totally inexplicable from any known causes, or variation of circumstances.

According to the views presented, there must be more or less malaria (or the gaseous products which, under certain conditions, form malaria,) evolved in every country where there is much vegetable matter to ferment, and sufficient warmth of climate to carry on fermentation. But, in the small quantity which is unavoidably extricated in every such temperate and fertile country, these products seem to be harmless. Perhaps a small quantity is absorbed as food by growing plants, and this aids the production of the earth. If so, this beneficial operation is made easy by another quality of malaria, which is well established as true. This is, that though it is so expanded by the sun as to rise above the lower air, still it remains on the surface of the earth in the night, after being extricated, or perhaps descends again from above, when condensed by the cold night-air, and of course lies in contact, through the night, with growing plants. Hence it is, that sleeping on the ground, or in the lowest apartments, and being exposed to the night-air, invites the attacks, and increases the virulence of malaria; and hence also it is, that the keeping of fires at night, even in warm weather, has been found highly useful to health, in places much subject to autumnal fevers.

Though it may then be theoretically true that every good soil, in every agreeable climate, is throwing out malaria to a certain extent, it is only large quantities that are hurtful; and in practice, we have only, if possible, to avoid the formation of the hurtful excess of the products of fermentation. If, in lower Virginia, we can guard against the existing and increasing excess of malaria, our situation would be one of the healthiest in the world. For while we are comparatively free from the many and fatal disorders of the lungs to which the inhabitants of northern, and what are usually and improperly called *healthy* countries, are peculiarly subject, we have no source of disease peculiar to our location, save this one, which I fully believe, it is within our power to guard against.

Putrefying animal matter, alone, however offensive in scent, is supposed not to produce malaria. It cannot be doubted but that decomposing vegetable matter is its source, because there is no production of it where there is no such material. Still, vegetable matter, alone, or even when mixed with some putrescent animal matter, does not seem generally to produce malaria in great quantity, or with manifestly injurious effects on health. Thus, the gradual fermentation and rotting of the litter in cattle-yards, when left to stand through summer and autumn—or when the same was heaped and so left, (as was formerly the general practice in lower Virginia on all farms where manure was an object of care—) never was known to be certainly and highly injurious to the residents on the farm. Doubtless, malaria, and to an injurious extent, was always thus produced; but I have never known a sensible difference in regard to health, in years when either of the practices above-named were pursued, and when the material was carried out and applied to the fields in the spring, before fermenting. Yet, if judged by the test of some of the causes and effects as described and reasoned from by writers on malaria, one well-filled yard of litter, rotting through summer, ought to have produced enough malaria to kill half the inhabitants of the farm; and effects, in general, which would have been so disastrous, and so sure, as to leave no doubt of the cause of the evils, and of the absolute necessity of preventing the recurrence in future.

But the putrefaction of vegetable matter, mixed with other things, as earth and water, and under peculiar circumstances, (though neither the precise admixture nor the circumstances are known,) produces disease to such extent, that there is no doubting or mistaking the connexion of causes and effects. Such sure and abundant sources of malaria are the following materials. 1st, The putrid and stinking water of stagnant ponds, partially dried by the heat of summer. 2d, The mud bottoms of such ponds, or of streams reduced by drought, rich in decomposed vegetable matter, and left bare of water only in summer. 3d, Fresh-water marshes, of vegetable soil, frequently, but not regularly, covered by the tides. 4th, Fresh-water marshes, laid dry by embankments, and thereby permitted to rot away rapidly. 5th, The meeting of salt and fresh waters on land full of vegetable matter. Of these several and most important sources of malaria, I deem the third (fresh-water marshes in their natural state) to be the least hurtful; and that the sources numbered 1st, 2d, 4th, and 5th, increase in virulence in the order in which they are named. The greater evils produced by the last are universally admitted, but still by an erroneous deduction from the premises. The belt of the tide-water region of Virginia, in which the fresh water flowing down the rivers mingles with the refluent salt water from the ocean, is well known to be more subject to autumnal diseases, than any other extensive space in the country. The breadth of this belt varies much in different seasons. The parts of the rivers in which the fresh and salt waters meet, and where each alternately has possession, as the tide ebbs or flows, may be but a few miles wide, and even that space is not stationary. But if the limits of this belt be fixed by the highest points to which the rivers have been known to be brackish, in driest summers, and by the lowest points where they are fresh in winter, then this belt may be considered for the time as 40 or 50 miles wide, and, in length, stretching across all the tide-waters of the state. But in the much narrower space where this mingling of the salt and fresh waters usually takes place during the heat of summer, malaria acts with most intensity. Hence the general opinion, that it is simply the meeting and mingling of the fresh and salt waters which cause disease. This is not so, or but in a very slight degree. It is either the passage of fresh-water over salt-water marshes, or of salt-water over fresh-water marshes, that causes the great production of malaria, and disease. This is an important distinction, and the truth or error of the position deserves the most careful investigation. If the mere mingling of the waters were the cause of sickliness, any relief for this part of the evil would be hopeless, as the waters *must* meet and mix together, *somewhere*. But if it be as I suppose, the evil may be greatly restrained by works of art, or by simply preventing the unnatural accumulation of vast reservoirs of fresh water in mill-ponds, which when discharged, by breaches in the dams, or by opening the flood-gates, overflow salt-marshes, which the natural or unobstructed stream never could have covered.

Salt-water marshes, not touched by fresh-water streams, are not unhealthy to any considerable extent. This is susceptible of proof by innumerable examples in Virginia on the borders of the ocean, or of the waters of the Chesapeake bay. It is rare, however, to find a large salt-marsh attached to extensive high-land, which is not reached by some small stream; and every salt-marsh of course must sometimes be well washed and freshened by the heaviest falls of rain. Therefore all must, slightly and at some times, be prejudicial to health. These, however, are exceptions of but small practical or sensible operation.

The view here taken of the manner in which malaria is produced most certainly, and acts most injuriously, though not sustained by any known authority in this country, nor by any other precisely as stated here, is not therefore presented as original. I derived it, and thence deduced my application to this country in a modified form, from the interesting report on the malaria of Italy by Gaetano Georgini, of which the substance was published in two different papers in the Farmers' Register, (p. 502 of Vol. IV, and 460 of Vol. V.) In this report the author shows by the most conclusive argument and facts, that the irregular irruptions of sea-water over tracts of marshes, or other low-grounds, of fresh-water alluvial formation, caused the long continued and worst effects of malaria; and that by simply guarding against the entrance of sea-water, the country was restored permanently to healthiness. He says nothing of the reverse operation, the irregular floodings, with fresh-water, of salt-marshes. But what is produced by the one, can scarcely fail to be as well produced in the other case. The *mode* in which the effect is produced is not attempted to be explained by the learned author quoted above; nor does any explanation seem sufficient to my mind. The rapid and abundant production of malaria may perhaps be aided, if not entirely caused, by the luxuriant cover of fresh-water plants, in the one case, being partly killed, and made ready for putrefaction, by being covered by salt water; and in the other case, in this country, by a like injurious operation on the plants peculiar to salt marshes, produced by the overflowing of fresh water. We know that certain plants flourish best in salt and wet soil, as others do in wet soil entirely free from salt; and that respectively with these different growths, the salt and the fresh marshes are heavily covered. It must follow from a sudden change in the condition, from salt to fresh, or the reverse, that the health of the entire growth must be greatly injured, and much of it subjected to death and decay.

The next most fertile source of malaria, (or perhaps what is even of greater malignity, for the small space occupied,) is presented in what is entirely the work of man—the miscalled *improvements* made by embanking and partially or entirely drying tide-marshes. The soils of these marshes, as I have ascertained by careful analyses, are composed, for about half their weight of vegetable matter, and probably nine-tenths of their bulk is of that material, destructible by decomposition, when circumstances are favorable to that result; and drainage and cultivation produce precisely the condition which is most favorable. When covered twice every day by flood-tide, a marsh soil of this kind, though composed of the most putrescent materials, is but little subject to decomposition; because being always thoroughly water-soaked, even when not entirely covered, and by water continually changed, the air is too much excluded, and the wetness is too much in excess, to favor the progress of decomposition. When the marsh rises so high as not to be covered by the daily or frequent tides, then decomposition is more favored by the drier state of the surface, and to a greater extent, malaria is evolved, and health injured. Hence the inference, that the higher and the drier the marsh, the more it is injurious to health. But as soon as such a vegetable and putrescent soil is made nearly dry, and still more when cultivated and exposed to be penetrated by the air, decomposition proceeds under the most favorable circumstances. The soil sinks annually and rapidly, not so much by drying (as commonly supposed,) as by actually rotting away, and in a few years, it is reduced to so low a level, as again necessarily to pass under the dominion and shelter of the water. The more complete the drainage, and the more perfect the management as arable or tilled land, the more rapidly is that end reached. In the progress to this end, a layer of the whole soil, of from one to three feet in thickness, will have passed off into the air in the gaseous products of putrefaction, of which enormous products, a large proportion will be malaria, and the effects produced by it on the health of some of the neighboring population are generally so evident as to leave no doubt of the source of the evil. More full details on the effects of embankments of tide-marshes are to be found in previous articles in this work.*

The production of malaria by the last named operation, the embanking of marshes, however, is necessarily of very limited extent—and moreover of very limited duration. Nature soon asserts and enforces her rights; and the hopes of the improver, and the land so improved, are together overwhelmed by the reinstatement of the waters, and this source of disease is thereby cut off.

Tide-marshes, however extensive and injurious in their operation on health, still are limited to a comparatively small proportion of our broad territory. But there is another source which spreads disease over half the state, and which is entirely of artificial formation, and of which the evil effects have been becoming more and more extensive, and more and more virulent, from the early settlements of the country to this time. This wide-spread and generally operating source of disease and death is furnished by the numerous mill-ponds, of variable height of surface, which are now scattered over the whole face of eastern Virginia, and of which every individual case adds something to the general and enormous amount of injury to health and to life.

The law of Virginia in regard to the erection of mill-ponds, with perhaps the exception of the fence-law, is one of the most stupid, and most regardless both of private rights and general interterests, of all in our code; and it is far more objectionable than the former, inasmuch as while the one merely robs private and destroys public wealth to an enormous amount, the mill-law permits and encourages also the destruction of health and of life throughout the whole land. It is true, unfortunately, that this opinion is not entertained by but few persons: and that even with those who admit that all such mill-ponds are injurious to some extent, their estimate of the amount of evil is much below mine. It is my object, to awaken the community to a sense of the enormity of the evil, and thereby to induce the commencement of measures of remedy and prevention. The universal acquiescence in this policy of our country, and the almost universal ignorance of the evils which it produces, requires strong language to enforce novel views in opposition to long established opinions. But it is confidently believed that my denunciations will be justified by reason and by facts, and by the magnitude of the existing evils.

There has long prevailed in Virginia a mania for building water-mills, which was not restrained by insufficient regular supplies of water to fill the ponds, nor by the insufficient prospect of business and of profit, even if there were no failure of water. In consequence, there have been not only erected mills on every stream barely sufficient to keep a common corn-mill in operation, but also on as many others where the water-power was either insufficient, or totally failed, during the driest season of every year. In the tide-water region, the mills for grinding wheat-flour, or any thing else for sale abroad, are limited to the falls of the large rivers. All the others, (and probably there is on average one for every square of five miles,) are merely designed to grind for toll the corn used for bread in the immediate neighborhood; and, considered merely in regard to money-cost and profit, it is most likely that half the mills in the country do not get enough toll-corn to pay for more that the costs of maintenance and repairs of their establishment. The more worthless the mill, on account of the insufficient supply of water, the more productive it necessarily is of malaria, diseases, and death. It will be difficult for me to make those who are unacquainted with our country believe that hundreds of mills have been built, and that most of them are still kept up, and many more new ones will probably yet be added to the number, which cannot yield any clear profit, above the entire cost, to the owners, independent of cost in property to the neighbors, and the cost (whatever that may be) of health and life to the country at large. Still the fact is notorious throughout lower Virginia, if it does not extend through the higher middle country. The only reason that I can conceive for so many unprofitable investments of this kind, is, that many residents of the country build mills, as many others raise race-horses, more for amusement and excitement, and to vary the monotony of their lives, than for profit. But this propensity of individuals could not have done much mischief to the country at large, but for the encouragement offered by the government. According to the law, and the long-established usage under the law, any man who desires to erect a mill, and for which it is necessary to pond the water on some of his neighbors' land, has nothing to do but to apply for an order of the county-court, by which the sheriff summons a jury to meet on the spot, to judge of, and assess the damages that will be sustained by the owners of the lands designed to be covered by the pond. The jury is generally composed principally of men as ignorant and unfit for such investigations and estimates as the neighborhood can furnish—and they decide by guess as to how much land will be covered, and what damage will be sustained in the loss of the use of the land. There is no question entertained as to whether a mill is at all required by the demand of the neighbors for meal; and if the question of the effect on health is even named, it is addressed to a body entirely unacquainted with, and regardless of the whole subject. In fact the question as to health has rarely been considered in any such cases; and never duly considered. If the land

* See Farmers' Register, p. 107, and 129, Vol. I. and p. 41, 42, Vol. V.

that will be covered by a pond, though very rich, is then in the state of swamp, and totally unproductive, such an uninformed jury, as the case is usually submitted to, will be very ready to decide that such land is worth nothing; and if $3 an acre is given as damages, for the land actually to be covered by the pond, it will be deemed a liberal allowance. The court will rarely refuse to sustain the verdict of the jury.

Though the use of the land thus covered is forever taken from the owner, or, for as long as the mill-owner may choose to keep up his pond, still the right of property is not changed. This small reservation of right, or feeble homage to justice, serves as a still further injury to the community, and is not of the least value to those to whom the right is reserved. It would be far better for all parties, if, when land was thus condemned to be covered by a mill-pond, that the damages assessed, however low and pitiful compared to the damages actually sustained, should have been deemed the purchase-money of the land, and the absolute right of property vested in the mill-owner. If this were the case now, there are many mill-ponds in Virginia which would be forthwith laid dry, even though the mills should necessarily go down; because the land covered by the ponds is now known to be worth more for cultivation than the mill is for toll. Hundreds of other mills, of greater profit and value, also, in that case, would be better supplied with water by canals than by their present ponds, by which their value as mills would be increased, to the owners and to the public, and the nuisances of the ponds be equally abated. But as the law now stands, if a mill, which will not bring in of net rent $50 a year, covers by its pond 500 acres of rich land belonging to other persons, the mill-owner has no interest whatever in draining the pond, because its drained bottom would belong to other persons. In any case approaching to this, and in which there would be a gain to all the individuals concerned, by draining the pond, still it is not done, and the nuisance continues long after it is well known to be such, because there is a contest between the several owners of the pond and of the land covered by it, in regard to their respective shares of profit to be gained by emptying the pond. Many such cases still exist in Virginia; although many of the most unprofitable ponds, from proper views of economy, have been drained, and either substituted by cheaper and more efficient canals, or the mills put down entirely. An old mill-pond in Dinwiddie county, which covered 1200 acres of land, has been drawn off, and thereby an indifferent mill exchanged for a large fertile farm. This would not have been done, even if the mill was worthless, but for the ownership of the mill, and the land covered by the pond, falling into the same hands. There is a mill-pond now kept up in Prince George county, which is supposed to cover nearly 400 acres of land; and there are many others not much smaller, on different branches of swamps in lower Virginia. The larger the pond, in general, the greater proportion of bottom is left dry in autumn, and the more disease is therefore produced; and though the draining of such large ponds would be so much the more an object of gain, there is the less chance for its being done, because of the separate ownerships and interests.

Almost all the mills throughout the lower part of Virginia, and also a large proportion of those in the more hilly middle country, are worked by streams which are inadequate to the daily supply of the mill, and evaporation from the pond, even if the grinding is not necessarily suspended or diminished at any time. To guard against the temporary failure in dry weather, the full "head" of the pond, (or the level of water for which damages were assessed, and to which the water may lawfully be raised,) is much higher than the lowest level that will work the mill. The land covered is also usually very nearly level, so that to raise the water 10 or 15 feet at the dam, will often back the water from one to two miles up the low-grounds. If the variation between a full head of water, and the lowest level, be 5 feet perpendicular, it will often cause the uncovering of many acres of the bottom of the pond to the hot sun, and thereby furnish a most fruitful source of malaria in every such case. Rich alluvial mud, as this always is, thus exposed, in hot weather cannot be otherwise than very injurious to health; and there is not a pond-mill in Virginia, with a variable head, which has not more or less of the pond every summer thus converted to a fruitful seed-bed and nursery of disease.

Besides this, there is the not rare occurrence of the pond being entirely drawn off in summer, by the breaking of the dam, and suffered so to remain for weeks or months, before being again repaired and filled. In this case, a double quantity of bottom is exposed to putrefaction, and fitted for the discharge of unhealthy miasma.

At all times, in ponds supplied by streams as feeble as most of those used for mills in Virginia, the water approaches to a stagnant state; and therefore, of itself is a producer of malaria. In dry seasons, when unusually low, the putridity of the water of such ponds is perceptible to the sense of smell; and it must be then far from harmless.

Another, and in certain situations, the greatest evil of mill-ponds, remains to be stated. The others above-mentioned are the effects of the scarcity of the supply of water; this is from the excess, which is found in all streams, at some times, even though the most deficient at others.

To guard as much as possible against the expected scarcity of water, the mill-owner aims to hold, when rains increase the usual supply, as "full a head" as he has a right to maintain. When this supply is exceeded, as it frequently is, and greatly, if the dam is not actually broken, and the whole emptied, in one prodigious flood, at least the flood-gates are opened widely, and a discharge made ten-fold greater than would have occurred, during equal time, if the stream had not been obstructed by a dam, and had discharged as regularly as the supply was increased. It will be evident, on considering these circumstances, that water from a mill-pond, whether discharged by flood-gates, or otherwise, must be far more variable in height, and in extent of inundation on the land below, than the natural stream, unobstructed by art; and still more than the stream opened and improved, and its course facilitated by art. An ordinary natural stream, which might have a very uniform discharge in dry weather, and would rarely overflow its banks in wet, if dammed across for a mill, would often have its bed, below the dam, left almost dry; and at rare and irregular times, would be converted to a tremendous flood, which would sweep over many hundreds of acres more than the floods of the natural stream could have reached. Besides the immense damage caused to cultivated land by these floods, (and which kind of damage is rarely estimated or thought of by juries, when mills are established above,) there are numerous hollows made, and filled with water, which, on the retreat of the flood, (as hasty as its inroad,) remain so many stagnant pools, until made dry by evaporation. The whole land, thus covered, is saturated with water; and, from the nature of the rich alluvial soil, is throughout, as it dries, made a producer of malaria.

But the worst part of this evil, by far, is when these artificial floods of fresh-water pass over salt-marshes—which happens in all the country in which the fresh and salt waters meet; and this combination of causes I consider the most efficient producer of disease in that part of the country, and the thing which ought most especially to be guarded against. According to the views before presented, the passage of fresh water over salt-marshes, no matter to what extent, is one of the most sure producers of malaria, and of a particularly malignant kind. The mill-ponds, alone, form other and far more extensive, if weaker sources of the poison; and by the union of the two, the mill-ponds exert all their usual bad influence above the dams, and spread ten-fold more pestilential effects below, by inundating the wide salt-marshes, which by natural streams would scarcely have been affected.

On Nansemond river there are lands already rich, and having inexhaustible supplies of the best marl, which have been sold at $10 the acre. There are hundreds of estates in the same belt of country, which cannot be sold for as much as the cost and present value of the buildings. And this otherwise fine country, so accursed by disease, owes its condition principally to the streams which flow into the salt tide-waters, and which are so numerous, and their sources so interlocked, that there is no spot safe, by remoteness of position, from these combined effects of mill-ponds and salt-marshes. It is therefore sufficiently evident why that otherwise finest part of the state, for agricultural improvement and profit, should stand among the lowest in both these respects. Yet this part of Virginia might be rendered both healthful and fruitful, and the delightful region which God has permitted it to be made, if man would accept and avail of his bounties, by merely using half the expense for improving, which has been lavished to inflict pestilence and poverty on the country.

These statements and expressions of opinion will be unpalatable, if not offensive; and perhaps may subject the writer to the charge of being willing to injure the residents of the region for whose relief in this respect he is most anxious, and of the facility and cheapness of obtaining relief, by the use of proper means, he feels most confident. If the exposure and probing of the ulcer be never so painful, let it be remembered that it is done solely for the purpose of seeking for, and applying, a sure remedy.

There is still another source of malaria, which it is necessary to touch on in connexion with the above-mentioned, though it has been already treated more fully elsewhere, and therefore will be but slightly mentioned here.*

From the vegetable matter upon the driest land, as it ferments and decays, there must be extricated more or less of the gaseous matter, which, when in excess, is injurious to health. According to this view, the whole surface of the country, and especially that most heavily covered with vegetable matter, may furnish malaria. The degree of hurtfulness of this product will depend on the power of growing vegetables to feed on, and of the soil to absorb and fix in it, this matter, which, according to its direction and quantity, may either enrich land, feed plants, or poison men. In earlier publications I have stated at large my reasons for believing that all the products of vegetable decomposition, on naturally poor lands, are lost to the land;† and as the ultimate results of decomposition are gaseous, or aëriform, they must go off into the air. These products constitute or cause malaria, and its injurious effects on the health of the inhabitants. But calcareous matter serves effectually to fix there the enriching principles of decaying vegetable matter, until they become the food of growing plants. Hence the deduction that a naturally poor soil, made calcareous, will no longer throw off gaseous products, or malaria, into the air; but will store it up as fertilizing manure. The sure remedy for the irregular and generally slight degree of sickliness thus caused, is, to marl or lime all the land that requires calcareous earth. But that remedy would not be sufficient, if mill-ponds or marshes in the neighborhood continued to send out large additional supplies of the aëriform poison.†

The correctness of my deductions as to the very injurious effects of mill-ponds on health, will be denied on several grounds, which, so far as expected, I will anticipate as objections, and state with the answers, as follows:

Objection 1. Admitting generally, and to some extent, the ill effects of mill-ponds in producing noxious exhalations, and autumnal diseases, it does not appear, that these effects can be either so great, or so sure, as is charged above. The residents on the farms nearest to mill-ponds are not always, and often not at all, more sickly than those who reside several miles distant. The house of the slave who acts as miller, is usually near the mill, and close to the pond; yet families so situated are generally as healthy as any others, and sometimes are healthy in a remarkable degree, compared to the neighborhood generally.

Answer. Near the mill-dam, or the lower end of the pond, may well be less affected by the exhalations from it, than places a mile or two more distant. That part is the deepest of the pond, and of which also the banks are steepest; and perhaps half a mile in length of the bottom of the upper and shallowest part of the pond, and of alluvial mud, might be left naked in drought, before a margin of steep hill-side, of three feet width, could be exposed near the mill. Further—from the greater lightness of the malaria, it will rise high in the air, and would soon be carried far away by a moderate breeze. If the wind be moderate, and steady to

* See "Essay on Calcareous Manures," 2d ed., chap. xix., and "Essay on the Police of Health," commencing p. 154, Vol. V. of Farmers' Register.

† Essay on Calc. Man., ch. iii., viii., and xii.

one direction, and still more if its course be confined to an opening by or between woods, or to a narrow valley between high hills, it may well be imagined that the poisonous air might injuriously affect persons perhaps five miles from the pond, and who would not suspect the operation of so distant a source; while others, close to its border, but in a different direction, or on a different level, might escape its influence.

Objection 2.—There is not enough difference in the usual or average healthiness of families the most exposed, and others the least exposed to mill-ponds, to attribute much of the effects to these causes. Whole neighborhoods, in some autumns, are very healthy, and in others very sickly, without either condition seeming to be connected with any certain and known state of the nearest mill-ponds.

Answer.—The extreme lightness of the poisonous air, and great and frequent variations in the direction, force, and continuance of the winds on which it is borne, make it generally impossible for it to be known from which particular pond or ponds the malaria rises, or where it is carried. It is most probable that the exhalations of twenty ponds, of which the most remote may be thirty miles apart, may be mingled together, even by the winds of a single day, and thus combine and average the effects of all. Further—if all the mill-ponds of a county furnish one half of the active and injurious malaria, and the other half is thrown off, nearly equally, by the whole surface of the land, (though some parts would receive the strongest doses, and others escape with having only the weakest,) it would be impossible to understand the mode, and estimate the intensity, of operation of the known general causes; or to refer, with certainty, any one effect to its special or principal cause. Thus, a farm, relieved from all malaria of its own product, by marling and by drying its mill-pond, though evidently showing the benefit in increased general healthiness, might still be sorely visited by the seeds of disease from other and remote sources, directed and concentrated by a steady wind.

Having presented these views of the origin, action and effects of malaria in this country, I can better exhibit the progress of the causes which I believe to have operated, and which are still continuing to operate, to produce the change from a healthy, to an unhealthy state.

When our ancestors first reached this shore, nearly the whole country was in a state of nature. The savages had cleared for cultivation but a few fertile spots on the banks of the rivers; all the rest of the land was under one great forest. The streams had not been obstructed by the cutting down of trees across their beds, (by which, in many cases, streams have since been choked, and swamps thereby formed, or greatly extended.) No dams had obstructed the free and regular course of the streams, and therefore no great artificial floods were formed. The soil not having been cultivated, was not exposed to be washed away by the rains into the rivers. The waters therefore were generally clear, instead of being generally muddy, as since all these circumstances have been changed. In this former state of things there could have been existing but few sources of malaria.

The first sources formed by the civilized settlers, was in making ponds to supply water-mills. But while these were yet few in number, the constructers of course chose the best and most unfailing streams; and the ponds were also, for a long time, surrounded by dense and tall forests. Such hilly land as the margins of the ponds would certainly not be brought into cultivation, while so much that was far better, and easier to till, remained unoccupied. Hence, such ponds produced but little malaria, and that little was warded off from the settlers, or taken up, by the forest growth. The general wooded state of the country, also, for a long time, rendered the supplies of water more regular, and prevented the severe droughts, which would have altered greatly, as is usual now, the levels of the ponds.

The clearing, cultivation, and consequent washing of the lands of the upper country, greatly increased the muddiness, and quantity of alluvial deposite of the rivers, and thereby increased the marshes both in breadth and in height. More mills continued to be built, and on streams worse and worse for water-power, as the choice became less open, and the mill-mania began to grow; and, in the general, each successive construction of a pond was less productive of profit, and more productive of disease, than its predecessors. The number of mills not only continued to increase, and is increasing to this day, and in the oldest settled parts of this state, as well as the newest, but gradual changes also took place in the condition of the old mills which greatly increased their fitness to produce disease. By the long continued deposite of mud from the streams, and the washing of the now cleared and tilled hill-sides, the ponds became more shallow, and the waste of water by evaporation therefore became greater; while the supply was lessened, in consequence of the extended clearings of the great forest which had before covered the whole country. To remedy the increasing deficiency of water, the owners of old mills, who were not prohibited by circumstances, raised the level of their ponds; which by increasing their surface and their contents, still more increased the daily evaporation, and also the violence of floods, and the variable height and surface of the water; all of which again combined to increase, still more than before, the product of malaria. The consideration of the progress of all these circumstances, and their bearing on each other, will serve to explain why a particular neighborhood might formerly have been healthy, though having two or three mill-ponds within or around it; and why it might gradually have become very unhealthy, in the course of time, by the malaria produced by the ponds of the same mills, or perhaps by the addition of one more new pond, to the former number. But, in such cases, so gradual would be the general change, and so irregular and variable the attacks and virulence of the autumnal diseases, that the sufferers would not attribute the change, (even if they admitted it to have taken place,) in their average degree of health, to causes which had so long existed, without being charged with doing mischief; and in which causes, no change of condition had been observed. Add to this, that self-love makes every man reluctant to believe, and to confess, that his own farm, or his own neighborhood, has become more sickly; and the change for the worse is attributed to transient causes, until the former state of things is almost forgotten, and the present is received as if it had always been the usual condition of circumstances.

During all this time, other causes were working to produce other nurseries of disease, and impediments to agricultural products and improvement. The wet alluvial bottom-lands, bordering on small rivers and still smaller streams, were for a long time neglected, and deemed of little value, except for their fine white-oak, cypress, and other noble timber trees. These were cut down so as to fall into or across the streams, when in reach, more often than otherwise; and in consequence of such obstructions, continually increased in number for more than a century, the before open streams were choked, and the bordering low-grounds converted to swamps; and those which had been swampy at first, were made still more so, by obstructing the sluggish streams and spreading them over the whole surface, and causing that surface continually to rise, by fallen trees and alluvion. But wet as are such swamps for the greater part of the year, most of the surface is dry in autumn; and the scanty water is then stagnant in numerous pools, until added to by the first heavy rain, or a flood from a mill-pond discharged above. Of course all these circumstances added enormously to the previous annual decomposition of vegetable matter, and consequent production of malaria. Such swamps as these, formed by nature and increased by art, are those on the Chickahominy, Blackwater, and many other long but gentle streams. To form or increase their evil qualities and tendencies the law has given full permission, and no small aid; but it positively, though indirectly, *forbids the drainage* of all such extensive swamps, and preserves them still as mere nurseries of disease. A general law for permitting and facilitating, under proper regulations, the draining of these great swamps, would be a measure which would be most beneficial, not only for improving the healthiness, but for increasing the agricultural products of the country.

But though the tendency of the general changes in the physical condition of the country was to increase the causes of autumnal diseases, there were numerous particular exceptions, in works serving to promote health. Of this kind were the opening and straightening of the choked channels of small rivers, and many large streams, in the hilly country, where there was enough descent to enable each individual proprietor of flooded low-ground, to relieve it by operations confined to his own land. The effectual drainage of much land of this kind has produced so much benefit to health, as, in many cases, to balance, and even exceed, the increasing pestiferous effects of the neighboring mill-ponds. Such facts would be taken, by most persons, as proofs that the increase of mill-ponds had not increased disease.

Such benefits have been produced by the gradual draining of the extensive low-ground of Gloucester, which in its former and natural swampy state, must, necessarily, have been an abundant source of malaria. This change, together with other circumstances stated in the recent description of that part of the country, has operated to render the Gloucester as free from bilious disorders as any part of the tide-water region—save the adjoining county of Matthews.* The remarkable general state of healthiness of all these very low lands, at present, as well as the exceptions, and evident causes of the exceptions, furnish the most clear and important evidence of the truth of the position, that mill-ponds, and floods of fresh-water discharged over salt-marshes, are the great sources of malaria in Virginia. As stated formerly,† there are but few fresh-water streams discharged on salt-marshes in these two counties, and not a pond-mill on the low-grounds, nor indeed in the whole county of Matthews, save one on its border nearest the high-land. The facts presented here, alone, will prove the great and certain benefit to be obtained by even a partial and imperfect avoidance of the action, separate and combined, of these two great sources of malaria.

The most important part of this subject is the consideration of the remedies for the evils described. But although the means available for this end, in my opinion, are ready, cheap, and sure, still it is needless at present to argue in their favor at great length. Unless the people are aroused to a proper sense of the evils under which the country suffers, no regard will be paid to the consideration of proper remedies; and if the former object can be gained, the latter will then necessarily follow.

The most important of these remedies, and of which the proper use, I maintain, will remove nearly all the existing sources of malaria, and make lower and middle Virginia in general as healthy as any region of the earth—will be merely here stated concisely but distinctly.

1st. To prevent the continuance of any mill-ponds of very uncertain supply, and variable "head," or height of water.

2d. To furnish to the land-floods, of streams swollen by rains, or by any mill-ponds still left, the quickest and best possible discharge to tide-water by open canals, so as to prevent the fresh-waters passing over any salt-marshes.

3d. To drain the great flat swamps; all of which require a continued canal to be extended from the lowest out-let, up to the head of the supply of water, in the most effective course, and on a general plan, through the lands of many different proprietors. The drainage of lands, so situated, is effectually forbidden by the existing laws; as there is no power to act, unless all the proprietors concur in every particular of the execution and expense of the drainage; which is obviously impossible.

4th. To refrain from embanking from the tide any marshes of the usual putrescent and perishable soil.

5th. To apply marl or lime to all lands needing calcareous manures, and on which they could be furnished at not too great cost for even such great improvement of soil and product, as would certainly be obtained in such cases.

The two last means of prevention are altogether within the province of individuals, and will be used, or not, according to the views of different individuals, as to the agricultural profit to be expected from such operations.

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* See the facts and reasons stated more fully at p. 179 and 190, in the last number of Farmers' Register.

† The same, p 190.

The three first-named means of remedy would each require the action of the legislature, to enable them to be used to any extent.

The necessity for a general plan being authorized by law for inducing and compelling combined operations to drain swamps on long and sluggish streams, though merely for agricultural improvement and profit, is already evident to most intelligent farmers; and perhaps nothing is now wanting to procure such legislation, but the proper exertion of some of the individuals who are most interested on the subject.*

The giving free vent to land-floods, also, by wide and straight canals, and preventing them, by dikes, from overflowing the salt-marshes, though a kind of work requiring public money, as well as legal authority, still may be hoped for, when the necessity of the measure shall have been made evident.

But there is no such prospect of success as to the most important reform needed, in the putting down of all fever-breeding mill-ponds; and he who will venture to advocate this general measure, will be regarded by most of those whom he aims to serve, as more an enemy than friend to their interests, and more deserving to be treated as a lunatic, than to be respected as a judicious advocate for valuable public improvements. It is not in the vain hope of now enforcing my views by extended argument, but to offer explanations, and thereby prevent misconstruction, on some particular points, that some further remarks will now be offered.

Even if the public mind had been prepared for a full legal reformation of the police of mill-ponds, and for the laying dry all such as are nuisances to health, there would be no accompanying necessity for injuring the private interests of mill-owners, nor of causing material loss or inconvenience to the customers of the mills. In the first place, in justice to the vested rights of the millers, (however unjust to others, and injurious to the public may have been the original creation of their rights,) I would advocate full compensation being made for every sacrifice of value in their ponds, which should be required and compelled for the general benefit. But *not more* than full compensation for all value thus destroyed should be granted; and many of the fever-breeding ponds have really no pecuniary value to their owners or to the public; and most others may, to greater advantage, be supplied with water by canals, instead of by ponds. Even if one-third of all the mills should be thus put down entirely, these would be such as now always fail in dry seasons; and the more permanent and regular supplies of water, which all the remaining mills would receive from the canals substituted for ponds, would render them able to furnish the whole country with meal, with regularity, certainty, and in abundance, and therefore more suitably and conveniently to the consumers, than all the mills, good and bad, now in operation. By an important innovation in the law in regard to mills, (enacted March 2d, 1826,) every owner of a mill is authorized to cut a canal through the lands of other persons, if required by the nature of the locality, so as to substitute the pond by a canal. Before this amendment of the old law, no mill-owner could effect any such improvement, unless in the rare case of his own land extending under the whole course of the desired canal. The privileges offered by this new provision have already been availed of in many cases, in Charlotte, and the neighboring counties, and to great advantage in regard to health as well as to increased power to the mills, and great value gained in the rich drained bottoms of the ponds being put under cultivation. Slow as such lessons are usually learned, and slow as new agricultural improvements are brought into extended use, this highly beneficial and profitable improvement, cannot fail to be adopted generally in the course of time.* The main obstacle to the early and general substitution of canals for ponds, wherever the change is practicable, is the absurd legal distribution of rights in the mill-ponds and the land which they cover, as stated on a preceding page (223); one person being vested with the perpetual right to keep the land overflowed and worthless, while others have the right of property in that land, to be exercised only in the never-expected event of the owner of the pond drawing it off and draining the rich bottom; and that for the gain of others, more than himself. Now I would get rid of this absurd conflict of rights, by vesting the full property in the land covered, in every mill-owner who would draw off the pond; or if he did not avail of the privilege offered, the land should be given up to its former owners, or to any one else, who would construct a canal, and thereby secure to the use of the mill an equally good supply of water-power.

Each of the several remedies proposed and stated above, would alone furnish a fruitful subject for investigation and discussion. But more extended remark from this source, is as yet uncalled for. Other persons, having better practical information, and thereby prepared to confirm or to disprove the positions here assumed, are invited to aid in the discussion. Let the truth be made known, on whichever side it may be found; and should all facts and deductions presented serve to show that the present system greatly needs reformation, and to awaken the public to the importance of the object, then will be the suitable and propitious time to ask attention to remedies proposed for the then acknowledged evils, inflicted by the action or permission of the government. Whenever the legislature is prepared to act decisively on this whole question, there will be before them a subject for the internal improvement of of Virginia, far more important in beneficial results, than the roads and canals which have cost millions of dollars to the treasury; and yet which will be cheaper, compared to the profit to be certainly counted on, than the most humble or contemptible job yet carried through by public expenditure and as a public improvement.

But according to the existing law, any single individual who clearly sustains injury to health from any particular mill-pond, has even now the legal power to have that particular nuisance abated, by means of suit for damages for the injury thereby sustained. It has been judicially settled, that such ground of suit for damages is not prevented by any previous assessment by the first jury, nor by any lapse of time during which the mill has

* See Far. Reg. vol. I., pp. 232, 386, 518, 783, 781.

* See facts and statements on this subject at p. 231, vol. V., pp. 1 to 3.; p. 579, vol. II.; p. 374, vol. IV.

been standing; nor is the ground removed by the new damages awarded for injury already sustained and sued for. No matter how often damages may have been given to the plaintiff by successive verdicts, and paid by the defendant, there will continue ground to sue, and recover, as long as the pond remains, and is hurtful. It is surprising that the law, so favorable to the interests of mill-owners, and regardless of all conflicting interests and rights of other persons, should have permitted, in this particular, so much of remedy for the previous injustice and injury inflicted by the law. And it is still more surprising, that after legal decisions have so clearly shown the remedy, that of so many thousands of individuals who are unquestionably suffering every autumn from the neighborhood of stagnant mill-ponds, so few should have availed themselves of the offered means of relief.

If the importance of this general subject were duly appreciated, its investigation would become an object of the care, and be conducted at the expense of government. If the legislature of Virginia (for example) would institute a "General Board of Health," or "Commission of Sanitary Police," for the purpose of investigating the subject of malaria thoroughly, and of reporting the sources and proper remedies, the body of evidence which would be collected, and the after-results, might be made worth many millions of increased pecuniary value to the state, besides the far greater benefit to be produced to the health, the physical and moral qualities, and the general happiness of the people. At any possible cost of such an investigation, and of the system of measures founded thereon, the public improvement and benefit produced thereby would exceed the expenses an hundred-fold.

CHINESE TREATISE ON RAISING SILK-WORMS.

[We are indebted to the attention of the Hon. John Forsyth, Secretary of State, for a very curious work, which, upon his recommendation, and we may say under his auspices, has recently been translated and published in this country. It is an octavo volume of 169 pages, and 10 plates, published by Peter Force, Washington, February, 1838, and entitled a '*Summary of the principal Chinese Treatises upon the Culture of the Mulberry and the Rearing of Silk-worms.*' The American publisher's note states that—

"This "SUMMARY" was first translated from the Chinese, by Stanislas Julien, member of the French Institute, and professor of Chinese Literature, in the College of France, and printed at the Royal Press, in Paris, by order of the Minister of Public Works, Agriculture and Commerce. The French copy from which this translation was made, was transmitted from Paris, to the SECRETARY OF STATE, and by his recommendation has been translated and published here."

The body of the work consists of numerous extracts from various Chinese works and authors, on the culture of the mulberry, and all the different parts of the management of silk-worms, and the cocoons. The Chinese originals of these extracts, are of various ages, but generally of very ancient date, and some are as old as 4000 years. Independent of any economical value, in the furnishing instruction in unknown and useful practices, this work is a literary curiosity, which cannot fail to be interesting to every general reader who knows any thing of the remarkable peculiarities of the Chinese people. That nation had reached a very high degree of civilization, and of advancement in learning and the ornamental and useful arts, many centuries before any part of the now enlightened portion of the world had emerged from ignorance and barbarism. The Chinese were thousands of years ago but little less advanced in these respects than now; and if they have learned less (as is the case in a very remarkable degree) than any rising people, they have also lost nothing of the acquisitions in knowledge which they possessed thousands of years ago. If, therefore, from their books and their present practices we can learn nothing novel or of late improvement, in China, we may surely count on meeting with instructions and practices approved by the experience gained through many centuries, by the most industrious, careful, and economical people in the world.

But it is not merely to readers of literary or antiquarian taste that this book may be interesting and valuable. There are many particulars of management recommended which are different from any used in Europe or this country; and if, to any of these practices, the Chinese owe their great and peculiar success in rearing silk-worms, and in silk culture generally, then there may be much value gained by adopting some of their methods, novel to us, though perhaps in use twenty or thirty centuries in China. In a late number of the Farmers' Register there was republished the novel information that rice-flour was a useful addition to the food of silk-worms; and this new discovery is found among the very old instructions presented in this Chinese work.

Other and more important differences of practice are exhibited in the manner of giving food to the worms, and especially in the numerous times of feeding, through night as well as day. In regard to other things, we quote the last paragraph of the "Introduction" to the French version, by M. Camille Beauvais, who is one of the highest European authorities on silk culture.

"I should like, in terminating these reflections, to call the attention of the reader to some important points of the Chinese work; for example, upon the manner of making the butterflies lay their eggs, and of preserving the eggs; also, of the means employed to make them hatch at the same time. I will point attention, from the same authority, to the disastrous effects which result from the sudden introduction of cold and damp air in a silk-room, where the temperature is high, as well as the fatal influence which is produced by the fermentation of the leaves, upon the health of the silk-worms. I will add another fact, to give in a few words an idea of the incontestable superiority of the Chinese methods over the European: it is, that *they hardly lose one silk-worm out of a hundred*, while the Europeans *lose fifty out of a hundred.*"

We shall copy from the American version of the Chinese work the part containing instructions for managing the insects, from the egg to the end of the feeding; and also a part of the "Advertisement" of the French translator, S. Julien. In the last mentioned, our readers will probably find cause for astonishment in the account of the great number of Chinese books on agriculture.—ED. FAR. REG.]

Extract from the Advertisement of the Translator.

A stranger to the *sérigène* industry, and to the science of agriculture, it does not belong to me, above all, after the introduction of M. Camille Beauvais, to speak of the practical advantages which the Chinese work offers, and of which I now publish the translation.

I will only present to the reader some details, purely literary, of which, some will not, perhaps, be uninteresting. The Chinese, whose literature is the richest in the world, possesses many hundred works upon agriculture, which. among us, always comprises the *raising of silk-worms and the cultivation of mulberry trees.* They have also particular treatises, such as the *Tsan-chou*, the *Tsan-king* (books on silk-worms); the *Nan-fang-tsan-chou*, methods used in the south; the *Pé-fang-tsan-chou*, methods used in the north of China, the *I-sang-tsong-lun*, general considerations upon the cultivation of mulberry trees, etc. But among the twelve thousand Chinese volumes which the Royal Library possesses, there are but three works which treat in a manner more or less extensive of the double question which occupies us. The first is a small Encyclopædia of the Arts and Trades, in 3 volumes, 8vo., entitled *Thien-kong-khaï-we*, of which the second edition has appeared in 1636. Brief proceedings are found there, which competent persons have thought very interesting. I have given them the greater part in the Supplement, (page 187–169.) The second work is found in an agricultural collection of sixty books, entitled *Nong-tching-tsiouen-chou.* It has been composed by *Siu-Kouang-ki*, who, after having obtained the degree of Doctor, occupied successively the most eminent offices, and became preceptor to the eldest son of the Emperor. We see in his biography,* that in the 35th year of the reign of *Chin-tsong* (1607), he received lessons from a learned European named *Li-ma-teou*, (the celebrated missionary, Matthew Ricci), and that he studied under his direction astronomy, mathematics, in their application to the Chinese calendar, and the theory of fire-arms. The Emperor *Ssé-tsong* having heard that *Siu-kouang*, who had just died, had left a great work on agriculture, entitled *Nong-tching-tsiouen-chou*, ordered it to be presented to him by the nephew of the author, and ordered it to be printed at the expense of the state.

The third work is entitled *King-ting-cheou-chi-thong-khao*, or a General Examination of Agriculture, composed by order of the Emperor. It is twice as extensive as the preceding collection, and is composed of LXXVIII books, distributed in 24 volumes, small, in folio, printed with all the care and elegance that distinguishes the imperial editions. This compilation, undertaken a hundred years after, (in 1739,) in virtue of a special decree, by learned men of the first order, aided by the most skillful agriculturists of the empire, gives him a high importance. The extent of this work, its official character, and recent date, if compared with the two collections above-mentioned, have made me resolve to extract from it the Treatise on the *Cultivation of Mulberry Trees and the Raising of Silk Worms*, the translation of which the Minister of Commerce has intrusted to me.

If I was not afraid of being misled from my subject, I would make all the objects known which this agricultural encyclopædia embraces. I will content myself to say that a complete treatise can be found there, (books XXI--XL.) of leguminous plants, of grain, and particularly of the cultivation of rice, accompanied by a number of figures engraved with care, of which more than a hundred represent the ploughing instruments of the Chinese, and the machines which they make use of for the irrigation of the fields. The part which I have translated occupies books LXXII, LXXVI.

The reader will be able to form an idea of the immense riches of the Chinese literature, by learning that the agricultural collections, entitled *Cheou-chi-thong-kao*, from which my translation is extracted, made a part of the library of the most estimable works in China, of which the publication was ordered in 1773, by the Emperor *Khien-long*, and which, according to the decree of this prince, was composed of a hundred and sixty thousand volumes. This collection was to form four libraries, called, *Ssé-kou*, or the *four Treasures.* It yet continues to be printed, and in 1818 there had already appeared seventy-eight thousand six hundred and twenty-seven volumes, of that vast collection. There has been published by order of the Emperor two accurate catalogues; one very much abridged, in fifteen small volumes, 12mo., (Peking, 1775,) and the other very extensive in one hundred and thirty-eight volumes, 8vo., (Peking, 1782.)

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THE RAISING OF SILK-WORMS.

PRELIMINARY OBSERVATIONS.

Testimony from Chinese authors, who speak of the cultivation of the mulberry, and the raising of silk-worms, from the most ancient times, (4438 years ago,) down to the year 976 of the Christian era.

In the Book on Silk Worms we read:

"The lawful wife of the emperor *Hoang-ti*, named *Si-ling-chi*, began the culture of silk."

It was at that time that the emperor, *Hoang-ti*, invented the art of making garments.

Observations by the Translator.—The same fact is mentioned more in detail, in the General History of China, by P. Mailla, in the year 2602, before our era, (4438 years ago.)

"This great prince, *(Hoang-ti,)* was desirous that *Si-ling-chi*, his legitimate wife, should contribute to the happiness of his people. He charged her to examine the silk-worms, and to test the practicability of using the thread. *Si-ling-chi* had a large quantity of these insects collected, which she fed herself, in a place prepared solely for that purpose, and discovered not only the means of raising them, but also the manner of

* *Ming-ssé* (Annals of the Dynasty of the *Ming*), book CCLI, folio 15, imperial edition, of twenty-four historians of the first order, in 700 volumes, small folio. Peking, 1739.

reeling the silk, and of employing it to make garments."

It is through gratitude for so great a benefit, says the history, entitled *Wai-ki*, that posterity has deified *Si-ling-chi*,, and rendered her particular honors, under the name of the *Goddess of Silk Worms.* (*Memoirs upon the Chinese.* Vol. 13, page 240.)

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It is written in the chapter *Iu-hong*, of *Chou-king*, one of the five canonical books of China:

"The mulberry trees may be planted and the silk worms raised."

Observation.—According to the annals of China, this chapter was composed about the year 2205 before Christ, (4041 years ago.) See the *Chou-king*, translated by P. Gaubil, page 45. [St. Julien.]

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It is written in the *Book on Worms*, one of the five canonical books, chapter *Pin-fong*, ode 1:

"In the month, when the silk worms are fed, (in the fourth month,) the leaves of the mulberry trees must be gathered."

Observation.—This chapter was composed by *Tcheou-kong*, uncle to the emperor *Tching-wang*, about the year 1115 before our era (viz.: 2951 years ago.) [St. Julien.]

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We read in the *Li-ki*, or Book of Ceremonies, one of the five canonical Chinese books,) in the chapter *Youeï-sing*:

"In the last spring month, the young empress purifies herself, and offers a sacrifice to the Goddess of Silk Worms. She goes to the fields, situated to the east, and gathers mulberry leaves herself. She forbids the noble ladies and ministers' wives all ornamental dress, and she dispenses with the labors of her waiting-women, who sew and embroider, so that they may be able to give all their attention to the raising of silk worms."

Observation.—The *Li-ki*, (or Book of Rites,) from which this passage has been extracted, was compiled by Confucius, whose birth was 551 years before Christ.

The work we translate has many similar passages, which relate to the fourth and eleventh centuries before Christ. [St. Julien.]

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In the work entitled *Nong-sang-thong-kioué*, we read:

"The place called *kien-kouan*, (or the house of cocoons,) is that where the empress herself raises silk worms. In ancient times, there was a plantation of mulberry trees, belonging to the state, and a building called *Tsan-chi*, (or the house of the silk worms,) which had the same destination as that which is now designated by the expression, *kien-kouan*, namely, the house of cocoons.

"The young empress purifies herself, and offers a sacrifice to the Goddess of the Silk Worms, as an example to the whole empire, and to promote the general culture of silk. The empress repairs to a mulberry plantation. She first cuts a branch; an attendant, who holds a basket, receives the leaves of the mulberry trees; afterwards, the empress cuts three branches. A maid of honor, endowed with the title of *Chang-chou*, (or President,) throws herself on her knees, and says: It is enough. The attendant who holds the basket receives the leaves, and carries them to the silk worms. It is forbidden to carry the leaves of the mulberry tree to that part of the palace called *Ken-chi*, or the golden house."

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In the history of the emperor *Hiao-wen-ti*, whose reign began in the year 163, before Christ, it is observed:

"By a decree, the empress was commanded to gather the leaves of the mulberry trees herself, to feed the silk worms, and to furnish the garments destined for sacrifices."

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The year 156, *before Christ.*—The emperor *King-ti*, made a decree, and commanded the empress to gather some mulberry leaves herself, in order to set the example to the whole empire.

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The year 48, *before Christ.*—The mother of the emperor, *Youen-ti*, visited the house of cocoons, (or of the silk worms,) and followed by the empress and the ladies of the palace, she went and gathered some mulberry leaves.

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The year 58, *anno Domini.*—Under the reign of *Ming-ti*, of the dynasty of *Han*, the empress and her attendants raised silk worms.

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The year 220, *anno Domini.*—Under the dynasty of *Weï*, the wife of the emperor *Wenti*, raised silk worms, in a place situated to the north of the city, so as to conform to the ritual of the dynasty of *Tcheou*. [Work composed in the tenth century before Christ.]

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Between the years 265 *and* 275 *anno Domini.*—Under the reign of *Wou-ti*, of the dynasty of *Tsin*, in the years of *Thaï-khang*, the emperor built a house called *Tsan-kong*, for the silk worms. The empress went herself, to gather mulberry leaves, in order to conform to the ancient customs of the dynasty of *Han*, and those of *Weï*.

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Between the years 454 *and* 457, *anno Domini.*—Under the dynasty of *Song*, the emperor *Hiao-wou-ti* had a house constructed for the silk worms.

The empress gathered, herself, the leaves of the mulberry trees, conformably to the usage of the dynasty of *Tsin*.

The author of the work entitled *Nong-sang-thong-kioué*, continues to quote some analogous facts, which he had gathered from the history of the emperors, from the years of *Thien-pao*, (from 968 to 976,) of the dynasty of *Song*, under which he lived, so as to show, that from the highest antiquity, the empress raised silk worms as an example to the whole empire.

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In the work entitled *Tsan-lun*, or Considerations upon the Silk Worm, we notice:

"Every species of tree requires a particular soil, except the mulberry tree alone, which grows every where; and, consequently, there is not a single place in the empire where silk worms cannot be raised."

The book on worms says, in chapter *Pin-fong*, (composed about the year 1115, before Christ:)

"A young girl takes her elegant basket and follows the concealed paths, to gather mulberry leaves."

By this passage it is seen that silk worms could be raised in the country of *Pin*.

Observation.—The country of *Pin* corresponds with the territory of which *Si-gan-fou* is now the capital, of the present province of *Chen-si*, which is situated in the northwest of China.—[St. Julien.]

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In the ode of *Tsang-tchong-tseu*, of the same work, we read: "Take care not to destroy our mulberry trees."

This passage shows that silk worms could be raised in the country of *Tching*.

Observation.—The country of *Tching* corresponds with the country of *Tching-tcheou*, a dependency of the department of *Khaï-fong-fou*, in the province of *Ho-nan*, which is situated in the centre of China. [St. Julien.]

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In the ode entitled *Tche-sin*, we read:

"The mulberry trees grow upon steep hills, and poplar trees in moist valleys."

This passage shows that silk worms could be raised in the kingdom of *Thsin*.

Observation.—The country of *Thsin* corresponds to *Thaï-youan-fou*, which is now the capital of *Chan-si*. That province is situated in the north of China. [St. Julien.]

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In the ode entitled *Mong*, we observe:

"The mulberry leaves have not yet fallen; they are fresh and abundant." (*Ibid.*) "The mulberry leaves become yellow and fall."

Also, in the ode entitled *Sang-tchong*:

"He made an appointment to meet me among the mulberry trees."

These two passages show that silk worms could be raised in the kingdom of *Weï*.

Observation.—The country of *Weï* corresponds with the territory of *Weï-hoeï-fou*, in the province of *Ho-nan*, which is situated, as its name indicates, south of the yellow river. The *Ho-nan* is situated in the centre of China. [St. Julien.]

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In the ode entitled *Hoang-i*, we find:

"He cuts, he lops the trees, called *yen* (wild mulberry trees,) and *tché*, (thorny trees,) the leaves of which serve to feed silk worms."

This passage shows that silk worms could be raised in the country of *Tcheou*.

Observation.—The author continues to show, by quotations from ancient works, that silk worms could be raised in the country of *Tcheou*, which corresponds with a part of the actual province of *Hou-nan*, which is situated in the centre of China; in the countries of *Lou* and *Thsi*, (in the province of *Chan-tong*,) in the north of China; in the country of *Thsou*, (ancient name of the central province of *Hou-kou-ang*, of which has been formed, under the present dynasty, the provinces of *Hou-pé* and *Hou-nan;*) in the kingdom of *Liang*, which makes a part of the actual territory of *Ho-nan*, a central province of China, and in the country of *Cho*, which corresponds with a part of the present territory of *Ssé-tchouen*, a western province of China.

The author thus terminates this article: "The five kinds of seed may be cultivated, and harvests obtained, in the coldest countries of China; further, mulberry trees may be successfully cultivated under any temperature whatever."

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CONSTRUCTION OF THE SILK WORMS' APARTMENT.

In the Book of Rites, (written by Confucius, in the fifth century before Christ,) it is observed:

"The emperor and his vassals were obligated to keep a plantation of mulberry trees, belonging to the state, and a nursery for silk worms. It was established near a river or brook of running water; its height was about eleven cubits, and surrounded by a hedge of thorny shrubs."

Same Work.—Lots were drawn by the ladies of the three palaces, and the noble-women who were pure, and surrounded with happy omens, thus chosen; were sent to the nursery, to feed the silk worms, and occupy themselves with all the care of their raising.

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Thsi-min-yao-chou.—The windows in the four fronts of the building must be opened, and paper pasted on them, to protect the worms from the exterior air. In the interior of the silk room, fires must be lighted at the four angles.

Same work.—In the third month, at the period called *Thsing-ming*, (the 5th of April,) the women charged with the feeding of the silk worms, are ordered to prepare their dwelling, and to stop up the holes and cracks through which the air might penetrate.

Same work.—The silk worms naturally love repose, and fear loud cries; therefore, their house should be quiet, and exempt from all noise. They love the heat, and fear the damp; their apartments should, therefore, be constructed of boards. In a quiet and retired house they will not be troubled with the cries and clamor of men. In a close house they will be sheltered from the sudden south winds. In a house constructed with plank, they will be sheltered from the exhalations and damp vapors of the earth.

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The Book on Silk Worms.—The silk worms like an apartment with a mild temperature; on the contrary, the cocoons should be kept in cool places.

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Wou-pen-sin-chou.—The house of the silk worms ought to be distant from all impurities, and every thing that exhales a disagreeable odor, such as stables, cow-houses, &c. Care must be taken during the night, that no light may penetrate the windows, or suddenly be shown, in the dwelling of the silk worms. Do not extinguish, in the silk room, paper matches, such as emit a great deal of smoke.

When the worms are newly hatched, they fear the dust made in sweeping. They are disturbed by crying and weeping; they do not like persons to come in their apartments, who are not perfectly clean. For example: A woman who has been brought to bed less than thirty days, or who has her menses.

(That observation is drawn from another work upon the same subject.)

Same work.—Whenever the silk worms are raised in autumn, the time of their hatching is not distant from the three periods called *San-fo*. (They fall in the middle of summer.) The heat (of the summer) yet subsists, and as it occasions a great deal of dampness in the apartments of silk worms, the necessary measures must be taken for the air to circulate freely in every part of the nursery.

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CONSTRUCTION OF THE OVEN.

In the middle of the house, a hole must be dug, of which the size and depth must be proportioned to the dimensions of the nursery. The ordinary size of this hole ought to be four feet square. On the four sides, a square brick wall, cemented with mortar, must be raised two feet in height. Cow dung must be taken well dried and reduced to powder, and the bottom of the hole must be covered with a bed of this powder, three or four inches thick. Above, a layer of small pieces of dry wood must be spread, at least five inches in diameter, which has been cut in the last month of the year. Mulberry, acacia, elm, or any kind of hard and solid wood may be used. Upon these pieces of wood spread a second bed of dry and pulverized cow dung. In the empty places, between each piece of wood, the pulverized cow dung must be well beaten down so as not to leave the smallest space; for if an empty space be left, the fire will produce flame, which may injure the house, and besides, this fire would not last for any length of time. When the hole is completely filled, and the pulverized cow dung, that covers the pieces of wood and fills the spaces between, is well pressed down, a bed of the same matter must be spread on. Seven or eight days before the hatching of the silk worms, live coals must be put on the dry cow dung and covered over with hot ashes.

The dry cow dung takes fire, and emits for six or seven days a black and yellow smoke. One day before the hatching of the silk worms, the door must be opened to dissipate the smoke, then carefully shut. From that moment the wood and the dry cow dung are completely on fire, to the bottom of the hole.

When the silk worms are young, they like the heat and fear the smoke, consequently a bright fire must not be made; moreover, a smart fire sometimes burns with force, and sometimes suddenly goes out; it cannot constantly spread an equal and uniform heat. But when the fire we recommend is once well lighted, it does not produce any smoke, and it can be preserved for one or two months without being extinguished or diminished. A mild heat is experienced without its being perceived that there is fire in the apartment. But if small branches be burnt, they will produce a smoke that will be spread throughout. It is necessary to construct, on the edges of the hole, a small square wall of bricks, about two feet high, so that the heat may ascend and penetrate to the middle of the apartment, and spread there in an equal manner. This wall will serve to prevent those persons who move round the silk room at night, from falling unawares into the hole. The house being constructed of dry and proper materials to receive the heat, the partition walls will soon become warm. The smoke proceeding from the pulverized cow dung, suffocates all the insects which might injure the silk worms.

Cow dung diffuses a wholesome smell in the apartment of the silk worms.

Observation of the Translator.—The surface of the hole ought to be covered with square tiles, pierced with holes, to facilitate the escape of the heat.

The old paper employed to cover the windows, must be replaced by white and perfectly clean paper. For fear the heat will escape, care must be taken not to raise the window shutters, or the straw mats from the windows, or the doors, during the time the old paper is being pulled off, and new pasted on. At the top of each window, place four large window blinds, or screens, of firm texture. They must be arranged in such a manner as to roll up or unroll when wanted.—(*Ssé-nong-pi-yong.*

Nong-sang-thong-kioue.—When a nursery is wanted, for the silk worms, a house must be constructed, exposed to the south. Above all, a smooth and agreeably situated place must be chosen. The best exposure is that exactly to the south; that of the south-west is not so good, that of the east still less so.

If the house is old, it must be swept with a great deal of care, and plastered a long time before it will be wanted. If it is done a short time before the hatching of the silk worms, the partition walls will preserve a dampness which will be fatal to them. Some persons cover the house with tiles, others with thatch. Timber and wood work must be plastered within and without to prevent the danger of fire. In the nursery, pillars must be placed, furnished with cross pieces, to receive the frames. The windows must have a large opening, to admit sufficient light to distinguish the sleeping and the awaking of the silk worms. Above the shelf, small dormer windows should be opened, to increase the light of the morning and evening, when required.

Even with the ground, pipes, or air conductors, communicating with the outside, must be placed at regular distances, and arranged so that they can be opened and shut easily. They will serve to dissipate dampness, or to expel dangerous effluvia.

Same work.—When persons wish to raise silk worms, they must at first open a room, situated to the east, to feed the newly hatched silk worms. They must be taken from this room before and after their second moulting. The window turned to the west, must be shut with care, because the rays of the setting sun are particularly injurious to the silk worms. The southwest wind is very dangerous for the silk worms. A row of trees, four to five feet distant, must be planted on the outside so as to shelter them.

[The author here employs many words to indicate the place of the idols, and practices of devotion, which must be followed for the success of the nursery.]

Same work.—When persons wish to feed the newly hatched silk worms, they must as first open a room with an eastern aspect. At the four angles, concave niches must be constructed, (small stoves) arranged like the three stars of the constellation of the heart, that is to say, in triangularly, in order to distribute the heat, in a uniform manner. The author adds, that the smallness of the room allows it to be easily warmed.

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Nong-sang-thsiouen-chou.—When the silk worms are about hatching, they require an extreme heat: at that time the air is still cold. After the third sleep (or the third moulting,) the silk worms require coolness. At that period the air is warm. Besides the wind, rain, dull, and clear weather often comes on unexpectedly; the temperature of the morning and evening, that of the day and night, undergoes great changes. If under these circumstances, the proper measures are not taken, the silk worms soon become sick. But all these changes of the atmosphere may be guarded against, if the rules we have described above be faithfully followed.

All around the nursery, (that is to say, at each window,) window blinds must be placed, which can be rolled up and unrolled at will. In the middle of the room, a fire must be lighted under ground. If the silk worms require heat, and the external air be cold, the mats that cover the windows must be let down, and the heat disseminated throughout the nursery. Then the cold from without cannot penetrate there, and a mild temperature is enjoyed throughout. But if it be rigorously cold, it will be impossible to warm the apartment, even by opening the doors of the oven; clods of dry dung must be lighted on the outside, and when they are set on fire, and produce no smoke, they must be placed at the four angles of the silk room. Soon a mild heat will be spread throughout; and as soon as the cold is diminished the rest of the burning lumps must be carried away.

When the silk worms require cooling, and the exterior air is warm, the openings of the heated pipe must be shut, and the window blinds raised up; then the interior heat moderates, and the fresh air from without penetrates the nursery. If it be sultry, it will not be sufficient to raise up all the window blinds to dissipate the heat. The paper must then be removed from the windows, the small dormer windows of the roof must be opened, and the air conductors also, which are even with the ground, and fresh water must be sprinkled outside of the windows, and about the bottom of the sash. A cool air will soon circulate in every part of the nursery.

When that sultry heat is dissipated, the paper must be again pasted on the windows, and the air pipes stopped up. In this manner the silk worms are neither incommoded with the heat nor cold, from the commencement to the end of the season. They have very little sickness among them, and the cocoons are as good as may be desired. It is by observing these proceedings that all the success of the raising of silk worms depends. But the cool air must not be suddenly replaced by warm; the fire must be increased gradually. If the cold rapidly succeeds to heat, the silk worms will become yellow and soft. When it is too warm, a cool air must not be introduced suddenly in the nursery; the windows should be opened by degrees. That precaution is necessary, for if the heat be suddenly replaced by a cool air, the silk worms will turn white and die. It is a serious danger, which should be known before hand, in order to remove the causes which give rise to it.

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ON BATHING THE EGGS OF SILK WORMS.

The old Dictionary *Eul-ya*, says there are three kinds of insects which form cocoons: 1st, the *Siang*, or the silk worm fed on mulberry leaves; 2d, the *Tcheou-in*, those fed on leaves of the jujube, and trees called *hoa* and *louan*; 3d, the *Hang*, which is fed on leaves of the plant called *siao*.

In the *chou-king*, (one of the canonical Books of the Chinese,) it is written: "The first day of the moon, of the last Spring month, the Prince's wife washes the eggs of the silk worms in the river."

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Abridged history of the kingdom of Ou.—In the district of *Nan-yang*, the silk worms form cocoons eight times a year.

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Kouang-tchi.—There are several varieties of silk worms, the autumn, winter, and wild silk worms.

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Yong-kia-ki.—In the district of *Yong-kia*, there exist eight species of the silk worm:

1st. The silk worms called *Hang-tckin-tsan*, form their cocoons in the third month, (April.)

2d. The silk worms called *Tché-tsan*, that is to say, worms which are fed with the leaves of the tree *tché*, form their cocoons at the commencement of the fourth month, (May.)

3d. The silk worms called *Hang-tsan*, form their cocoons in the fourth month, (May.)

4th. The silk worms called *Ai-tchin-tsan*, that is to say, cherished and precious silk worms, form their cocoons in the fifth month, (June.)

5th. The silk worms called *Ai tsan*, or cherished silk worms, form their cocoons towards the end of the sixth month, (July.)

6th. The silk worms called *Han-tchin-tsan*, that is to say, cold and precious silk worms, form their cocoons in the seventh month, (August.)

7th. The silk worms called *Ssé-tchou-tsan*, that is to say, silk worms from a fourth laying of eggs, form their cocoons at the beginning of the ninth month, (October.)

8th. The silk worms called *Han-tsan*, that is to say, cold silk worms, form their cocoons in the tenth month, (November.)

In the same work we read:

All the silk worms of the first kind, which mature twice a year (that is to say, those that lay eggs for a second progeny the same year,) are called *Tchin-tsan*, that is to say, precious silk worms. There are few persons that raise silk worms called precious.

The worms of the fifth class, called *Aï-tsan*, or cherished silk worms, proceed from the eggs of the worms of the third class, anciently called *Hang-tsan*.

When the silk worms (of the first class) called *Hang-tchin*, have formed their cocoons, in the third month, (April.) the moths appear, and their eggs must be collected. In the seventh and eigth month, the eggs open, and the moths are hatched. A great number of persons raise this species of silk worm. They are called *Hang-tsan*, or silk worms of the third class.

When silk worms called *Aï-tsan*, or cherished silk-worms, (of the fifth class,) are wanted, eggs of the worms of the third class, called *Hang-tchin*, must be taken, and put in an earthern vessel, the dimensions of which should be in proportion to the quantity of eggs that are required to be preserved. The opening of the vessel must be stopped up with paper, then the vessel must be placed in a basin, filled with spring water, in order that the cool air may delay the hatching of the eggs.

Thus the eggs must be left from three to seven days; at the expiration of that time they hatch, and the silk worms can be raised. They are called *Aï-tchin*, or cherished and precious silk worms; they are also named *Aï-tseu*, or beloved children. They are of the fourth class.

When they have formed their cocoons, the moths come forth and lay their eggs. Seven days after the laying of eggs, they hatch and become silk worms. A great number of persons raise worms of that kind. They are the worms of the fifth class, called *Aï-tsan*, or cherished silk worms.

Care must be taken that the water surrounding the vase be of the height of the eggs it contains; for, if the exterior water be raised above the line of the eggs, they will die, or not be hatched. If the exterior water be lower than the eggs, then they will not feel the cool air, and their hatching will not be delayed. If their hatching be not prevented, they cannot be preserved from three to seven days in the vase. If they cannot be kept from three to seven days in the vessel, when they hatch, they will fail to *accomplish their task*, that is to say: they will attempt, in vain, to spin their cocoon. When the moths have come forth, and the females have laid their eggs, they cannot hatch at the end of seven days; these eggs will not hatch until the following year; but they must be deposited under the shade of a bushy tree. Some persons put them in unbaked earthern vessels. They hatch in from three to seven days, and the worms which proceed from them succeed in forming a good cocoon.

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Tsa-hou-hing-chou.—Thirteen varieties of silk worms are now distinguished:

1st. The silk worms which have three moultings, and only hatch once;

2d. The silk worms which have four moultings, and hatch twice; that is to say: those whose eggs produce a second crop in the same year;

3d. The silk worms with white heads;

4th. The silk worms called *Hié-chi-tsan;*

5th. The silk worms of the country of *Thsou.* (*Thsou* is the ancient name of the present province of *Hou-kouang.*)

6th. The black silk worms; among them, some hatch once, others twice. (See 2d ;)

7th. Ash colored silk worms;

8th. The silk worms hatched from an Autumn moth ;

9th. The silk worms hatched in the middle of Autumn ;

10th. The silk worms called *Lao-Thsieou-eul-tsan*, (literally, old towards Autumn ;)

11th. Silk worms of the last of Autumn, called *Lao-hiaï-eul-tsan* ;

12th. Silk worms called *Kin-eul-tsan ;*

13th. Silk worms that work in the same cocoon. Sometimes two, sometimes three silk worms, spin together in the same cocoon.

In general, the silk spun by the worms, which moult thrice, differs much from that of the worms which moult four times.

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Hai-ning-hien-tchi.—On the night preceding the period called *tsing-ming*, (the 5th of April,) those who raise silk worms envelop the eggs in a covering of cotton, and place it under them, in their bed; they think the natural heat of the human body hastens the hatching of the silk worms.

Same work.—The twelfth day of the last moon of the year (that is to say, at the end of December, or in the month of January, when there is an intercalary moon,) all those who raise silk worms bathe the eggs in salt water, expose them to the fumigations of the melongena, and envelop them in a piece of rice ball. At the end of twenty-four days they take them out; they afterwards wash them in fresh water, and wait for the coming of Spring.

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Sse-nong-pi-yong.—The summer silk worms are of another species; they are vulgarly called *San-tsan*, or third silk worms.

The silk worms which are raised in the Spring, lay eggs for the Summer; those that are raised in Summer, lay eggs for the Autumn; those of the Autumn, lay eggs for the Spring of the following year. None of these eggs must be neglected, for otherwise eggs will be wanted for the next raising.

Same work.—The silk worms of Autumn, are also called *Youen-tsan*, that is to say: second silk worms, or silk worms of a second rearing. But in gathering the leaves to feed them, they never fail to injure the tree. It sometimes happens, that some misfortune from heaven destroys the Spring silk worms, the raising of the Autumn silk worms cannot be dispensed with, but must be done to repair the loss. But the late crops are surer and more advantageous than those of the commencement of the year.

Siu-kouang-ki, says: "The men of the present day do not raise the Autumnal silk worms; they are contented to preserve the eggs of the Summer for the crop of the following Spring. They succeed equally well."

The same author again says: "It is a very just idea to say, the Autumn silk worms serve to repair the losses which may have been experienced in the Spring, and to supply the wants of the year. In the Autumn there are many fine days ; consequently, the raising at that time promises more certain success, than that of the Spring. But now-a-days we meet with people who say : *the Autumnal silk worms can no longer find tender leaves.* We see that they are totally ignorant of the powerful reasons which may oblige them to attempt a rearing in Autumn, from the necessity of sometimes repairing the losses which have been experienced, and of supplying the wants of the year. When the silk worms are raised in the Summer, or Autumn, care must be taken to preserve them from the gnats and flies."

Same work.—After the period called *Thsing-ming*, (after the 5th of April,) the eggs commence to change. At first they assume a uniform color, and swell up; afterwards they grow round and present a pointed side. Their centre resembles the color of willow trees, in the beginning of Spring. At last they are transformed into worms, which have the appearance of small black ants. The worms which fold themselves in a circular manner, and resemble a mountain that is seen at a distance, are those which must absolutely be preserved; but those with flat heads, which are dry, and appear as if they were burnt, as well as those of a sky-blue, and yellow, or flesh color, must not be raised.

Same work.—Some persons water the eggs with salt water. That operation is called *sien-tsan*, that is to say, *baths of the silk worms.* The eggs thus washed, produce the best silk worms.

The worms of which the eggs were not washed, are called *Ho-tsan*, that is to say, ardent silk worms, (they are those of Autumn.) They are less esteemed than the preceding.

In the work entitled *Sang-tsan-tchi-choué*, we read:

"Those who wish the eggs to hatch quickly, often unfold, and roll up one by one, the leaves of the paper where the moths have deposited their eggs. (This paper should be manufactured of cotton, or the bark of mulberry trees. According to the ideas of the Chinese, they banish from the nurseries every thing made of hemp; for example: ropes and hempen cloth. Our European paper would be very injurious to silk worms.) Those who wish to retard the hatching, unfold the leaves at distant intervals, and afterwards roll them in a tight manner, without leaving the least empty space in the centre of the roll."

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Hoang-sing-tseng, says:—The twelfth day of the last moon, in December, or in January, if there is one intercalary month, the eggs must be soaked in salt water, and taken out the twenty-fourth day. Then the silk will be much easier to wind.

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Another author, says:—The eighth day of the last moon, the leaves covered with eggs must be dipped in water where the ashes of the mulberry branches have been boiled, or the ashes of grass. They must be taken out at the expiration of one day. The twelfth day of the second moon, a bath must be given to the eggs, on the morning of the period called *Thsing-ming;* then they must be wrapped up in cotton paper, and deposited in the kitchen. Wait until the mulberry leaves are as large as a tea-spoon, then envelop the eggs in cotton: at night they must be covered with warm garments which have been worn during the day; in the morning they must be wrapped in blankets. When the eggs are hatched, the worms must be warmed by artificial heat; but so long as they are not out of the egg, they ought to be well taken care of, and hatched by the heat of fire.

When it is desirable to soak the leaves of paper, covered with eggs, the ashes of the mulberry tree must be used; the leaves should be moistened, and powdered with the ashes. Afterwards they must be rolled and soaked in the water where a certain quantity of salt has been dissolved. If it be apprehended that the rolls of paper will swim, they must be kept in submersion, by placing them under a china plate. The paper ought to be taken out the twenty-fourth day.

The leaves must be washed in running water, to remove the ashes, or they may be washed in a basin. Afterwards they can be newly hung up in the cool air, and the eggs hatched in the beginning of Spring. If part of the eggs do not hatch, they must be kept in darkness, and nothing more is to be feared from a useless expense of leaves.

The twelfth day of the second moon, leaves of plants called *thsaï* and *yé-thsaï*, blossoms of the leek, peach tree, and white beans, must be taken. They must be crushed in water, and afterwards the leaves must be bathed in it.

When the females lay eggs, they generally stop at the end of one night. In the contrary case, the silk worms produced by their eggs, cannot all hatch together.

Same work.—Many persons preserve the eggs of the silk worms, in bamboo boxes, when they are exposed to all the changes of the damp, tepid, hot, or burning weather. If they are subjected, suddenly, from cold to excessive heat, they are affected by it in a fatal manner. The inhabitants of the province of *Tché-kiang*, call that *Tching-pou.* That expression implies, that the silk worms contract a disease, when they are in the egg, (literally, *on the linen cloth*, or on the leaves of paper.) The worms of those eggs are yellow when hatched: the worms hatched of a yellow color, are not worth the trouble of raising. They may be compared to a child who has contracted a disease in the womb. At its birth, it is weak and feeble. It is difficult to cure it of this innate disease. In general, when one wishes to preserve the eggs of the silk worms, the leaves must be spread on bamboo boards, making it so as not to be exposed to the wind or sun. Moreover, they must be covered with a silk cloth to prevent butterflies, or insects from the cotton plant, eating them.

Much snow may be expected about the first day of the last moon, it may be in the course of the last moon. Leaves covered with eggs are spread in the midst of the snow. After one day they must be taken up, and newly spread on bamboo boards, and covered as before with a silk cloth.

When Spring comes, the precise time when the eggs are about hatching must be attentively observed; powdered cinnabar, must be taken, diluted in lukewarm water, and the eggs dipped in that water. The water should be neither too cold nor too warm; it ought to be kept at the temperature of the human body.

Same work.—Before the worms are hatched, the eggs should be weighed, and the weight written on the back of the paper to which they are attached. When the silk worms are hatched, take care not to separate them from the paper. There are many persons, who as soon as they see the worms hatch, detach them from the paper, with a small broom or quill; but these little beings, as delicate and slender as a hair, or a bit of silk, cannot support the wounds given them with the broom or quill. The mulberry leaves must be cut into extremely fine shreds, and spread in an equal manner, upon a large sheet of paper. The side of the paper, on which the worms are hatching, must be applied to that which is covered with bits of the mulberry leaves. The worms liking the smell of mulberry leaves, descend themselves on the paper, destined to receive them.

Then the paper, on which the eggs were, must be newly weighed; the quantity of hatched worms will be known, and it can be calculated how many leaves will be required to feed them. It is much better to have more leaves than are wanted for the number of silk worms to be raised. Then an abundant nourishment will be had for the silk worms, and one will not be exposed to the misfortune caused by a scarcity of leaves.

There are many persons who do not make this calculation beforehand; but when the leaves are about failing, they find themselves reduced to the most painful extremities; they pawn, or sell their effects to procure them. They have the grief of seeing their silk worms tormented by hunger; the hurdles are strewed with worms that languish and die. Thus, by their want of forecast, they uselessly sacrifice the lives of a great number of these precious insects.

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Nong-sang-tsi-yao.—It depends on one's self to retard or hasten the changing of color, in the eggs; but care must be taken to change them in a natural manner, and not to compromit the life of a silk worm enclosed in the egg.

When the leaves of the mulberry tree are grown, at eight or ten o'clock in the morning, the sheets of paper must be taken out of the vase, unrolled and hung up. There is no rigorous rule to determine the progress of the eggs. Only the first day, their color must be changed to three-tenths, the second day to seven-tenths. Then the leaves must be rolled, they must be put in a paper tube, with the two ends well pasted, and they must be replaced in the vase. The third day, towards twelve o'clock, the rolls must be again taken out of the vase and unfolded. Their color will then be completely changed.

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Nong-sang-pi-Kioue.—The art of raising silk worms begins with the choice of the eggs, and the preservation of the cocoons. Select in the cocoon room, the cocoons that are turned towards the light (that is to say, those from the top of the cocoon room) such as are brilliant, neat, and of a firm texture.

The moths which come out the first day, are called *miao-ngo* (viz: grass moths. The latest of all, are called *mo-ngo*, (that is to say: the last butterflies.) Neither of them ought to be kept. Only those which come out after the second day must be taken. The sheets of the paper must be spread upon the cases of a shelf, then the males and females come close together and copulate. When the evening comes, the male butterflies must be taken away, and the females must be placed on sheets of paper, leaving an equal distance between them. The eggs which are found in lumps, ought to be thrown out. When the females have laid a number of eggs, they must be left on the sheets where they are deposited and covered from three to five days. When the sheets are hung up, the eggs ought to be turned outward (read: in-ward) for fear the wind may cause them to perish.

Same work.—At the winter solstice, and the eighth day of the last moon, the eggs must not be bathed in too deep a water.

After having dipped them, they must be taken out. The fifteenth day of the moon (when it is full) several sheets must be taken, covered with eggs and rolled together. Tie them firmly with a string of mulberry bark, (or of cotton,) and suspend them before the porch or vestibule of the house, at the height of a long pole, in order that they may be exposed to the cold which is felt at the close of the year. After new-year's day the rolls must be spread out, and placed upright in an earthern vessel. At the end of ten days, when the sun is above the horizon, the leaves must be taken out of the vessel. Whenever the weather has been dull or rainy, they must be exposed to the heat of the sun, as soon as they commence to hatch.

Such is the manner of bathing and preserving the eggs of the silk-worms.

Wou-pen-sin-chou.—At the time called *thsing-ming*, (the 5th of April,) take the leaves covered with eggs, which have been deposited in an earthen vessel and transport them, sheltered, from the wind to a room where a mild heat reigns, and suspend them at half the height of the apartment.

At the time called *kou-iu*, (28th April,) expose the leaves to the air and sun, but they must be inverted or turned inside out. You must roll from left to right those that were rolled contrarily, and you must roll from right to left those that were rolled the opposite way; every day you must change and roll them in a different way from the old one. After having sufficiently rolled and unrolled them, you must put them as before in the vase.

When the time of hatching approaches, the leaves must be carried to a room where they will be sheltered from the wind and sun; the silk-worms will hatch *all at once*.

Same work.—To make the silk-worms descend, when hatched, there are many persons who strike the reverse of the leaves with a small stick of peach wood. When the worms have descended, they gather them together with a small broom or quill, put them in an envelop of paper and weigh them, then spread them upon the hurdles. Afterwards, at the different periods of their existence, they experience diseases which are frequently produced by that dangerous practice.

When the worms are hatched, a bed of chopped straw must be placed on a hurdle, where are likewise placed one or two jujube fruits, cooked in the ashes. Before the hatching of the silk-worms, the leaves covered with eggs must be weighed. After the hatching, the newly hatched worms must be spread on the chopped straw, distribute them in an equal manner, and very distant from one another.

When the worms are all hatched, the empty leaves must be weighed, and the exact quantity of worms to be raised will be known.

If the rules we have just laid down are faithfully followed, not one silk-worm out of a hundred will be lost.

We see persons at the present day, who deposit on a single mat, worms proceeding from one or two ounces of eggs; they are heaped up, and pressed against one another. The infallible result is, that they lose a great number of silk worms.

When a person has newly hatched silk worms, the proceeds of three ounces of eggs, it is necessary to spread them in an equal manner upon a large hurdle. Above all, do not raise too great a number of silk worms, for, if your means only permit you to nourish the silk worms proceeding from three ounces of eggs, and, from cupidity, you attempt to raise the worms of four ounces of eggs, you will soon feel the want of space, hurdles, laborers, and fuel. In this manner you will lose, at the same time, your silk worms, and the expenses incurred in that unprofitable attempt.

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Nong-tching-tsiouen-chou.—In the work entitled *Ssé-nong-pi-yong*, we read:

"To make silk worms hatch, the degrees of heat and cold, proper for them, must be known, and the manner of hastening or retarding their hatching, in order that *not one may hatch before or after the others.*

"The following method must be pursued:

"When the eggs have assumed an ash color, the leaves covered with eggs must be united two by two, and extended upon a clean frame. Afterwards they must be rolled up tightly and the two ends tied with a pack-thread, (of cotton or bark of the mulberry tree,) and the rolls placed upright in a clean, cool room, where there is no smoke.

"The evening of the third day, the rolls must be taken, unfolded, and extended on the hurdles. It is a very happy circumstance if none of the worms are hatched. But if by chance there are any hatched before the others, they must be taken and thrown out. Afterwards the leaves must be taken three together, rolled in a loose manner, and deposited in the room newly warmed for the silk worms. The time of the rising of the sun must be attentively observed, then the leaves must be unrolled, and spread, one by one, upon hurdles in the middle of the yard. If there is any dew the hurdles must be placed in a cool room, or under a kind of tent. Some time after, the leaves must be transported to a room prepared for the silk worms, and they must be spread, one by one, upon hurdles placed on the ground. After a few moments the silk worms will hatch *all at once*, looking like small black ants. There will not be one that will hatch before or after the others. The hatched worms must then be weighed with the leaves of paper, to know the number of silk worms to be fed, and to calculate, in advance, the quantity of leaves which will be wanted."

Same work.—When the newly hatched worms are made to descend, they must be dealt carefully with, spread upon the hurdle in an equal manner, and a proper space left between them. Care must be taken not to wound them, or to press one against the other. As soon as the worms are all hatched, the fresh and tender leaves must be taken, and cut in very fine shreds, with a very sharp knife; then they must be spread, with a coarse sieve, upon the sheets which are to receive the silk worms, and under which a bed of chopped straw must be previously spread. The cut leaves must be spread in a uniform manner, in very light layers. Afterwards the sheets of paper must be taken, where the worms newly hatched are, and they must be applied to the mulberry leaves; the worms descend themselves on the mulberry leaves. If some worms are too long a time in descending, or if they ascend upon the back of the sheet of paper, or if they do not descend, when the leaf is turned over, they must be thrown away, with the leaf to which they remain attached. They are diseased worms, that it would be impossible to raise.

Same work.—The success in raising silk worms depends on the precaution which is taken in the beginning, and subsequently, not to expose them to any danger. If the silk worms do not revive *all at once*, from their first sleep, or moulting, it proceeds from their not having changed color, and not hatching *all at once*. If they do not change color, and do not hatch *all at once*, it is because the rules prescribed to preserve the eggs, have not been strictly followed.

Same work.—In the work entitled *Thsin-kouan-tsan-chou*, we read:

"The first day of the last moon the eggs must be collected and watered with cow's urine; afterwards they must be washed with clean water. It must be so done that the sheets of paper covered with eggs be not torn. (An author advises to strengthen them with threads of cotton or silk, basted at distances according to their length and breadth.")

FOOD FOR THE SILK WORMS.

Kouai-ki-tchi.—The greater part of the spring silk worms have four moultings, all the others have but three. The inhabitants of the country of *Youé* express the idea attached to the word *mein*, sleep (moulting) by the word *yao*, youth. Thus they say: the first, second and third youth of the silk worms.

The Book on Silk Worms.—Three brilliant colors are distinguishable in the silk worm:

When they are of a shining white, feed them moderately;

When of a dazzling blue they must be abundantly fed;

When their skin is wrinkled, it is a sign that they are hungry;

When they are of bright yellow, diminish, by degrees, their food.

Thsi-min-yao-chou.—Whenever the silk worms are fed, the window blinds must be raised up, and closed again when they have finished eating. The light excites an appetite in the silk worm, (literally: as soon as the silk worms see the light they eat.) After a plentiful meal they grow and become large.

The Book on Silk Worms.—The next day, after the hatching of the silk worms, mulberry leaves, or leaves of *tché*, dried in a well-aired place, must be given to them. When they are about the twentieth of an inch long, they will eat five times during the day and night.

The ninth day they refuse food during one day and night. This repose is called the first moulting.

Seven days after, they again moult, as the first time. When they have eaten some leaves and attained the length of the tenth of an inch, they will feed six times during the day and night.

Seven days after they moult as before.

Five days after they leave off eating. This abstinence lasts for two days, (the sixth and seventh days;) it is called *ta-mien*, or the great moulting. Then the silk worms eat but half the leaf. They will feed eight times during the day and night.

Three days thereafter they have a great appetite; then they will eat the whole leaf. They will feed ten times during the day and night. Before three days have elapsed, they begin to work at their cocoons.

When the silk worms begin to feed, after each moulting, leaves must be spread lightly over them. If the leaves are thrown in upon them, sensations will be produced destructive to their appetite.

Observation by the Translator.—The preceding extract relates to silk worms of four moultings, the raising of which lasts a longer time than that of the ordinary silk worms, that is to say: silk worms of three moultings.

Ho-pi-sse-loui.—When the silk worms lay down and remain motionless, that repose is called moulting. During the time of moulting they do not eat, either the mulberry leaves, or leaves of the tree, *tché*. At the end of one day and night, they shed their skins.

There are some silk worms which have three moultings, and others four.

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Hoang-sing-tseng, says:—From the hatching of the silk worms to their third moulting, cut leaves ought to be constantly given them. When the ardent silk worms are fed, that is to say, Autumn silk worms, they must be carefully watched. As soon as they have eaten their leaves, give them more, for they will fall sick, if they breathe the heat of the silk room fasting.

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Nong-sang-tsi-yao.—Towards the end of Autumn, before the mulberry leaves turn yellow, a large quantity must be gathered. They must be dried and broken up in such a manner so as to be reduced almost to powder. They must be preserved in a place warmed by a fire that produces no smoke. They will answer the next year to feed the spring silk worms, after each of their moultings.

Same work.—The eighth day of the last month, (January,) small green peas, called *lo-teou*, (dolichos,) must be soaked in fresh water. They must be spread on frames, not very thick, and dried in the sun. Wash some clean rice in pure water and dry it also. These green peas and rice must be preserved in a shaded place. Flour made from them, will serve to feed the silk worms after their last moulting. It must be spread equally on the leaves given to them for food.

Same Work.—Manner of feeding the newly-hatched silk worms.—The leaves of the mulberry must be frequently cut in very fine shreds, and lightly spread over them with a sieve. The food ought to be distributed without interruption. In the space of one hour, (two of our hours) four meals must be given them, which makes forty-eight repasts in the space of one day and night.

Same work.—Food must be given to the silk worms without fail during the day and night. If their repasts are multiplied, it will necessarily result, that they will soon arrive at maturity; but if their meals are rare, and not numerous, they will attain their growth slowly.

When the silk worms attain maturity in twenty-five days, one frame or hurdle will furnish twenty-five ounces of silk. If in twenty-eight days, only twenty ounces can be obtained. If the time be one month, or forty days, one hurdle will furnish but ten ounces of silk.

Those persons who feed silk worms ought to endeavor not to sleep. Laziness has serious inconveniences.

Every time the silk worms are fed, all the hurdles must be visited with the greatest attention. It is essential for the leaves to be distributed in an equal manner. If the weather be dark and rainy, if the exterior air be cold, before feeding the silk worms, dry branches of mulberry trees must be taken, or rather a handful of rice straw, stripped of all its leaves, fire must be put to it, and the flame put around and above the hurdles in order to dissipate the cold and damp which benumbs the silk worms. After that operation they must be fed. In that manner they do not contract any disease. The time of their general moulting must be observed, and then the feeding must be suspended. Afterwards nothing is given them to eat, until they are all recovered from their torpid state. If food is given them, when they are but eight or nine-tenths of them recovered, they will not arrive, *all together*, at maturity; besides, great numbers of them will be lost.

From the second to the great moulting, (the third moulting,) when the worms assume a glossy yellow color, and when they are disposed to moult, the nourishment must be suspended, and they be transported to other frames. Afterwards, when they are all recovered, they must be slowly fed, that is to say: they must have their repasts given them at long intervals, and leaves must be spread on them in very light layers. If the leaves were distributed too abundantly, they would eat without appetite and become sick. Now, as it is the food which gives strength and life to the silk worms, the greatest attention must be paid to see that it be suitable and possesses all the proper qualities. The silk worms like not leaves saturated with rain or dew; if they eat of them, the greatest number immediately fall sick.

Same work.—When the silk worms recover from their great moulting, (their third moulting,) the heat of the rooms must be diminished when it incommodes them. At that time frequent meals must be given them. If a south wind blow, the window blinds must be let down, and the straw mats of the doors closed. At that moment they must be transported to other hurdles. When the silk worms are spread on the hurdles, the distance of one finger must be left between each one. Then the small green peas, which were reserved from the month of January, must be taken, and soaked in a small quantity of water, until they germinate: afterwards they must be dried in the sun, and reduced to powder.

The clean rice, which was also laid by in the month of January, can be employed for the same use, after having been boiled by steam, and reduced to flour. At the fourth feeding, that flour must be spread in a uniform manner, upon mulberry leaves. It will refresh the silk worms, and dissipate the internal heat they feel at that period of their age, and which is a mortal poison to them. The silk they afterwards produce, is more abundant, easier to reel, and, besides, it is stronger and more brilliant.

If there be but a small quantity of fresh leaves, the leaves which were cropped the preceding autumn must be taken, pounded again and reduced to powder. The new leaves must be lightly moistened, and the powdered leaves spread on in a uniform manner. Thus a want of leaves may be supplied. The leaves of the plant called *ou-kiu*, *(cicorium intubus?)* can also be used as a substitute for that flour.

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Nong-sse-pi-yong.—Same subject.—Early in the morning, the roots of the mulberry trees must be watered, and the leaves gathered soon after. If they are watered early in the morning, the leaves will be very juicy; if they are gathered soon after having been watered, they will not wither.

They must be cut in fine shreds with a well sharpened knife, and spread in light layers, with a coarse sieve. If a very sharp knife be not used, the leaves will lose their juice; if they be not cut very thin, they will cover and overload the silk worms. If a sieve be not made use of, they will not be distributed in an equal manner; if the cut leaves be not distributed in an equal manner, the silk worms will not all eat an equal quantity.

The juice of the leaves is not very abundant; at the expiration of some time, it dries up; for that reason the leaves immediately after the watering require to be sifted on the silk worms.

The first day, two repasts an hour must be given them, that is to say, about forty-eight repasts in the space of a day and night.

The second day, thirty repasts must be given them, in the same interval of time, and the leaves which are distributed to them, must be cut a little smaller.

The third day, only twenty meals must be given them (during the day and night,) composed of leaves thinner than the second day. They must be kept in great obscurity and heat. Generally, the newly hatched worms require darkness. When they recover from their sleep, or moulting, a little light ought to be allowed them; at a later period, when they show a smart appetite, a great deal of light must be given them.

Same work.—Another method.—As soon as the leaves are cut very fine, they must be spread in light layers with a sieve. Four repasts must be given by the hour, (two of our hours,) which makes about forty-eight repasts in the space of one day and one night. Some persons give but thirty-six in the same interval of time. This is my opinion. The newly hatched worms only feed on the juice of the leaves. If their repasts are not multiplied, they will resemble young foster children who are deprived of milk from their infancy; consequently, they never fail to be weak, pitiful and sickly.

Leaves full of juice, which have been gathered the preceding night, from the branches exposed to the south-east, must be given them. These leaves must be kept apart, in an earthen jar, and cut up very fine as soon as they have been taken out.

Same work.—Method for diminishing the food and hastening the moulting.—When the silk worms are disposed to sleep, (to moult,) their food must be diminished in proportion to the degree of yellow or white which their skin assumes; the leaves destined for their food must be cut in fine shreds, and frequently spread in light layers.

When the silk worms are completely yellow, they ought to be transported, in succession, to other hurdles, without caring whether the sky be dark or serene, if it be in the morning or the middle of the night. When they have been transported to other hurdles, the feeding must be suspended until they have all recovered from their moulting, when they may be fed again. This is called *diminishing the food* and *deciding the moulting*. These two expressions imply, that the nourishing of the silk worms, which are disposed to moult, must be diminished, (care must be taken not to cover or overload them with leaves,) and, on the other side, the silk worms must be abundantly fed, (which are not disposed to moult,) in order that they may quickly moult. Not only will they *all moult together*, but they will be exempt from diseases caused by the accumulation of leaves, and the internal heat which consequently follows.

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Nong-sang-thong-kioue.—The silk worms may be found in ten different situations: They may be cold or hot, starved or satiated, sufficiently far apart, or too near together, asleep or awake; they may eat slowly or with appetite.

Same work.—Injurious things to the silk worms.—1st. The silk worms do not like to eat damp leaves;

2d. They do not like to eat warm leaves;

3d. The newly hatched worms do not like the smell of fish, fried in a pan;

4th. They do not like to be in the neighborhood of persons who pound rice in mortars;

5th. They do not like to hear strokes on sonorous bodies;

6th. A woman, who has borne a child within a month, ought not to be *the matron of silk worms;* that is to say: ought not to be charged with the raising of silk worms;

7th. They dislike men, who smell of wine, to give them food, to transport them from one place to another, or to spread them on hurdles;

8th. From the time they are hatched, until maturity, the silk worms dread smoke and odorous exhalations;

9th. They do not like to have skin or hair burnt near them;

10th. They do not like the smell of fish, musk, or the odor of certain herbaceous animals, (like the goat, &c.;)

11th. They do not like to have a window, exposed to the wind, to be opened during the day;

12th. They do not like to receive the rays of the setting sun;

13th. They do not like, when the temperature of their habitation is warm, to have a sudden cold or violent wind introduced there;

14th. When their habitation is cool, they do not like a sudden change to excessive heat;

15th. They do not like dirty and slovenly persons to enter their room;

16th. Care must be taken to keep all noxious effluvia and filth distant from the apartments of the silk worms.

Same work.—The third day between ten and two o'clock in the afternoon, three hurdles, or frames, must be placed upon another stage. The one above protects the worms from the dust; that below protects them from dampness; and the middle one is destined to receive the silk worms. Young silk worms when incommoded by internal heat must be changed. A small quantity of worms, occupying a space as large as a square of a chequer-board, must be deposited on the middle frame; they will soon cover it entirely. By degrees the quantity of food must be increased. In the morning, if the weather be clear, the window situated to the east can be opened, and during the day, those which are in an opposite direction to the wind. By degrees they will change color; and, according to the color they assume, their food must be increased or diminished. When they are completely yellow, food must not be given them. They remain motionless, and that is called *theou-mien*, (or the first moulting.) When they have been removed after their first moulting, six meals may be given them, during the space of one day and night. The second day the quantity of leaves must be gradually increased. The windows can be half opened. From the first moment they begin to turn yellow, they must be kept very warm. When they are entirely torpid they require a great deal of heat; when they are perfectly recovered, they only want a moderate heat.

When the silk worms are removed, after their second moulting, and are all recovered, light repasts ought to be given them at first. Four repasts in one day and night will be enough. The next day the quantity of leaves may be augmented by degrees. Some persons open the windows.

From the first moment they begin to turn yellow, they require a good heat; when they are once torpid, a moderate heat ought to be allowed them; when they are all recovered they require a mild heat.

When the silk worms are removed after their third moulting, and they are all revived, three repasts must be given them during one day and night. The first repast ought to be very light; the second lighter than the first, the third the same as the first. If these three repasts be not administered with much caution, the silk worms will feed slowly until the period of their maturity. The second day, the quantity of leaves must be increased by degrees. The windows can be thrown entirely open, and the dormer windows above the frames may be likewise opened.

From the first moment they begin to turn yellow, they require a mild heat; when they are completely torpid a lukewarm heat is required; when they are all revived they require coolness. After each repast a basket of leaves must be taken, and the tour of the shelves made. If an empty place is perceived (upon a hurdle) it must be covered with leaves strewn with rice flour. After the seventh or eighth feeding, (from ten to two o'clock,) cut leaves must be spread upon the hurdles; they must be moistened equally with fresh water; then, after a lapse of some time, sifted rice flour must be spread, being careful to distribute it in a uniform manner. For each basket of leaves a *ching*, (a kind of measure,) of fresh water and four ounces of flour must be used. If the flour cannot be had, a basket of new leaves only must be used; it will furnish a repast for the silk worms of a frame.

[Extract from *Nong-tching-tsiouen-chou*. The powder of leaves, which are spread on fresh leaves, fills the body of the silk worms, (that is to say: is very nourishing,) and disposes them to make a firm and thick cocoon, the silk of which is remarkably strong.]

When the leaves are cut up, moisten them with fresh water: then sift the powdered leaves, and spread them in a uniform manner.

After the great moulting of the silk worms (the third moulting,) from three to five meals of that kind must be given them at certain intervals. When the silk worms approach their maturity, they require light and frequent repasts and moderate heat.

Same work.—If among the silk worms there be any that are backward, that is to say, which do not appear disposed to moult at the same time with the others, frequent supplies of food ought to be given them, in order to accelerate and cause their moulting, at the same time with the rest of the hurdle. When the silk worms do not moult all at once, it proceeds from a species of disease, which dates from their hatching. This method must be followed to remedy it: If among the silk worms which are completely yellow, some change their white color, and begin to turn yellow, much time is not required to become completely so. By the aid of very frequent feeding they will soon overtake the others; in fact, multiplying the feeding hastens the period of their moulting.

But when the greatest number are completely yellow, many blue and white ones are found, they are far from becoming entirely yellow, and frequent repasts given them will be useless trouble; it is impossible for the latter to arrive at the moulting at the same time with the first.

The change of color in the silk worms is the least change that is experienced. When they moult they cease eating, and shed their skin; then they experience a great change. But the greatest of these changes, is their metamorphosis from the chrysalis into butterflies, or moths. When a silk worm is completely yellow, its mouth is shut, it no longer eats but sleeps, or is torpid: it then resembles a man afflicted with some dreadful disease; the blood spreads throughout, its body experiences great modifications. If it remains a day and night without eating, its moulting produces a happy relief.

If, then, there be many blue and white silk worms, and their feeding be too much hurried, their health will be disordered, and a precocious moulting will not produce relief. When those which were blue or white turn yellow, and are disposed to moult, all the others have accomplished their moulting, and are recovered.

When the silk worms begin to recover from their moulting, they want but little food; they resemble a convalescent patient, to whom only slight nourishment is given to repair, gradually, their strength. If while the backward ones moult, the nourishment of the earliest be suspended, they will languish with hunger and weakness, yet you are compelled to wait; and besides, one will be obliged to give them food when the backward ones are recovering. A great number will contract diseases, and very little silk will be gathered from them. For that reason the author of *Tsan-king*, or the *Book on Silk Worms*, says, with much reason, that "the irregular moulting of the silk worms always causes a diminution of silk."

Same work.—When the silk worms are just hatched their color is black. Their food must be gradually increased. Three days thereafter they gradually become white; then they gain appetite. Leaves, not cut so small, must be given them. When they are blue, it is the period of their great appetite. Leaves must then be given them more abundantly, and not cut so small. When they again become white, they feed slowly; their food must be diminished a little. When they are turning yellow they have but a delicate appetite; their food must be again diminished. When they are completely yellow, they entirely cease eating; that is called their moulting. When they are recovered, they change from yellow to white, from white to blue, from blue to a second white color; at last from white to yellow; this is their second moulting. At each moulting they experience the same changes of color. They must be observed with care, in order to diminish or to increase their food, of which the quantity ought to vary, according to the different situations in which they are found.

The leaves which are given them, ought to be neither wet with dew, nor dried in the wind or sun, nor impregnated with disagreeable smells, for as soon as they have fed upon them, they will contract diseases. If care be taken to preserve, in advance, a sufficiency of leaves for three days, there will be nothing to fear from long rains: the silk worms will never have to eat damp leaves, and at the same time, they will not suffer from hunger. When leaves are again gathered, the heat arising from the accumulation in sacks, must be completely dissipated before giving them to the silk worms. The space of one day and night is, for the silk worms, like unto a year with its four seasons. The morning and evening are the Spring and Autumn; the middle of the day resembles the Summer; and the middle of the night Winter. In these four periods of the day the weather is never the same. When a good fire is preserved in the silk-room, great attention ought to be paid to keep it at the corresponding temperature for each one of those four periods. The degree of heat ought not to be constantly the same. From the time they are hatched, until their second sleep, (moulting,) the silk worms require a moderate heat. The matron of the silk worms, (the person who takes care of them, ought to wear a single garment, (that is to say not double.) She must regulate the temperature of the silk-room, according to the sensation of cold and heat she feels.

If she feels cold, she necessarily will judge that the silk worms are cold, and the fire must then be increased; if she feels warm, she will conclude from it, that the silk worms are too warm, and the fire must then be suitably diminished.

When the silk worms are all asleep, if the sky be clear and brilliant, between ten and two o'clock the windows must be opened, to introduce air and light in the apartment. If the wind be southerly, the windows to the north must be opened; if northerly, the windows on the south side must be opened. The air which enters from a side opposite to the direction of the wind cannot injure the silk worms.

When the silk worms have recovered from their great moulting, (the third moulting,) three repasts must be given them, then the paper that covers the windows, must be cut with a pair of scissors, to allow the air and light to penetrate into the apartment. The silk worms will not be disturbed or incommoded.

After the great moulting, when the windows have been opened, and the paper cut from the windows, if the exterior air is too warm, an unglazed earthen vessel must be placed at the entrance of the door, in which the water must be often renewed, in order that the air may be refreshed in its passage. If the wind raises, if it should rain, or if the night becomes cold, the windows must be closed immediately.

Nong-tching-tsiouen-chou.—The silk worms are of a warm constitution. It is better to make use of a fire during the whole time of the raising.

The following is a method of warming the nursery:

A long stove, placed upon a hand-barrow, must be made use of, so that it may be carried by two men. When the leaves are spread on the silk worms, wait until they have climbed upon the leaves, and then bring in the stove, which must be carefully lighted outside of the apartment. The fire should consist of hot coals; it must be covered over with a bed of straw ashes, to prevent a red and brilliant flame. When the silk worms have finished eating, the stove must be carried back. Afterwards, when other food is given to the silk worms, the same stove must be brought in each time. Then the silk worms will escape the diseases which heat causes; but if the stove be introduced when the silk worms are hungry, they soon become warm. If the stove be introduced soon after having given them food, that is to say, when they are under the leaves, not having had time to ascend them, they will soon be incommoded by the fermentation of their dung, and they will, besides, be overloaded by the leaves spread upon them.

Same work.—When the air of the silk-room is warm, if it be suddenly made cold, the silk worms will lose their appetite, and feed no longer. Then a chafing-dish, filled with clods of dry cow dung, well ignited, and free from smoke, and by the aid of an iron fork, must be moved about repeatedly above the frames. That operation dissipates the cold, which benumbs the silk worms, and they soon feed with an appetite.

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ON THE DISTRIBUTION OF THE SILK WORMS UPON THE FRAMES, AND THE SPACE TO BE ALLOWED THEM.

Thsi-ming-yao-chou.—When the silk worms are moulting, three frames are constantly required. The middle frame is destined to receive the silk worms, the superior and the inferior ought to remain empty. The lower frame preserves the worms from the dampness of the ground, the upper preserves them from the dust of the apartment.

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Wou-pen-sin-chou.—When the silk worms are about hatching, they require cool air. A bed of chopped straw must be spread on the frame; wheat straw must not be used. Every day they must be removed once upon other frames; if they are not changed, it generally happens that white spots come over them.

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ON REMOVING THE SILK WORM.

In removing the silk worms many persons must be employed in order to perform it quickly. If they are left for a long time, heaped up in the baskets, they become heated and perspire abundantly. In consequence, a great number of them fall sick and die. By degrees they will diminish every time they are removed; and those which later arrive at maturity, will only produce small and ill-supplied cocoons.

The dung of the silk worms must be frequently removed. If it be not carried away, they become heated. The heat produces fermentation, and causes a putrid effluvia. Afterwards a large number of silk worms turn white and die.

Whenever the silk worms are removed they must be distributed upon the frames in such a manner as to leave some space between them;

if they are placed too near together, the strongest will feed at the expense of the weakest. It is necessary to make the tour of the frames often, and to visit them with care. Moreover, if the air does not circulate freely in the apartment, and the door be suddenly opened, a fatal wind may penetrate, and a great number, consequently turn red and die. When the silk worms are distributed upon the frames, it ought to be done in a tender manner; they must not be thrown down, or they will be wounded by striking against each other. The health of a great number of silk worms will suffer, and afterwards they will become what are called *laï-lao-ong;* that is to say, *lazy old men.* They leave a red chrysalis.

Nong-sang-yao-tchi.—Two frames must be placed below the one where the newly-hatched silk worms are. When the sun has risen above the horizon, a frame must be taken away and dried until the setting of the sun. It must then be replaced under the frame where the silk worms are. The next day remove a frame again from beneath, expose it to the rays of the sun and then replace it, as at first. In that manner the silk worms will naturally receive a mild and temperate heat. That frame must be removed as soon as they have eaten, after the second moulting.

Same work.—There are some silk worms which turn white and die; it arises from their having been injured by damp exhalations, within a short time after their hatching. When the sky is clear and serene, take three or four frames and carry them quickly into the apartment of the silk worms, after having exposed them for some time to the rays of the sun. Then as one frame is removed and replaced by another, so continue to change them, until all the frames of the silk worms are sufficiently warmed by the heat of the sun.

The country people, vulgarly say: "when the dung of the silk worms is dry and scattered, it is a sign that they are in good health." When the dung appears in damp heaps, and of a shining white, it announces that the silk worms are sick; the frames must then be quickly changed. But if at the time, when it is proper to change them, a damp rain or a cold wind comes on, it will not do to remove them; the straw of rushes, chopped to the size of a bean, must be taken, and one or two bushels distributed on each frame; it must be spread in an equal manner upon the silk worms. Then a layer of fresh leaves must be placed over them. Soon after the silk worms ascend to eat the mulberry leaves. The bed of rush straw separates the silk worms from the dung, and relieves them from that inconvenience. As soon as the sky has become serene, they must be removed to other frames; if a person has no rush straw, the rice straw will supply its place.

Sse-nong-pi-yong.—The silk worms produced by three ounces of eggs, which occupy a single frame at the moment of their hatching, will cover thirty frames at the close, or last period of their lives. In general, one tenth of an ounce of silk worms, newly hatched, will furnish a frame of silk worms, in supposing that the frame is as usual, ten feet long, and two wide. If the frames are of a smaller dimension, they ought to receive a smaller quantity of newly hatched worms. If they are too numerous for the space they occupy, they will find themselves close, and, consequently, serious accidents will result from it.

Those persons who intend raising silk worms, to cover more than thirty frames, ought to increase the number of frames destined for the young silk worms, (hatching silk worms.)

Those who only raise a small quantity of worms, can make use of baskets with small borders.

Same work.—The third day, between ten and twelve o'clock, three frames must be placed upon a separate stage. The hatching worms, which have deposited a light bed of dung, must be changed. It must be done with a delicate hand. A quantity of silk worms which (at the moment of their hatching,) occupied a space the size of a square of a chequer-board, ought to be distributed upon the middle frame.

REMOVAL OF THE SILK WORMS AFTER THEIR FIRST MOULTING.

Sse-nong-pi-yong.—Place four frames upon a separate stage, and the worms which have deposited a light bed of dung must be changed. When they have eaten abundantly, a quantity of silk worms, which, at their hatching, occupied a space as large a man at draughts, will fill the two middle frames; a quantity of silk worms, which occupy a space no larger than a small piece of money, will cover the third frame.

REMOVAL OF THE SILK WORMS AFTER THEIR SECOND MOULTING.

A quantity of silk worms, which at the moment of their hatching occupy a space no larger than a small piece of money, will cover six frames. When they have eaten abundantly, the same silk worms will cover twelve frames.

REMOVAL OF THE SILK WORMS AFTER THEIR THIRD MOULTING.

A quantity of silk worms, which at the moment of their hatching, occupy a space as large as two pieces of money, will cover twenty-five frames. When they are all torpid, the bed of chopped straw must be removed; they will then fill thirty frames.

To remove and separate the silk worms, in a proper manner, it must be done with promptitude and tenderness. They must be separated from one another, and an equal space left between them, for fear they should wet themselves, and reciprocally injure one another. The silk worms evacuate freely; for that reason they must, absolutely, be separated. When they have deposited a large quantity of dung, it is necessary to remove them to other frames. If they are not separated they will be too much crowded. If the frames are not changed, they will be injured by the abundant humors which they void. For that reason, these two operations ought to be performed with great celerity.

The silk worms are weak and delicate beings; they suffer much from being rudely handled. When they are small, they must be treated with great care and a kind of affection; but when they have become large, there are few who pay any attention in removing them. They are heaped together, pell mell, for a long time, and they are tumbled about, or let fall. This defect of care and precaution causes their diseases, and often destroys them; therefore, they should be touched with a light hand, and distributed upon the frames at an equal distance from one another.

Sang-tsan-tchi-choue.—The silk worms of four moultings are of a different species; they are raised in the same manner as the Spring silk worms, (which have but three moultings.) Only after the third, they must be distributed upon fifteen frames. When they have fed abundantly, they must be spread upon twenty frames; and after the great moulting, (the fourth moulting) they must be distributed upon thirty frames.

Nong-sang-thong-kioue.—Upon each stage three frames are placed; the first is destined to receive the dust of the apartment, and that below, to intercept the dampness of the ground. A bed of chopped rice straw must be spread upon the middle frame, in order that it may receive the silk worms which are removed. This rice straw must be broken, and softened in an equal manner, upon the middle frame; then a sheet of paper must be spread above, of which the extremities are pasted to the edge of the frame. Upon that sheet of paper the silk worms must be placed.

Nong-tching-tsiouen-chou.—Hoang-sing-tseng says: When it is desirable to remove the silk worms, rice straw, crushed in a mill, must be spread, in advance, upon other frames. It renders them healthy and active, and preserves them from diseases. Some persons change them by the aid of a net, which they strew with mulberry leaves.

ENTRANCE OF THE SILK WORMS IN THE COCOON ROOM.

Nong-chou.—The floor of the cocoon room must be boarded with planks of the fir tree, six feet long, and three feet wide. A frame pierced with large holes, must be constructed of the thin bamboo from which arrows are made. In these holes some reeds must be inserted; then long and large bamboo branches, stripped of their leaves must be crossed above. The cocoon room must be covered with a frame work of woven reeds.

The silk worms will then have a place, where they can establish themselves in safety without fear of falling. When the interior of the cocoon room is well arranged, when it affords the necessary depth and proper security, and the frame presents no interval, the silk worms must be successively spread over it. At first, the frame must be a little inclined, until the worms are emptied of excremental matter, afterwards they must be moderately warmed with a small brasier, or pan of live coals. When they have begun to enclose themselves in their cocoon, (that is to say, when their cocoon will have formed a light net work,) the heat must be increased by degrees. They must not stop in the middle of their work; if the temperature be a little too cold, they walk upon their silk and cease to spin. When it comes to be reeled it will frequently break. In general, one will be obliged to have the cocoons boiled, and silk stuff made of it, because it is impossible to reel it from one end to the other.

Thsi-min-yao-chou.—When the silk worms have arrived at the age of maturity, if it happens to rain, it will injure the cocoons; it will be better also to establish the cocoon rooms in the interior of the nursery.

Observation.—The round and oblong cocoons' rooms must be placed outside.

A parcel of small dry branches must be laid upon the frames, and the silk worms spread on them. When that operation is performed, they must be again covered over with a bed of dry branches. One stage, or story, can support ten large frames.

Another method.—In place of small dry branches, the stalks of plants may be used, on which the silk worms must be spread. The frames must be suspended, between wooden pillars, with cords, or hooked sticks. Several may be arranged one above another. When the frames are suspended, they must be moderately warmed by means of chafing-dishes placed below. As soon as the silk worms feel the heat, they work industriously; but if they are affected by the cold they will work slowly. The frames must often be visited. As soon as they are warm enough, the chafing-dishes must be removed. If a cool air circulates above in the cocoon room, (while the lower part is warm,) the silk will not be spoiled by the dampness produced by the silk worms; the silk worms that die, will immediately fall, and the cocoons of the other worms will not be injured by coming in contact with them, the dung will not adhere to the cocoons, nor produce any blemish. If the silk be impregnated with dampness, it will be difficult to prepare it for the die; if the cocoon be soiled, the silk will easily break; if the cocoon be defective, it will be good for nothing.

The cocoon rooms furnished with stalks of dry plants, are as advantageous as those we have just described.

Same work.—There are some countries where the place for cocoons is outside, (in the open air;) but if in the evening the air becomes cold, no silk worm can form its cocoon. When the cocoon rooms are warmed, the silk will be fitter to receive the die; besides it acquires lustre and whiteness.

Wou-pen-sin-chou.—The ground on which the cocoon rooms are established, ought to be high and level. It must be well aired in the interior. Small branches, or dry stalks of plants, must be spread there in an equal manner; afterwards, the silk worms must be distributed there, leaving a proper distance between them; if they are too near, they will create too much heat; if they are crowded, they spin with difficulty; and, moreover, their silk will be difficult to reel. The cocoon rooms must not be established in places exposed to the north-east, nor where domestic animals are raised; neither under trees, above a hole, nor near places covered with manure or stagnant waters.

Nong-sse-pi-yong.—The following is the manner of establishing the cocoon room: A dry and warm place must be chosen, in order that neither the cold nor dampness can penetrate into the interior of the cocoon room. When the worms approach their maturity, a fire must be lighted upon the ground where the cocoon room is to be located, until it is perfectly dry; afterwards, the remains of the fire and the ashes must be swept away, and the cocoon room constructed.

Same Work.—Six diseases of silk worms are noted in the cocoon room:

1st. When the silk worms dirty the cocoon room;

2d. When the silk worms fall in the cocoon room;

3d. When they move about without spinning;

4th. When they change in red chrysalis;

5th. When they turn white and die;

6th. When they turn black.

The foulness of the cocoon room arises from portions of leaves which the mature worms have brought with them; they ferment and produce a fatal moisture.

The five other diseases always result from the moisture of the ground, or the cold of the exterior air.

From the Wesleyan Methodist Magazine.

OBSERVATIONS ON PROGNOSTICATIONS OF THE WEATHER [IN ENGLAND.]

By the Rev. Adam Clarke, LL. D., F. A. S.

From my earliest childhood I was bred up on a little farm, which I was taught to care for, and cultivate ever since I was able to spring the rattle, use the whip, manage the sickle, or handle the spade; and as I found that much of our success depended on a proper knowledge and management of the weather, I was led to study it ever since I was eight years of age. I believe *meteorology* is a *natural science*, and one of the first that is studied; and that every child in the country makes, untaught, some progress in it: at least so it was with me. I had actually learned, by silent observation, to form good conjectures concerning the coming weather, and, on this head, to teach wisdom among those who were perfect, especially among such as had not been obliged like me to watch earnestly, that what was so necessary to the *family support*, should not be spoiled by the weather before it was housed. Many a time, even in tender youth, have I watched the heavens with anxiety, examined the different appearances of the morning and evening sun, the phases of the moon, the scintillation of the stars, the course and color of the clouds, the flight of the crow and the swallow, the gambols of the colt, the fluttering of the ducks, and the loud screams of the seamew—not forgetting even the hue and croaking of the frog. From the little knowledge I had derived from close observation, I often ventured to direct our agricultural operations in reference to the coming days, and was seldom much mistaken in my reckoning. When I thought I had a pretty good stock of knowledge and experience in this way, I ventured to give counsel to my neighbors. For my kindness, or perhaps officiousness on this head, I met one day with a mortifying rebuff. I was about ten years of age; it was harvest time, and 'what sort of a day to-morrow would be,' was the subject of conversation. To a very intelligent gentleman who was present, I stated in opposition to his own opinion, 'Mr. P. to-morrow will be a *foul day*.'—To which he answered 'Adam, how can you tell?' I answered, without giving the *rule* on which my prognostication was founded, 'O sir, I know it will be so.' 'You know! how should you know?' 'Why, sir,' I pleasantly replied, 'because I am *weatherwise*.' 'Yes,' said he, 'or *otherwise*.' The next day, however, proved that my augury was well drawn.

About twenty years ago, a Table, purporting to be the work of the late Dr. Herschel, was variously published, professing to form prognostics of the weather, by the times of the change, full and quarters of the moon. I have carefully consulted this Table for several years, and was amazed at its general accuracy:—for though long, as you have seen, engaged in the study of the weather, I never thought that any rules could be devised liable to so few exceptions. I have made a little alteration in the arrangements, illustrated it with further observations, and have sent it that you may insert it in the Magazine, as it has hitherto been confined generally to a few almanacs.

A TABLE *for foretelling the weather through all the lunations of each year for ever.*

This Table and the accompanying remarks, are the result of many years' actual observation; the whole being constructed on a due consideration of the attraction of the sun and moon in their several positions respecting the earth; and will, by simple inspection, show the observer what kind of weather will most probably follow the entrance of the moon into any of its *quarters*, and that so near the truth as to be seldom or never found to fail.

MOON. TIME OF CHANGE. If the New Moon—the First Quarter—the Full Moon—or the last Quarter happens.	IN SUMMER.	IN WINTER.
Between midnight and two in the morning.	Fair.	hard frost unless the wind be S. or W.
—— 2 and 4 morning.	cold with frequent showers.	snow and stormy.
—— 4 and 6 "	rain.	rain.
—— 6 and 8 "	wind and rain.	stormy.
—— 8 and 10 "	changeable.	cold rain, if wind W.; snow if E.
—— 10 and 12 "	frequent showers.	cold and high wind.
At 12 o'clock at noon and two P. M.	very rainy.	snow or rain.
Between 2 and 4 afternoon.	changeable.	fair and mild.
—— 4 and 6	fair.	fair.
—— 6 and 8	fair if wind N. W.; rainy if S. or S. W.	fair and frosty if wind N. or N. E.; ra. or sn. if S. or S. W.
—— 8 and 10 "	ditto.	ditto.
—— 10 and midnight.	fair.	fair and frosty.

Observations.

1. The nearer the time of the moon's change,

first quarter, full and last quarter, are to midnight, the fairer will the weather be during the seven days following.

2. The space for this calculation occupies from ten at night till two next morning.

3. The nearer to mid-day, or noon, the phases of the moon happen, the more foul or wet weather may be expected during the next seven days.

4. The space for this calculation occupies from ten in the forenoon to two in the afternoon. These observations refer principally to summer, though they affect spring and autumn nearly in the same ratio.

5. The moon's change,—first quarter;—full,—and last quarter, happening during six of the afternoon hours, i. e. from four to ten, may be followed by fair weather; but this is mostly dependent on the wind, as it is noted in the Table.

6. Though the weather, from a variety of irregular causes, is more uncertain in the latter part of autumn, the whole of winter, and the beginning of spring; yet, in the main, the above observations will apply to those periods also.

7. To prognosticate correctly, especially in those cases where the *wind* is concerned, the observer should be in sight of a good *vane*, where the four cardinal points of the heavens are correctly placed. With this precaution he will scarcely ever be deceived in depending on the Table.

It is said that the late Dr. Darwin, having made an appointment to take a country jaunt with some friends on the ensuing day; but perceiving that the weather would be unfavorable, sent as an excuse for not keeping his promise, a poetical epistle containing an enumeration of *most* of *the signs* of *approaching ill weather.*—I have *enlarged* these by adding several new ones, and remodelling others; and subjoin it as very useful, and a thing easy to be remembered.

Signs of approaching foul weather.

The *hollow winds* begin to blow;
The *clouds look black,* the *glass is low;*
The *soot falls down,* the *spaniels sleep;*
And *spiders* from their *cobwebs peep.*
Last night the *sun* went *pale to bed;*
The *moon* in *haloes* hid her head.
The boding shepherd heaves a sigh,
For see, a *rainbow* spans the sky.
The *walls are damp,* the *ditches smell,*
Closed is the pink-eyed *pimpernell.*
Hark! how the *chairs* and *tables crack,*
Old BETTY'S *joints* are on the rack:
Her *corns* with *shooting pains* torment her,
And to her bed untimely sent her.
Loud *quack the ducks,* the *sea-fowl cry,*
The *distant hills* are *looking nigh.*
How restless are the *snorting swine!*
The *busy flies* disturb the *kine.*
Low o'er the *grass* the *swallow wings.*
The *cricket,* too, how *sharp he sings!*
Puss on the hearth, with *velvet paws,*
Sits *wiping* o'er her *whiskered jaws.*
The *smoke* from *chimneys right ascends;*
Then spreading, *back to earth it bends.*
The *wind* unsteady *veers around,*
Or settling in the *south is found.*
Through the clear stream the *fishes rise,*
And *nimbly catch* the incautious *flies.*
The *glow worms,* numerous, clear and bright,
Illumed the *dewy hill* last night.
At dusk the squalid *toad* was seen,
Like *quadruped,* stalk o'er the green.
The *whirling wind* the dust obeys,
And in the *rapid eddy* plays.
The *frog* has changed his *yellow vest,*
And in a *russet coat* is dressed.
The *sky is green,* the air is still:
The *mellow* blackbird's voice is shrill.
The *dog,* so altered is his taste,
Quits mutton bones, on *grass* to feast.
Behold the *rooks,* how odd their flight,
They imitate the *gliding kite,*
And seem *precipitate to fall,*
As if they felt the piercing ball.
The *tender colts on back do lie,*
Nor heed the traveller passing by.
In *fiery red* the *sun* doth *rise,*
Then *wades through clouds* to mount the skies.
'Twill *surely rain,* we see't with sorrow,
No *working in the fields to-morrow.*

Hoping that this paper will be of some use to your country readers, I am, dear sir, yours truly,

ADAM CLARKE.

REMARKS ON DR. CLARKE'S WEATHER TABLE.

To the Editor of the Farmers' Register.

I now comply with your request, in sending you for publication, a copy of the Weather Table which was published in the New England Farmer, in December, 1830, with the remarks, &c. annexed. The table will speak for itself; but as you wished my observations relative to its correctness, and as I have had the table since 1830, and noticed particularly how far it was correct, I now give you a few of them. Judging from the observations of seven years, I can truly say no certain reliance can be placed on the rules in general; but still the table will be found more often correct than otherwise in its prognostics of *wet* weather. I am now writing Monday evening, the 4th of June, and it is raining and blowing most severely. It rained on Saturday, and has been cloudy and moist ever since, and now we have a severe storm, which promises to last some hours. Well, by the Almanac, the first quarter of the moon was on the 31st May, Thursday, 25 minutes past 2 o'clock in the morning.

The Weather Table says, that the weather 7 days from Thursday morning, 25 minutes past 2 o'clock, would be on the average cold, with frequent showers. It is cool, and we have had rain before the present violent storm, and the weather thus far has nearly corresponded with the prognostic. It has corresponded as to cool rainy weather, and it will rarely be found to answer to the prognostics in the table more correctly.

My observations have convinced me, that in the summer season there is much more reliance to be placed on the table than at any other season. If any change, quartering, &c. of the moon takes place near 12 o'clock in the day, I have never known it to fail to rain copiously some time in the course of the next 7 days, and most frequently the season is a wet one during those days. If, however, it rains copiously a day or two before such change, occasional showers only occur during the period. The change of the moon on the 23d day of May last, between 11 and 12 o'clock in the day, was preceded by much rain, and during the 7 days following we had but little rain, although the weather was moist, with occasional showers; and the weather is now more like what the change of the moon on the 23d of May prognosticated. I have thus far found the table much more correct in respect to rainy than as to clear weather. I remember that during, I think, the winter of 1837, the changes, &c. of the moon for a month, indicated wet weather according to the table. We had much rain and no clear weather for three weeks, but the fourth week was clear, although rain was indicated. It will not require very long observations for any person to be convinced, that the changes, &c. of the moon between 2 o'clock in the morning and noon, are much more frequently followed by rain than the evening changes. I think it will also be found, that in the fall and winter the north-east winds accompany the rains in *this state*, instead of the south-west winds spoken of in the table. Being a farmer on a small scale, I have found from sad experience, that for the last five or six years we have had a spell of very wet weather between the 31st of May and the 10th of June, and four days of such weather have already passed this month. The May wheat will probably be much injured, if not destroyed by the rust, in consequence of this weather. If, however, the season was not so backward, the May wheat would be past danger; for some few years since, some crops of that wheat were cut in this neighborhood on the 26th May. Much of it is now in bloom.

In closing my remarks, I have this to say about the weather table. In the summer season, it will often assist the farmer who will attentively observe the winds and the clouds, in judging as to the probability of rainy weather while about to cure his hay and his fodder, &c. A. B. S.

June 4th, 1838.

For the Farmers' Register.

EASTERN SHORE RAILROAD.

Sir—As much with a view to the spirit, as the letter of **** ****, from the Eastern Shore of Maryland, and as to a general discussion of the subject, I address you. The Eastern Shore railroad is to cost, for 118 miles, but $8541 per mile, and, with all the insinuations to the contrary, will not, agreeably to the description given of the ground, cost more than $10,000 per mile; at the same time it will enjoy a prospect of its reasonable share of the 50,000 travellers passing annually from north to south. Fifty thousand, did I say? rather 500,000; for, before ten years shall have elapsed, a number nearer to 500,000, than to 50,000, will pass it. In short, there will be among those who "travel by land *or* by water," sufficient to pay both road and steamers, and to repress feelings like those which have prompted this tilt against the former; for that there will be ample room for both, there is not the slightest doubt.

But how does the Eastern Shore writer sustain himself? He thinks Engineer Kearney's notion of Tangier quite out of the question; forgets that, as in the case of Philadelphia, it may possibly furnish an "excellent winter harbor" for Baltimore, and the probability which exists of the ships availing themselves of that harbor, instead of waiting in Hampton Roads "for a thaw." I think that, were I a Baltimorean, I should hail the project with pleasure; inasmuch as with —— miles back carriage from Elkton, it would give my fellow citizens the same chance of having their merchandise in winter, as Philadelphia. That city, it seems, projects "a railroad from the capes, to strike the railroad at Wilmington, (note A;) and, when this shall be accomplished, foreign goods can be transported to those cities (P. and W.) and cargoes carried by the return cars. By these means Jack Tar may be kept *constantly* at sea, free from the temptations and corruptions of the city, and *perhaps* Philadelphia may regain her commercial ascendency in the country." I cannot see why these arguments, will not as fully and as forcibly apply to Baltimore, as to Philadelphia; and, according to **** ****'s own showing, infinitely more so; for, without the Eastern Shore road, the trade of north Maryland, during the season of interruption, in a great degree, will pass to Pennsylvania. Besides, trade at all times will seek that place where supplies arrive without interruption.

Of the facilities of Tangier as a harbor, I am ignorant; but I had thought some of the British men of war had made good use of it during the last war, and as to the sneers of **** **** relative to "the musquitoes and the marshes," and "the gloomy Siberian forests," they still more strongly enforce on my mind the value of the improvement. It is to form a link in the great chain of coast railroad; (of another from Wilmington to Charleston they begin to speak.) It is to pass through a country requiring it, and thus the services the road may render are incalculable.

In page 744, of your 5th volume, and page 2 of the 6th, I see what is doing for Jersey, by means of marl, and what may be done for Maryland and Delaware, by means of lime; and as the upper Delawares are now boring for finding marl daily, I do not know whether a similar result may not be witnessed on lower Delaware, Accomac, and Northampton. I would observe, I am ignorant of localities, and without good maps; but, I do not fear being found in any grievous error, as my general ground is so solid.

As to *all* the routes from the south, and *vice versa*, there will be room enough, and travel enough, for the whole of them; but, as to "the most eligible one" being by "Richmond, Washington, and Baltimore," **** **** is mistaken, unless he confines himself to those who wish to loiter and spend money in taverns, or seek office at Washington. He allows that three hours would be saved from Portsmouth to Philadelphia, (note B). It is 85 miles by water to Tangier, and may be run in 6 or 7 hours. Doubtless, ere the road is completed, cars will travel with perfect safety, at the rate of 20 miles an hour, and this brings you to Wilmington in 12 or 13—so that I greatly suspect more than three hours will be saved in time; and I know that thrice, or more than thrice that number will be saved in dollars—and especially to families. Of personal conveniences I am silent.

As to "no art" being able to improve "the Siberian forest of Delaware" it weighs as much with me as the ultimate and prophetic clause of the communication. Of the correctness of both, I am in great doubt. Of the powers of the writer in prophecy, a full proof is *now* (thank Heaven!) to be had as to Atlantic steamer navigation; and, perhaps, ere these lines can appear in print, the return of the Sirius and Great Western will give the *coup-de-grace* to all this sort of vaticination. The pious, the philanthrophic, the philosophic, the political, the mercantile and the mechanical classes will all join, and join most heartily, in prayer for their success.

However, I would add, that an experience of more than half a century has thoroughly and conscientiously answered me, that in an active and enterprising community, (and some acquaintance with such a society as that of the United States has more impressively implanted it on my mind,) there is not the slightest doubt, that, like the Bridgewater canal and the Liverpool and Manchester railroad, *every* road projected in Virginia, will not only *directly* pay the proprietors a large interest, but *indirectly*, to the mass of society, a most enormous profit. "The value of every farm, consequently the wealth, and *perhaps the strength* of a country, greatly depend on an easy and uninterrupted communication by good roads." *(Rees' Cy.)* Of course there is no individual in Virginia, who is not concerned in opening roads either in his own or any other sections; and whether the road be from Abingdon to Winchester, or to Lynchburg, from the Roanoke to the Ohio, or the Kanawha to the James or the Appomatox, from Raleigh, from Wilmington, or from Fayetteville—every one of them will tend to augment her trade, foster her agriculture, and increase the general income of the state—of course, the real value of her landed property—and perhaps be the means, in 1850, of rescuing her from the condition, as to representation in Congress, in which the census of 1840 *must* leave her. Nor has *any* section of the country any thing whatever to fear from roads coming from north or south. The wheels of commerce should revolve with rapidity. Unlike that of fortune, they confer benefit at every turn. This we are all taught by the experience of the last century. Louis XIV. and George II. set a glorious example in France and Great Britain. They were great road-makers

In a country like that of the United States, there is not, nor will there ever be, one highway "of preference," that will "beggar" the other: a sentiment, I regret to see promulgated, and especially from such a state as Maryland; especially as there will be one and one great use for the Eastern Shore railroad. It will form a link in a great chain. It is necessary for the conveyance of the mail *directly* from New York, &c. to the south and south-west. As soon as it is completed, letters will rapidly proceed thither, passing through Raleigh, Columbia, and Augusta. as well as at Wilmington and Charleston. Express mails will be put down; and as soon as others, equally interested, choose to act, no more horses will be killed in carrying presidential messages at extra sessions. Here will be a difficulty, and indeed a difficulty. However, it will be removed when responsible engineers shall attend to their own business, and do not permit their journeymen, and perhaps journeymen looking forward to an interest in the contract to be made on the ground they pointed out, to run roads through morasses; and at an expense *per mile*, equal altogether to the fee simple value of the farms through which they pass; roads which, if laid out in a circuitous way, would not only, 1st. have been better sited; 2d. would have increased the value of land that required it; 3. would have not only furnished a market for wood, but wood for a market, where in winter it is sold for from \$4 50 to \$7 00 per cord; 4. would, perhaps, have partially rendered the road useful and usable to two, instead of one section of country; for, as you observe, "to adopt the route which will command the most transportation, and yield the most profitable dividends, is a consideration of still more importance than choosing the best (shortest) and most practicable route for a railway;" 5. would not have cost a dollar more—perhaps not as much. Dr. Howard pointed out one of 156 miles for the Charleston and Hamburg railroad. The company, under would-be-wiser advice, ran a straight line of 136. It spent double the money that was necessary, and has now to pay for embankment, as much or more than the whole of his route would have originally cost.

As to any partiality you are charged to have shown to the Petersburg road, you may refer for your exculpation to "Smeaton," at page 622 of Vol. II, of the Register, where the conduct of the Richmond and Petersburg delegations in the house of delegates was discussed, and their opposition to the Portsmouth and Roanoke road condemned. Have not both succeeded, admirably succeeded? The animadversion on their "*powerful scrutiny—their searching sagacity*"—was intended to be severe. But, I fear, "my lords of Norfolk" do not superabound with that liberality of courteousness they expect to receive, and indeed do receive from others. G. L. C.

NOTES.

Note A.—By what route? Why cannot the Eastern Shore railroad be so run as to serve Philadelphia and Tangier? The maps do not show on which side the Breakwater is constructing, and I forget the position.

Note B.—The fact is, that Richmond, Washington, and Baltimore are avoided as much as possible on account of their expense. Philadelphia is not a cheap, but it is a comfortable place. There are two cheap villages in its vicinity. The great object is to reach Philadelphia, &c., &c. There they can see the world, and thence they take their departure; "to various ways they run, &c." The same reasons take so many passengers direct from Charleston to New York. But a railroad into the mountains of Virginia would produce the same effect. Well would it be, if that and more were attempted. New York borrowed \$7,000,000 for her canal. In 20 years her productive public property was increased from \$2,193,617 to \$22,157,142. The revenue from \$419,907 to \$1,413,846. On public buildings \$500,000 were expended. The school and literature funds were doubled. The state tax discontinued; the people relieved from taxation. How terrible then are the effects of the national debt?

SUBTERRANEAN TRAVELLING.

The line of railway between Lyons and St. Etienne, the largest manufacturing town and the richest coal district in France, is only 34 miles in length; yet, such is the unevenness of the country, and so great has been the anxiety of the engineers to preserve as complete a level as possible, that there are actually no less than *twenty tunnels* between the two termini. One of these is a mile in length, while another, which is half a mile long, is carried under the bed of a river which crosses the line.—*Mechanics' Magazine.*

GEOLOGICAL ORIGIN AND FORMATION OF SOIL.

Extract from Dr. C. T. Jackson's Geological Survey of part of Maine.

Every attentive person must have observed, that solid rocks, exposed to the combined action of air, water, and different degrees of temperature, undergo decomposition and disintegration, so that they crumble into powder, and that some rocks decay more rapidly than others, owing to their structure, or mineralogical composition. If a rock is porous, or stratified in its structure, water infiltrates into it, and on freezing, expands with such power as to tear the surface of the rock to pieces, so that it readily crumbles. When fire runs through the forests, it heats the surface of the rocks, and by the irregular expansion produced, they are shivered into fragments.

The action of running water and friction of stones, also serve to grind the rocks into powder, by attrition of their surfaces, and the detritus is borne along by the streams, and deposited in low lands, or along their borders.

When a rock contains iron pyrites, or sulphuret of iron, that mineral, by the action of air and water, decomposes, and forms copperas, or sulphate of iron, and the sulphuric acid of that substance acts powerfully on some of the ingredients of the rock, and causes its rapid decomposition. Any person, who has been on Iron Mine Hill, in Gardiner, will fully understand how rapid is this operation, and may there see its results. The oxidizing power of the atmosphere, also, acts powerfully upon the surface of those rocks, which have for one of their components, the prot-oxides of the metals, iron and manganese, and as those oxides take up another portion of oxygen, they increase in bulk, become brown or black, and the stone falls into fragments.

These are a few of the causes now in action, which modify the solid crust of the globe, and it appears that their effects are far more important, than we might at first imagine. Whoever looks upon the muddy waters of the Mississippi, Ganges, Po, the Rhine, and the Rhone, or reads the calculations respecting the enormous quantity of matter brought down from the mountains by those rivers, will at once appreciate the modifying influence of those causes which are continually wearing down the solid matter that forms the mass of our mountains.

Geology teaches us, that such causes were formerly in more powerful operation, and that the ancient world was, from its infancy, subject to violent catastrophes accompanied by powerful inroads of the sea; oceanic currents and tumultuous waves having for many successive periods rushed over the land, and beaten the loftiest crags of the highest mountains. We should then naturally expect, that the earth would present ample testimony of the action of these powerful causes of disintegration of the rocks, and we do observe that a large portion of the loose materials upon the surface, bears proofs of aqueous action and mechanical abrasion. By those ancient convulsions, the detritus of the solid rocks was prepared, and forming the various soils, which we observe, the earth was rendered capable of yielding its rich stores of vegetation, on which a large proportion of the animated creatures depend for their food. From the foundation of the everlasting hills, the Creator began to prepare the world for the habitation of his noblest creature, man, and converted a portion of the solid rocks into soils, which were given as the field of human labor, and to the progenitor of our race it was commanded that he should till the soil.

If we take up a handful of earth, and examine it attentively, we shall readily discover such mineral ingredients, as denote the rocks from which it originated. Thus we discover in a soil numerous spangles of mica, grains of quartz, and white or brown earthy looking particles, which are felspar; besides which, we remark a considerable portion of fine brown powder, which being examined with a microscope is found to be composed of the same minerals, more finely pulverised, and mixed with the brown oxide of iron. It will be at once understood, that such a soil arises from the disintegration and decomposition of granite rocks, and that the oxide of iron was derived from the pyrites, or the prot-oxide of iron, contained in that rock.

A soil arising from the decomposition of gneiss, possesses similar characters, only the mica is more abundant.

Soils from mica slate are made up of a large proportion of mica, mixed with grains of quartz.

Sienite, and hornblende rock produce a dark brown soil, in which there is but little quartz, and a great deal of felspar, and decomposed hornblende.

Greenstone trap rocks form, by their decomposition, a brown soil, which contains pieces of the undecomposed rock, but the component minerals in the soil itself, are rarely so distinct as to be discoverable. This soil is a warm kind of loam, soft and spongy, easily compressed into smaller dimensions by the pressure of the hand, but not adhesive like clay. It is peculiarly adapted to the growth of potatoes. and is a luxuriant soil for most of our ordinary produce.

Slate-rocks form a soil of a blue color, in which numerous undecomposed fragments of the rock may be discovered. When transported by water, it is deposited in the state of tough blue clay.

Limestone forms various colored soils, according to the nature of the impurities it contains. They are generally of a light yellowish brown color, from admixture of a certain proportion of oxide of iron. This is especially the case with those soils derived from the argillo-ferruginous limestone.

Calcareous soils, if they are rich in carbonate of lime, may be distinguished by their effervescence with acids, and the quantity of this substance may be estimated by the loss of weight which indicates the proportion of carbonic acid, that has been expelled, and since the carbonic acid always occurs in the ratio of nearly 44 per cent. to 56 per cent. of lime, it is easy, by a proportional calculation, to ascertain the quantity of that mineral in the soil.

It more frequently happens, that there is so minute a quantity of carbonate of lime in the soil, as to require a minute chemical analysis for its detection, and few farmers have either leisure or means for such an operation. Examples of such analyses will be presently laid before you.

Talcose slate rocks, when decomposed, form a light brown soil, in which particles of the rock are discoverable, and, on analysis, a considerable quantity of the silicate of magnesia is found, which is one of the chief components of talc.

Red sandstone, on disintegration, forms soil composed almost entirely of grains of quartz, with oxide of iron, and clay, with a few spangles of undecomposed mica.

Grau-wacke, or conglomerate, when disintegrated, produces a light gray soil, full of smooth rounded pebbles, which originate from the undecomposed components of the rock.

Red porphyry is very slow of decomposition, and forms a bright red fine powder, filled with angular fragments of the rock.

I have thus distinguished and described the appearances which characterize those soils that arise immediately from the decay of solid rocks, and various characteristic specimens of each variety may be seen in the cabinet arranged for the use of the state.

Let us next consider how soils are distributed on the earth's surface, and see how their qualities depend upon their situation.

In various sections of this report may be seen recorded the proofs of diluvial transportation of rocks, far from their parent beds, and we have every reason to believe, that this removal was effected by a tremendous current of water, that swept over the state from the north 15° west, to the south 15° east, and we have adduced in testimony, that such was the direction of that current, numerous grooves, furrows, or scratches upon the surface of the solid rocks, in place, and have shown conclusively, that the rocks which we find thus transported, proved to be portions of ledges situated to the north of the localities where their scattered fragments are found.

It is a matter of surprise, that such enormous masses of rock should have been moved so far by an aqueous current; but, when it is remembered, that a rock does not weigh but half so much when immersed in water, as it does when weighed in air, owing to the support given it by the water around; and when we reflect on the fact, that a rock is still more powerfully supported under the pressure of deep water, it may be conceived, that, if a flood of water did once rush over the land, it might have removed large and weighty masses of rock, such as we find to have been the case.

From the observations made upon Mount Ktaadn, it is proved, that the current did rush over the summit of that lofty mountain, and consequently, the diluvial waters rose to the height of more than 5000 feet. Hence we are enabled to prove, that the ancient ocean, which rushed over the surface of the state, was at least a mile in depth, and its transporting power must have been greatly increased by its enormous pressure.

It will be readily conceived, that if solid rocks were moved from their native beds, and carried forward several miles, the finer particles of soil should have been transported to a still greater distance, so we find that the whole mass of loose materials on the surface has been removed southwardly, and the soil resting upon the surface of rocks, in place, is rarely, if ever, such as results from the decomposition of those rocks, but was evidently derived from those ledges which occur to the northward.

If an attentive observer examines the soil in the city of Portland, he will discover, at once, that it is made up from the detritus of granite and gneiss rocks, while the ledges in that city are wholly composed of the argillaceous, talcose, and mica slate-rocks, and granite and gneiss occur in great abundance to the northward.

All the markings on the surface of the rocks, and the scattered boulders of granite and gneiss, which abound in that soil, indicate its origin to have been in the north 15° or 20° west. I merely quote the above locality, on account of its being a spot where most persons will have occasion to examine the facts stated. The various sections of the state present ample illustration of the same fact, and every one who will take the trouble, may convince himself of its reality.

The tertiary deposits of clay, sand and marine shells, were evidently produced in tranquil water, since their strata indicate, by their situation, structure and beds of shells, that the clay was gradually and slowly deposited, allowing time for the propagation and growth of the various shell fish in its several layers. Not so was the diluvial matter deposited, for we find it to bear marks of sudden and violent transportation and deposition, the various pebbles, boulders and erratic blocks of stone being mixed in great confusion. I have formerly mentioned a locality, in Bangor, near the court-house, where, it would seem, there are proofs of a gradual subsidence of the diluvial current, the various particles becoming smaller, as we ascend the embankment, until we come to fine clay, which must have subsided from tranquil water.

We observe, then, that the tertiary deposits were cut through by the diluvial waters, which have excavated deep valleys, and heaped up long ridges called horse-backs, and the general direction of these valleys and ridges, coincides with the direction formerly indicated, as the course in which the current swept.

Although we are informed in the scriptures, that the deluge was ordained for the punishment of wicked men, it is certain, that there was mercy mingled with this dispensation, for the soils were comminuted, transported, and mixed in such a manner, that their qualities were improved, and rendered more suitable for the growth of plants, so that new and more fertile soils were prepared for coming generations, who literally *reap* advantage from the deluge.

Besides the ancient aqueous current, we see every day the action of water modifying the surface of the globe, transporting fine particles from the mountain-side, and depositing them in the valleys and along the margin of running streams. Especially during freshets, when the rivers burst their narrow confines, and spread out over the intervales, do we see rich deposits formed of *alluvial soil.*

Such currents, arising amid decomposing vegetable matters, transport an infinity of fine particles of such matter, and deposit it with the various earthy ingredients, which form our richest meadows, and luxuriant intervale soils. Thus are formed many of those bottom lands, which occur along the river-courses of the western states, and the banks of rivers in Maine, under similar circumstances, are found to be composed of like soils.

A river, coursing its way amid various rocks, carries down and deposits fine particles of every kind, which it meets with in its way.

If the rocks above are limestone, we shall have calcareous soil brought down and deposited by the river. So on the banks of the Aroostook, we find a rich alluvial soil, equalling in fertility the famed regions of the western states, and capable, even under a less genial clime, of producing crops of wheat and other grain, fully equal in abundance with any soils of which we have any records.

From the Genesee Farmer.

ROOTS VERSUS HAY.

We take the following from a report made to the Massachusetts Agricultural Society, by the Messrs. Colts of Pitsfield, Berkshire Co., and we do it to show the immense advantage made in substituting roots for hay in feeding cattle, as well as in the quantity of ground necessary to produce a given quantity of food.

The writer says—"My stock now consists of 1000 sheep, 8 young oxen, 6 cows, a pair of horses, and a single horse. I have raised this season for the use of my stock 5544 bushels of vegetables, and all to be grated and fed out with cut straw, the cattle constantly, the sheep one feed a day, which seems to be a necessary food in our long cold winters: it keeps them in health and also in flesh. As to the respective value of the vegetable food, the following statement will perhaps best exhibit it. I have commenced feeding and shall continue to feed,—

14 head of horned cattle with 20 lbs. of cut straw each per day, 4 cents for each 20 lbs., 56 cents. Also to each, 113 lbs. of roots grated, mixed with straw, 3 cents, 42 cents. And now allow 150 days for the season of feeding at 98 cents, is $147,00. The same stock would require 20 lbs. of hay each per day for 150 days; they would consume 42,000 lbs. equal to 21 tons; at the moderate price of $10 per ton $210,00. Balance in favor of root feed $63, and I am sure the stock will appear far better at the opening of the spring.

You will perceive that the respective value of vegetables for food is six cents a bushel, while hay is at ten, and straw at four. It may be said that there is some cost in preparing food; but this is more than compensated if properly done by the extra quantities of manure made."

Thus it appears that 20 lbs. of straw and 8 lbs. of roots mixed, afford more nutriment, and of course are more valuable than 20 lbs. of good hay, while the actual cost is much less. Fourteen or fifteen tons of roots are a moderate crop per acre, while the average of hay will fall considerably below two tons to the acre. The advantage in favor of the turnip is thus perfectly apparent, and the farmer who persists in mowing his twenty or forty acres, and keeping his stock on hay, when five or six of these same acres would furnish roots sufficient if mixed with the straw which might be grown on the remainder, to keep his animals far better than the hay, and leave the grain crop nearly as a clear profit, is clearly acting against his true interests. Again, we say to our farmers, you did well last year by so extensively entering upon the culture of roots; you will do better this year by greatly extending their cultivation.

From the Maine Farmer.

ACCOUNT CURRENT WITH A PIG.

Mr. Holmes;—I write that farmers and pork raisers may learn whether it is profitable to go largely into the business in this state or not. I have to this end opened an account current with a pig, for which I gave on the first of October at a month old, $1,50

Kept it until it was 16 months old, and then slaughtered it. 14 months of which time I kept it on raw and boiled potatoes—allowing it a peck a day; soon after weaning it did not need that amount—but it had milk or something as expensive; which results in his consuming, in the 14 months, 105 bushels—at 20 cents the bushel, amounts to 21,00

The month on its dam, and 14 months on potatoes, as above, brings it to 15 months old: the other month (for it was not slaughtered until 16 months old,) I kept him on Barley meal, at 67 cents the bushel, and it eat a half peck per day—which amounts, for the last month to 2,40

Tax 30

I charge nothing for attendance, risk, &c., being more than paid in offal and manure.

25,20

When slaughtered, it weighed three hundred pounds, which, at 8 cents the pound, brought me $24,00

Loss, 1,20

But if potatoes cost only ten cents per bushel, (which, in fact, is all they cost in raising,) then deduct from my charges against it 10,50

Making the profit $14,70.

Twelve such would give a profit of $176,40—a pretty item—and plenty of manure.

Some may suppose the pig was not so expensive as I have made it—that it would not eat a peck of potatoes a day, &c. &c If potatoes are worth more than I have put them at, pork should be too. I write, hoping to hear from others. No doubt September pigs are most profitable—they eat much less than earlier ones in winter; whereas early pigs eat, the first summer, what the later ones should have,—and on new year's day, when the September pigs are 16 months old, there will be very little difference in their size, if the late ones are kept warm the first winter. Some have supposed an early spring pig on the whole most profitable to kill on the first of January following; respecting which, I hope some farmer will communicate his views through the Maine Farmer.

Pen and Ink.

THE COMMERCIAL CONVENTION OF VIRGINIA.

In pursuance of the action and recommendation of the Commercial Convention held at Augusta, Ga., and the invitation and appointment made by the people of Norfolk, a convention of delegates, from various parts of Virginia, was held at Richmond, on the 13th inst., which adjourned on the 16th. There were more than 100 delegates present, and a large proportion of them from the country, and some from remote parts of the state. From the zeal displayed in the assembling and the debates of this body, and the newly excited and growing anxiety among the people in general for improving the present condition, and changing the course, of the foreign trade of Virginia, highly valuable results may be anticipated, even though the *direct* action of this convention may be of small importance. In fact, no practical measure for relief, or particular action, has been agreed on, to forward the great end in view, save the recommendation of an increase of banking capital. But even if the direct action were still less, the indirect operation of this and future conventions cannot fail to be most important and beneficial. What is now required, is to fan the patriotic excitement which has been kindled—to arouse every Virginian, and every Southron, both of town and country, to the evils that the south labors under—and the necessity, and the ready means offered by combined and proper action, for entire and permanent relief. Another convention is invited by a resolution of this meeting, to be held in Norfolk, on the 2d Wednesday in November. It is hoped that every Virginian who earnestly desires to place his country in her proper condition of commercial independence and prosperity, will lend his aid to the forming, and the proper and practical action of that meeting. The place of meeting—the noblest natural sea-port of the south, and the proper site for a great commercial entrepot, and a rich and populous city—will help much to show the advantages of Norfolk as a point for concentrating the foreign trade of Virginia, and to allay the petty jealousies of trade, which would divide, scatter, and thereby certainly destroy, the business and prosperity of the foreign trade of Virginia. We ardently hope that Richmond, Petersburg, and Fredericksburg will all enter separately and largely upon the direct import trade; but as ships can go to the wharves of neither of these towns, it will be decidedly better for their separate and particular interests, and still more so for the general interest of the commonwealth, that Norfolk should be the single point at which all ships bringing foreign goods shall meet, and thence distribute their cargoes to the various importers. The disadvantage of the small increased distance thus given to the passage of cargoes designed for other towns, would be scarcely worth notice, compared to the great advantages of all ships in the foreign trade being concentrated in the most convenient harbor, and where every article of supply, and facility for repairs and accommodation for ships, is ready, and will rapidly increase with the new demand. The jealousies and mistaken rivalships between the traders of the different towns of Virginia, have operated to counteract this proper condition of trade; and, in the pitiful contest, the interests of every party and every town has suffered. Let us, of other towns, concur heartily in permitting and aiding Norfolk to enjoy all her great natural advantages as a sea-port; and every other particular interest, and every portion, of this great state will profit by the prosperity of Norfolk, and the building up there the great sea-port and entrepot of southern trade.

We did not design to offer any thing more, at this time, than merely the results, and the principal report and resolution of the Convention—and even for this, we scarcely have space. Two important reports, one on the state of commerce, and the other, on that of the manufactures of Virginia, are yet to be prepared by different committees, and to be published hereafter; and these papers cannot fail to furnish much valuable information, and important aid to the great objects of the convention. These reports, or extracts from them, we hope will furnish appropriate matter to lay before the readers of the Farmers' Register.

Extracts from the proceedings of the Commercial Convention.

"Mr. Macfarland, (of Richmond,) from the Committee on Commerce, submitted the following report.

"The committee to whom it was referred by the Convention, to inquire into and report, whether the merchants of Virginia can import goods from foreign countries, on as good terms as the merchants of any of our sister states; and secondly, how the foreign trade of Virginia is affected by the want of capital, and in what manner the inconvenience under which it labors may be remedied—submit the following report:

"That the time allowed the committee for the consideration of a subject so comprehensive and interesting as the foreign commerce of the state, has been altogether too limited to enable it to perform its duty in a manner satisfactory to itself. There was not time for many inquiries which belong to such an investigation. The causes that have operated unfavorably to southern commerce, and denied to it the relative importance which was to have been expected from the enterprise and abundant elements of foreign trade of the south, could not be explored in a few hours of hurried consultation. The question especially addressed to the committee, and to which it has been under the necessity of confining its attention, has respect to the capacity of Virginia to maintain a foreign import trade. And if it shall appear not only that we can maintain such a trade, but are possessed of advantages which would enable us to enter into successful competition for it, the inquiry, how we may recover that trade, is the one immediately affecting the interests and business of the state.

"The question propounded in the resolution, namely, whether the merchants of Virginia can import from foreign countries on as good terms as the merchants of any of our sister states, may be answered confidently in the affirmative. They can so import. The markets of foreign countries, and the agency by which foregn traffic is performed, are as freely opened to Virginia capital and enterprise as to any other. From no part of our country can the operation of purchasing abroad, and of bringing home, be performed with more despatch, or at cheaper rates. This being conceded, as from the obvious nature of the proposition it must be, the question arises, whether it is the interest and policy of the state to foster and encourage a direct foreign import trade.

"Pursuing this inquiry, it is, in the first place, to be remarked, that Virginia has a large export trade—large when compared with the aggregate export of all the states. Her exports for three years ending with December, 1837, averaged $5,265,461. This, of course, gave her that amount of foreign capital, ready to be employed in whatsoever mode that was profitable. Yet, whilst she had it in her power, through the medium of her exports, to obtain directly, and at a reduced cost, the foreign productions demanded by her consumption, the course of trade hitherto has been to obtain those productions in northern cities; thereby receiving them through a circuitous channel, and at an enhanced cost. The average import for the period just referred to, has been less than one-seventh of her exports; and assuming that the difference between those two amounts has been expended in procuring at the north those foreign supplies, which her exports would have enabled her to procure directly from abroad, and assuming further, that the augmented cost of the former operation is equal to fifteen per centum, and we detect an annual loss of about $700,000 incurred by the state from her neglect of the import trade. But that sum is far below the actual annual loss; for fifteen per centum is an under estimate of the addition to the charges upon the foreign supplies coming through the indirect channel referred to, and the sum assumed to be invested in those supplies, is below the actual amount. The loss to the consumer of foreign supplies, so obtained, is equal at least to fifteen per cent. upon the amount of his purchases.

"Now, if any thing be needed to rouse the citizens of our state from the supineness which could overlook so enormous a tax upon its industry and resources, or reconcile them to it, it would seem to be the consideration, that it is with their own sterling money the importation is made, which they submit to receive at second hand at so ruinous a sacrifice. Again; the tonnage which is employed in carrying on the export commerce of the state would be more than adequate to the importation of all the foreign supplies demanded by our whole consumption. But, through the neglect of the import trade, the important advantages resulting from the employment of that tonnage have been lost to the state, and appropriated by those who have had the sagacity and enterprise to enlist it in their service. The amount of which loss is not to be estimated simply by the sacrifice of the benefits which would accrue to us, from the employment therein of domestic capital and labor, but by the sacrifice in addition of the associated trades and occupations that always attend upon the successful prosecution of any one important branch of business.

"Finally—for your committee must be content to suggest some of the prominent, rather than attempt to develop the numerous reasons which commend the import trade to the favor and patronage of our state—another, and not the least, consideration why a vigorous and persevering effort should be made to secure it, is, that it will have the effect of recovering the state from that dependence on northern markets, which has exposed us to suffer by their vicissitudes, without any direct participation in their prosperity.

"Upon the first view of the subject, the causes of the disparity between the amount of our export and import commerce, may not suggest themselves to inquirers generally. The former being large, as we have seen, involving all the facilities which are needed for making purchases abroad; the tonnage which carried out our staples being at hand to be employed in bringing in the productions for which it is to be exchanged; and the simple operation of barter being the natural and cheap mode of effecting that exchange, why is it that, at great pecuniary loss, our people rely upon others for productions that they could procure better by themselves? To answer this question fully, would lead the committee into an investigation, which they have not time to pursue. But among the most prominent causes that may be assigned, the capital required by the import trade, being greatly more than the capital necessary for the export [trade,] may be instanced as not the least influential. The export merchant, through the system of advances that universally prevails, has a large proportion of the capital employed in his purchases speedily restored to him, through the medium of a sterling bill which he is permitted to draw upon his consignee. The like rapidity of purchase and return is not enjoyed by the import merchant. He is exposed to the more tardy process of effecting a sale; and that sale is upon time. It is manifest, therefore, that the amount of capital requisite for the successful prosecution of the latter description of commerce is greatly beyond the capital which will suffice for the former. This consideration, in a great degree, accounts for the comparative languishing condition of the import trade, and the reluctance of our merchants to engage in it. The capital of few, comparatively, is adequate to its burthen; and the exigency resulting therefrom has not hitherto been met and provided for by the granting of those banking facilities, which a timely and earnest appeal to our legislature would doubtless have obtained. And this brings the committee to the consideration of the second resolution.

"It is the opinion of your committee, than an increase of banking facilities, so that the important interest which they now seek to recommend to general and spirited support, would readily obtain the accommodation of which it stands in need; accompanied by a patriotic determination of all classes of our citizens to support a course of domestic industry so auspicious to private and state wealth, comfort, and independence, and accompanied also by a judicious system of internal improvements, so that every section of our extended territory may be accommodated, and their rich resources developed, would secure to our state an extent of foreign commerce that would be the source of untold benefits to all classes of our people, and of power and consideration to our commonwealth."

Mr. Ruffin (of Petersburg) offered the following substitute for so much of the report as recommends the increase of banking capital.

"The desired change of the course of trade may be still more aided and secured by the action of the state government, which can be so powerfully wielded, according to the direction given, either for the benefit or the prostration of the best interests of the commonwealth. This may be done in various modes; but only one will be here specified, and recommended, as being the most obvious, and the most intimately connected with the practical operations of trade. This is, to increase the banking capital of Virginia to the amount required for the trade and business of the state, and at the same time to reform the system of banking, so as to guard as much as possible against the strong tendency of all such institutions to sacrifice the general interest of the country whenever the separate banking and stockholding interest can be thereby benefited. The reformation of banking operations is required at least as much as their extension; and both ought to be carried through together. Heretofore, Virginia has suffered her full share of the great evils of the general banking policy and operations of all the states, and has profited by but few of the advantages which a full participation in the direction of the operations would have secured to us, as they have, and in a great degree at our expense and loss, secured to the northern states. It is highly expedient that Virginia should enjoy more of the benefits of the banking system, and be better secured from its dangers and evils. Our state policy heretofore has been to refuse the good belonging to, or to be drawn from banking, and to receive, and submit to its worst evils, inflicted by the hands of others over whom we had no control, and whose gain was our loss."

This amendment was rejected, ayes 21, noes 60; and the report was then adopted, together with the following resolution.

"*Resolved*, That a vigorous and persevering effort be made to build up and sustain a large and increasing foreign import trade—that a committee of merchants be appointed, to sit after the adjournment of the Convention, to prepare an address to our fellow-citizens, unfolding the importance of such a trade, and the ready capacity of Virginia to obtain it—stating the support the trade will derive from an increase of banking facilities, under such restrictions and modifications as the wisdom of the legislature may devise, and from an addition to the banking capital, if the addition authorized by the existing laws shall be found, after a sufficient trial, to be inadequate to sustain and support the various interests of the commonwealth—and stating the aid the trade will derive from a judicious system of internal improvements; and that the legislature be respectfully requested to meet the advances of any neighboring state, who may have enacted laws to transport her products and merchandise into Virginia."

SHEEP GRAZING AMONG GROWING CORN.

To the Editor of the Farmers' Register.

Baltimore, June 20, 1838.

A few days since, I took a ride into the country with a friend, and, on passing a farm about twelve miles from the city, we observed a *flock of sheep quietly feeding in a corn-field.* The corn was about a foot high. Supposing we should be doing the owner a service, we took speedy occasion of informing him of it. He laughed, and said they would not hurt the corn; that the sheep were purposely kept in the field for the purpose of keeping down the blue grass, &c. On further conversation, he informed us that sheep will never touch the green or growing corn plant; that they must be very hungry if they do, &c. Having seen the sheep in his corn, and observed his undisturbed manner on being informed of the fact, I could not, of course, doubt the correctness of his theory; but I had never before known the fact, and thought there must be many others equally ignorant. If sheep will not only not injure the corn, but contribute to its culture by destroying the grass, and especially blue grass, I suppose it would be a great object with all corn-planters to have large flocks of them. I have mentioned the circumstance to several persons, who promise to try their sheep in their corn-fields. Pray, sir, is this old or new to you? If the former, say nothing about it; if the latter, let your readers have it.

GIDEON B. SMITH.

JAUFFRET'S NEW MANURE.

The conductor of the Gardener's Magazine speaks, in the May No., as follows of Jauffret's new manure, of which several notices have been lately published in the Farmers' Register.

"We have obtained satisfactory information from Paris respecting Jauffret's manure, and have also examined a heap of it prepared under the direction of M. Lozivy, at Durnsfield Lodge, near Wandsworth. The secret composition is given in detail in the *Repertory of Patent Inventions*, No. 51, p. 166; and we shall give it, with our opinion on the subject, and the facts on which that opinion is formed, in our next Number."

SINGULAR DISCOVERY OF A SUBTERRANEAN RIVER.

A singular discovery was made in Blaen-y-nant lead mines, near Mold, Flintshire, a few days ago. The workmen at the end of one of the levels were surprised, and obliged to run for their lives, in consequence of an immense rush of water suddenly bursting in upon them. After three days the water totally disappeared; and, on cautiously proceeding to the place, they found an opening of about four inches diameter, through which the water had issued. Hearing a sound as of a heavy run of water inside, they enlarged the aperture so as to admit of their passing through, and found that it was the bed of a subterraneous river, which in all probability affords the principal supply to the far-famed St. Winifred's Well, at Holywell, from which it is distant about twelve miles. The stream being then shallow, they explored it about sixty yards down, and were astonished to find several large caverns to the right and left, from the roofs and sides of which were suspended numerous and beautiful specimens of white spar or stalactites. The company are in high spirits, these appearances being considered favorable for a large lodgment of ore.—*Shrewsbury Chronicle.*

From the Southern Agriculturist.

OF THE SUCKERS ON CORN.

Fonthill, May 2, 1838.

Dear Sir—I made a trial last summer of retaining the suckers on a part of my corn, which was sufficient to convince me, that nothing is gained by taking them away. From some cause last season, I saw more suckers shooting out from the roots of my manured corn, than I think I had observed before; and at the request of a gentleman, (to whom I had shown them, with the remark that I did not think that nature would, in relieving itself, do a substantial injury to any plant,) I preserved them, and watched their progress to maturity. They grew along with the parent stalks, (and becoming more and more detached as the season advanced, and as they acquired support from the roots which they sent out,) tasselled at the same time, and a great many, though not all, bore ears, at the proper places. And I have satisfied myself, at least, from the experiment, that by leaving the suckers, I made as much corn —certainly much more fodder—and saved the labor, in a busy season, of taking them away.

COTTON.

From the Southern Agriculturist.

ON FEEDING HORSES ON PEASE, TO SAVE BLADES.

May 10*th*, 1838.

Mr. Editor—Agreeably to my promise, you will find below a piece on feeding horses on pease, to save blades. In 1836, I believed that I had not made as many blades, as I thought would serve my horses the year; and I had a fine crop of pease. I fed my horses on pease in the haums at night, and at 12 o'clock, and in the morning, on corn. I gave each horse half a bushel of pease in the haums. My horses got fat on them, and they did a great deal of work all the time. This piece may benefit the up-country planter, more than the down-country planter, as they have the advantage of marsh, that they can use by the first of May. But if the up-country planter's blades happen to give out by April, he has nothing that he can feed on in place of the blades, but oats, and they do not come in until the middle of June. I have been pursuing the same course with my horses this winter, though I had a plenty of blades, and I intend to continue to do it as long as I am a planter.

Hoping this may benefit some planters, I am yours, respectfully,

COLLETON.

From the Genesee Farmer.

PRUNING TREES.

A most injudicious system with regard to pruning trees appears to have been adopted by many of our farmers. A tree is neglected until it is comparatively old, and the top a dense mass of brush rather than properly directed branches, and then is attacked by the farmer with axe and saw, and nearly all the top cut off at a single operation. In the first place trees ought never to be left so long without pruning, where it is ever to be expected or required. The pruning should be made annually, and keep pace with their growth. In this way such ruinous loppings off of wood will be prevented, and the injuries that result from such a course be avoided.

When a fruit tree has grown with a thick bushy top, the bark of the central branches is tender, and when suddenly exposed to cold winds or hot sun, the effect cannot be otherwise than prejudicial. If the pruning is performed gradually, or annually, the bark is alike adapted to resist the influence of the seasons, and is not apt to become thick and tight, or tender and cracked. Perhaps the peach suffers more from injudicious pruning than almost any other tree; and where any considerable part of the top is cut off at once, it is most usually fatal. A mode which has been adopted to a considerable extent in the peach growing districts of New Jersey obviates in a great measure this difficulty, and also another serious one, the danger of the branches breaking when heavily laden with fruit. After the tree is planted where it is to grow, it is allowed to stand till it becomes well rooted, when it is cut off near the ground. Sprouts immediately spring up around the root, and of these five or six of the best situated ones are selected to remain, and the rest are carefully eradicated. These shoots are either budded, or suffered to grow up the natural fruit, according to the pleasure of the proprietor. The advantages derived from this course are these: these offshoots spread more laterally than would branches from a single trunk, and of course the sun acts upon every part of the branches more fully; and when they are loaded with fruit, they will fall to the ground in every direction, rendering the gathering of the fruit easy, and preventing the breaking down of the tree.

The experience of the best fruit-growers of the country, as well as the deductions of philosophy, would seem to point out the summer as the most suitable time to prune trees, as the material for covering the wounds is already elaborated, and will be immediately applied by the remaining branches. Professed nurserymen are more careful in this respect than the common farmer; pruning is by them carried on upon more of a system, and hence trees managed by them rarely are called to undergo such amputations of the top, as those where less attention is given them, and perhaps no pruning attempted. Much of the excellence of fruit, and the productiveness of the tree is dependent on pruning, and by commencing early, and following up a system carefully, such a shape may be given to the crown, and such a direction to the main branches, as most effectually to secure the advantages of sun and air.

From the Genesee Farmer.

BREEDING IN AND IN.

The judicious breeder will not too long confine himself to his own stock, unless it be very large. The breeding from too close affinities—the breeding *in and in* as it is called, though it has many advantages, to a certain extent, in the hands of most skilful and judicious breeders; though it may be pursued until the excellent form and quality of a breed is developed and established, and was the source whence sprung the superior cattle and sheep of Bakewell, and to some extent of the superior short horns of Mr. Colling; yet, to it also must be traced the speedy degeneracy—the absolute disappearance of the New Leicester cattle, and, in the hands of many an agriculturist, the impairment of the constitution of the New Leicester sheep.

Bakewell was a master spirit in breeding, and it cannot be denied, produced a breed of cattle worthy the efforts of such a skilful agriculturist. The principle on which he seemed to act was novel, bold, and for a time a successful one. Some of his cattle were extraordinary illustrations of the harmlessness of such a system, but he had a large stock on which to work, a veil of mystery was thrown over the most of his proceedings, and no one knew his occasional deviations from this rule, nor his skilful interposition of remoter affinities, when he saw, or apprehended danger.

But what has now become of the New Leicester or Bakewell cattle? where are they to be found? It was a bold and successful experiment, and seemed for a while to answer the most sanguine expectations of that skilful and spirited breeder.

In districts, in which experiments were carried on, it established a breed of cattle equalled by few; and it enabled the long horns to contend, and often successfully, with the heaviest and best of the middle horns. But no sooner had the master spirits of the day disappeared, than the character of the breed began imperceptibly to change. It had acquired a delicacy of constitution inconsistent with common management and keep; and it began slowly but undeniably to deteriorate. Many of them had been bred to a degree of refinement, that the propagation of the species was not always certain. The breed itself gradually diminished, in some places it almost disappeared. The reader may scarcely give credit to the assertion, but it is strictly true, that in 1833 there was not a single improved Leicester on the Dishley farm; nor a dozen within the circuit of as many miles. It would seem as if some strange convulsion of nature, or some murderous pestilence, had suddenly swept away the whole of this valuable breed.

The above remarks are in substance taken from that valuable treatise on British cattle, before alluded to. In Kentucky, though the principle of breeding *in and in* has met with general disapprobation, yet, it has been more or less practised by many breeders. To one of whom allusion will be made, not from unkindness, but merely for example, for he, like Mr. Bakewell of England, is a monument to illustrate the propriety of the practice. This breeder, (now less notorious) had, several years since, one of the finest herds of milking and breeding blooded cattle in Kentucky, and deservedly had high reputation as a breeder. But vainly imagining that they were far superior to all others, proper crossing was neglected, the stock began to diminish in size; many of them became hornless; and their constitutions were impaired, in consequence of which they suffered more from cold, in winter, and were more liable to disease, in summer; the murrain soon got among them, and played such sad havoc in one short season, that at present, only a few venerable animals remain of that once superior but ill-fated herd.

With this short digression we will again quote our valuable author. "It has therefore become a kind of principle with the agriculturist to effect a change in his stock every second or third year; and that change is most conveniently effected by introducing a new bull. This bull should be as nearly as possible of the same sort; coming from a similar pasturage and climate; but possessing no relationship—or at most a very distant one—not related to the stock to which he is introduced. He should bring with him every good point which the breeder has labored hard to produce in his stock; and if possible some improvement; and especially where the old stock may have been somewhat deficient; and most certainly he should have no manifest defect of form, and that most essential of all qualifications, a hardy constitution, should not be wanting." R. W. S.

STATE OF THE WHEAT-CROP.

The present wheat-crop throughout Virginia, and other adjacent states so far as we have heard, is the best, in quantity and quality combined, that has grown for many years—if not the best that has ever been made. Some partial disasters, on particular farms, have been suffered, from chinch-bug, hessian fly, or rust; but nothing worth naming as affecting the general crop of Virginia. A more considerable cause of diminution will be found in the circumstance that there is less surface now under wheat than a few years ago; as the repeated losses and failures of wheat have caused almost every farmer to withdraw some portion of his field (the part promising the least product,) from wheat-culture, and substituting oats or rye. The crop is now so far advanced in lower Virginia, that it may be considered out of danger, except from continued wet weather during the time for harvest; by which cause we have known one crop (in 1821) nearly lost, after it was ripe enough to be reaped. The weather now (June 25th) is very favorable.

Harvest was begun on some of the most highly improved marled land on James river on the 18th inst., with purple-straw wheat—which was as early as (what is called) May wheat, elsewhere, was ready for the scythe. There has been a predominance of cold weather for the time of year, through the last 60 days, or more, and the growth and ripening of wheat were every where more backward than usual. If the crop should prove as abundant as we now expect, it will be a most important means of restoring the commercial prosperity of the United States, and especially of Virginia, which has latterly been so wofully eclipsed.

There is also a prospect of good prices for, as well as good products of wheat. For crops to be delivered before August, at landings on James river (tide water,) $1.50 per bushel is offered; and sales have been made on these terms, by most of those who expect to be able to effect so early a delivery. Afterwards, prices must be considerably lower, unless there should be a failure of the European crop, and a consequent great foreign demand; neither of which contingencies is at all probable at this time. According to these views, every farmer should endeavor to get his crop to market as early as possible.—Ed. Far. Reg.

June 23d.

From the Farmer's Cabinet.

SUMMER PRUNING OF TREES.

"Experience is the best teacher."

The right time for pruning trees is after the first running of the sap, from the middle of June to the first week in July. The reasons for it are—in the first place, when a tree is in full leaf you can better judge what branches to remove, than when it is leafless. In the next, the wound heals over more kindly and effectually after summer trimming, than after winter or spring pruning; and lastly, suckers are not so like to shoot out after midsummer trimming, as if it was performed in the spring of the year. The writer of this has performed the operation extensively on a large number of trees of various kinds, the last week in June, with the greatest success, and has never seen a tree, in the least degree, injured by it. The practice is now becoming general among those who have the most knowledge of the subject, and it is hoped that those who are timid at departing from an old custom, will make a trial of it this season, on a scale proportionate to their faith, and rest assured diappointment will not follow the experiment.

Pyrus.

From the Mining Journal.

FLINT IN WHEAT.

The scoundrels who burn wheatstacks in the country leave behind them some curious chemical results. "Swing" is a grand experimentalist. There are found in the embers, lumps of coarse glass, which are the result of the fusion of the silica, or flint, which wheat straw in particular is found to contain in very considerable quantities.

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ORIGINAL COMMUNICATIONS.

SELECTIONS.

ERRATA.

The following errata were caused by the illegible writing of the several pieces in which they occur:

No. 2, p. 78, col. 2, at end of 3d paragraph, for "*shown*," read "*slow.*"

No. 3, p. 164, col. 2, line 3 from bottom, for "*gents*," read "*goats.*"

No. 4, 202, col. 2, line 17 of editorial remarks, for "*extreme*," read "*extensive.*" This last error is corrected in part of the impression.

THE FARMERS' REGISTER.

VOL. VI. AUGUST 1, 1838. No. 5.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

From the New England Farmer.

LETTER FROM DR. D. STEBBINS, OF NORTHAMPTON, MASS., TO THE CONGRESSIONAL COMMITTEE ON AGRICULTURE.

Northampton, County of Hampshire, Mass., February 10, 1838.

I have received a communication from the committee on agriculture, dated Washington City, January 30, 1838, for answers to several interrogatories about the culture of the mulberry and sugar-beet. The committee must be aware that the silk-business of America is but in its infancy; yet, knowledge of the subject is constantly on the increase. Improvements are made from year to year, not only in the culture of the mulberry; but in the manufacture of the article of silk. Let it not, therefore, be thought wonderful, if it should be found necessary hereafter, to abandon our present opinion, practice of culture, and machinery used in the manufacture, for a better mode and more simple machinery, and so cheap as to take place of the domestic wheel, reel and loom. If, in either respect, any improvement can be made, Yankee perseverance and ingenuity will discover it.

The committee will please accept of the aid of Edward Church, Esq., of this place, who has long resided in France; and, while there, became very much interested in the subject of sugar from the beet; I presume that he possesses as much information on that subject, or even more, than almost any person in the United States, and have engaged him to reply to the subject of beet-sugar.

On the subject, or respecting the culture of the mulberry, it would afford me great pleasure to present the committee with an *infallible* mode of treatment, which would be applicable to every variety of climate, and the inconstancy of the weather for several years past. But so variable have been the seasons, that the successful mode of culture and protection of the tree during one year, has disappointed the cultivator the next year.

1. In reply to the first question : I began the examination of the mulberry business several years since; but did not commence the cultivation of the multicaulis until 1833, and ever since have carefully watched the progress.

2. Respecting *soil, situation* and *exposure;* I have found that our *poor, light, dry,* and even gravelly soil, is better adapted to the culture of the multicaulis, than our richest lands. The *location* or *situation,* should be high, or elevated above the danger of water collecting about the roots.

On such soils, although the trees would not attain the height of trees grown on rich land, yet the foliage would be more numerous; and the chance of having the trees ripen, or form hard wood for cuttings, and sustaining our winters, would be enhanced.

3. Respecting the *most valuable mulberry* for cultivation; its *capability* to endure the *cold* and *frost;* the *quantity* and *quality* of foliage; *labor* of culture, and *stripping.* These questions will be answered with reference to this climate; and will include not only my own observation and experience, but the experience of others of my acquaintance, in whose opinion I have the utmost confidence.

I commenced with the *Italian* white mulberry, and have used also the *black* and *red* mulberry; each of which requires good soil; no matter how rich. I found that, although the worms would feed well on these, yet they were equally fond of the multicaulis, which was selected for its large leaf, nutritious quality, and tender fibre, which the worms can eat, while the fibres or ribs of the white mulberry are so ligneous as not to be edible. Eighty pounds of multicaulis foliage are considered equal to one hundred pounds of the Italian white, for feeding worms.

The tree or shrub commonly known as the multicaulis, was found in a garden in *Manilla,* cultivated as a tree of ornament; and, to distinguish this from all other mulberries, is now called the *Manilla multicaulis,* and particularly to distinguish it from *another tree,* more deserving of *multicaulis,* on account of its capacity to produce more numerous stalks and branches.

Although the *Manilla multicaulis* has a very large leaf, grows rapidly, and the silk worm is fond of it; yet, in consequence of its rapid growth the stalks are often so green and tender, that, when overtaken by early frost, they are liable to be injured, before the wood has been sufficiently formed to endure cold and frost.

Nevertheless, the *Manilla* multicaulis is so valuable a tree, that experienced cultivators have told me that, if it should become necessary to take them up every autumn, protect them during winter, and re-set every spring, it would be much better than to cultivate the white mulberry; and that the culture of an acre of mulberry would require no more labor and expense than that required for an acre of Indian corn.

But there is another mulberry alluded to—the *Canton* multicaulis—so called from the place of its derivation, being the product of seed which the *Canton mission* were requested to procure, being considered the very best and most approved mulberry used by the Chinese, and is believed to be the first genuine seed ever imported into this or any other country. It was obtained under very favorable circumstances, such as have not often occurred; and the same mission have recently forwarded more seed for next spring's use.

That the *Canton* multicaulis is the true kind used by the Chinese, is made evident from a set of historical paintings from China, and from the seed growing at the foot of the stalk, different from other mulberries.

From the experience I have had, I concur in opinion with those who have cultivated the several kinds of mulberry, that the *Canton* multicaulis is deserving of the first consideration, and to be preferred to all others; not only on account of its equal capability of enduring cold and frost, but from the number, quality, and size of the leaf. Although not so large as the Manilla leaf, yet a leaf of the same size, is considered much heavier than the Manilla—some say double the weight.

I have cocoons in possession, made by worms which were fed exclusively on the foliage of the white mulberry; and another parcel fed exclusively upon the foliage of the *Canton*. The latter have a lustre and brilliancy far surpassing the former; and the difference is nearly as great as between the Merino and wool of native sheep.

It is the opinion of horticulturists and those best acquainted with the propagation of trees or plants from seeds, that trees from seed withstand the severity of climate better than trees propagated by any other mode.

Another circumstance occurred last autumn, in favor of the *Canton:* I had the *Canton* and *Manilla* trees, and another kind, called the *Asiatic* seedling, growing side-by-side in my garden, each having the same exposure to an untimely and severe frost, when the *Manilla* was much injured, the *Canton* and *Asiatic* escaped unhurt; and two other kinds, called the Chinese and Smyrna, were uninjured.

These seedlings, we hope, will be a most valuable acquisition to the list of mulberries adapted to the feeding of worms, and enduring the cold and frost; nevertheless, great caution is necessary in the use of imported seed; for instance, seed grown upon the multicaulis tree, will not produce a plant like the original tree; at least, it has so proved under my observation. The leaf is different in shape, and not one-fourth so large as the original; neither do the seeds produce trees which furnish a uniform leaf in shape or size. There is often deception in seed procured at foreign seed-stores; sometimes the vitality of the seed is destroyed, or otherwise injured by neglect. For these and other reasons which might be offered, purchasers of seed have been disappointed, and the mulberry cause injured; because they have expected too much, or that, by the seed of a certain *name*, they should obtain the genuine tree. The peach, apple, and some other trees, from seed or stone fruit, when planted, produce a great variety; perhaps not one seed in a thousand shall produce a tree, in all respects, like the original. It is advisable to have no dependence on the seed, but to procure trees which have developed the true character.

Having mentioned the *Canton* mulberry as first on the list, yet some, who do not know the Canton, would have the Manilla stand at the head of the list of the most valuable mulberries. The *Asiatic* and *Chinese* may be the next best, on account of their capability of enduring cold and frost; the leaf of which, in shape, resembles the *Canton*, but not so large; each of which, however, on account of the numerous buds on the stalks, may produce as much weight of foliage, and of as good quality, as the Manilla multicaulis of the same age. But should the Manilla multicaulis utterly fail of acclimation in this latitude, resort may be had to the *Canton*, *Asiatic*, *Chinese*, and some others which have been propagated from the seed, and give fair promise of adaptation to this climate.

In a more favored clime, the last year, these trees attained a much greater height and larger leaf, than in this place.

4. Respecting the *best mode* of cultivation, *stripping*, *value*, *expense*, and *profit*, of an acre of mulberry, I shall not only communicate my own experience, but that of the most skilful cultivators in this region.

In *this climate*, the culture, setting out mulberry roots, or cuttings, commences at the usual time of making our gardens, after the spring frosts, and when the earth has been suitably warmed by the sun—last April or beginning of May; and soon as the foliage has grown to the size of an apple-leaf, or the full size of the white mulberry leaf, (about the 15th or 20th of June,) the eggs may be brought out for hatching; and, if they can be kept back, so as to be hatched at different times, as the foliage multiplies, the cultivator will have the advantage of several crops in succession from the same lot of eggs—a much better way than to breed *in*-and-*in*, as it is called. Eggs may be preserved during winter in a cool place; freezing does not injure them; but before spring, they should be secured in glass bottles corked tight, to exclude the external air, and each bottle of eggs put into an ice-house, placed on a *cake* of *ice;* if set upon a shelf, they would hatch, even in an ice-house. Eggs thus secured, may be kept back, save much labor, time, and expense. As one class of worms are advanced, another can succeed them on the same shelves or hurdles. In this way, the same number of trees would feed double the usual quantity of worms.

In gathering the foliage, the buds must not be injured, nor the extreme ends of the limbs deprived of the leaves, leaving two or three leaves at the end untouched; commencing on one side of the field, and when once gone over, there will be a new crop of leaves ready at the place of beginning; and thus the foliage may be gathered several times from the same shrub or tree, whether the product of a root or cutting. I had roots and cuttings set out last spring, the foliage of which was gathered three or four times from the same trees, without injury; indeed the trees apparently grow better by having the leaves taken off so frequently, always leaving the buds uninjured, and the extreme ends of the branches without stripping. Instead of stripping the leaves, each leaf should be taken separate; if the bud should be injured, it would be spoiled for a cutting, or even foliage. Frequent defoliation of the mulberry does not injure it, although such treatment would spoil some other trees.

When trees are started from cuttings, it will often be found that a shoot will grow several inches before there is any root formed; in this case the support is derived from the atmosphere, instead of any assistance from the root, as is usual with other trees.

Vegetables of rapid growth are said to perspire their weight in twenty-four hours; this rapid evaporation or perspiration will account for so many cuttings failing to become trees; the leaves become discolored, wilt, and the plant is ruined. But to avoid this, let the cuttings be watered in dry weather, and take off the leaves until roots shall be formed.

Respecting the *cultivation*, the earth may be stirred or the trees hoed so frequently as to prevent the weeds growing; but not after the first of

August, that the trees may have opportunity to form wood; and the location must be so elevated and dry as to be out of the way of water setting near the plants.

Respecting the *value* of an acre set with mulberry, it depends on the price of the mulberry and number of trees set therein. If the trees are set $2\frac{1}{2}$ feet apart in the rows, and the rows 3 feet apart, an acre would take 5,808 trees, which at 25 cents each, would be worth $1,452. Some prefer to have the rows 4 feet apart, and 2 feet apart in the rows; in this case it would require 5,445 trees to the acre. But provided an acre of ground shall be set with cuttings, the rows 2 feet apart, and $1\frac{1}{2}$ foot apart in the rows, 14,520 cuttings might be set in an acre, which at $30 cost per 1,000 or 3 cents, would amount to $453 60, to stock an acre. It may be understood that a purchaser wishing to stock an acre of ground, the trees and cuttings could be purchased at a less price than above stated.

Taking into consideration the number of trees the most proper for an acre, and a reasonable price for the trees, the *average* price of an acre of land set with mulberries, including the land, might be worth from 750 to 1,000 dollars investment.

The *cultivation* of an acre of mulberry would, of itself, be no more than that of an acre of corn; but, including the *gathering* the leaves, *feeding* the worms, and *reeling* the silk, need not exceed 200 dollars. The *profits* of an acre of mulberry would depend upon the fidelity with which the worms are fed, and the quantity of raw silk made from the cocoons.

Some cultivators assert than an acre of ground set with mulberry will, the second year, produce foliage sufficient to feed 1,000,000 of worms, and that number of cocoons will make $333\frac{1}{2}$ lbs. of silk. I have no personal knowledge of one acre having been set apart for that purpose; but from experiments made with certain number of trees, in proportion to the acre, it has been ascertained that 100 lbs. of raw silk may be made from an acre the first year of setting out; and if the roots can be preserved without removal during the winter, a much greater quantity of foliage would be furnished, and, of course, a greater quantity of silk might be made the second and third year; so that the maximum might be 300 lbs. or more of silk to the acre. But assuming the minimum quantity, (100 lbs. from an acre,) it would yield the cultivator a greater profit than from any other product from the soil.

The last year I requested several cultivators to make thorough experiments to ascertain the *certain* profits of an acre. Only one, however, met the application with the precision desired. He, by strict economy of time, labor, and expense, although he gave *three* dollars per week and board, to two experienced females, as teachers in gathering foliage, feeding worms, and reeling silk, found that his silk cost him only *two dollars* the pound, and estimates his silk worth at least six to seven dollars the pound, on account of excellency of the reeling, for which he has the liberal bounty of the state, and also a premium from the Agricultural Society. The quantity and value of silk depend on the skill and perfection of reeling.

The value of *American* silk far exceeds the imported raw silk, not only in lustre, but strength of fibre, and the small comparative waste in the manufacture; and is probably worth 25 per cent. over the imported article of raw silk.

The same cultivator informs me that, the last year, being a year of experiment, attended with loss of time and expense, which he can avoid another year, he feels confident that he can hereafter make raw silk at $1 50 per pound.

5. Respecting the most valuable silk worm: Perhaps the large gray or black one-crop worm on all accounts is equal to any other. There sre several varieties of worms—one called the two-crop worm; but one good yield is worth more than two poor ones, with imperfect cocoons.

In China, where several crops are taken in succession, from hatching eggs of the preceding crop, it has been found that the quality of each succeeding crop of silk is deteriorated, and that silk grown in the elevated or northern regions of China, uniformly commands or obtains 20 per cent. more for any quantity of silk, than for silk grown in the warmer latitudes; and for the same reason that American silk is superior to that imported. It has been thought that the Chinese seldom or never export the silk grown in the cool regions, but that it is retained for the superior fabrics. Eggs, to be of good quality, must have the maturity of age. The usual time of hatching the first parcel of eggs, in *this climate*, is from the 15th to the 20th of June, or as soon as the mulberry leaves have a size to commence gathering. 3000 worms, (or even 2000 or 2400, if well attended,) will make cocoons sufficient for one pound of silk.

The *quantity*, *quality* and *value*, and *market* of cocoons, depend very much on the attention of feeding the worms, ventilation and cleanliness of the cocoonery; in cold seasons the worms do not make so perfect cocoons as when the weather is mild during the time of feeding.

As to a market for cocoons, the several silk factories and reeling establishments will readily purchase or reel them on hire; and that the producer should receive the benefit of good cocoons, instead of purchasing by the pound, a fair price would be given for any quantity yielding a pound of silk. The cultivator must, therefore, see the propriety of so faithfully feeding the worms as to produce hard and sound cocoons.

But the cultivator would derive the greatest profit by reeling his own cocoons, as every family might do with very little expense.

6. The legislature of Massachusetts give a generous bounty to encourage the growth of silk—about sufficient to cover all the expense of gathering the leaves, feeding the worms, and reeling the silk; so that every pound of silk raised and made in Massachusetts may be considered a clear profit to the cultivator; rent of the land, taxes, and interest of investment not included. Nevertheless, even these items may be overcome in a very short time.

The legislature of Massachusetts offer a bounty, on the manufacture of beets into sugar, of three cents on the pound—probably sufficient to cover the expense of manufacture.

Finally. On the subject of mulberry and silk, although it has engrossed much of my time and attention under the most anxious solicitude for its success, and with the persuasion that it would ultimately be found the most lucrative business which the cultivator of the soil could pursue, yet, that any certain infallible rules and modes of procedure, can at this early stage of the business be pointed out as applicable to all future years, I do not believe. *But there must be a starting point*, and we must be guided by the best light now before us. It is with great diffidence I enter on the subject to be laid before the committee of Congress, being aware that I may differ in *sentiment*, *practice*, and *opinion* from other more experienced cultivators, and that it may be found expedient hereafter to relinquish present and adopt new measures. But when intelligence shall be received and laid before the committee from various sections of the United States, I feel confident that the committee will find matter to report favorably on the culture of silk in this country.

Respectfully yours,
DANIEL STEBBINS.

To the honorable Chairman of the Committee on Agriculture, Washington City.

P. S.—There are in this place, two large silk factories doing a profitable business.

From the Franklin Farmer.

BOOKS ON AGRICULTURE, FOR SCHOOL BOYS.

We have thought the cause of agricultural improvement would be greatly promoted by the publication of a series of elementary books on agriculture, designed for the use of the schoolboy. Why should not our children have facilities for the acquisition of knowledge applicable to this pursuit as well as on less useful ones? If education is designed to fit us to engage in the practical duties of life, why is it that the most important of all earthly subjects, and one which occupies the labors of a vast majority of our people, is not the leading object of the schoolboy's education? We have elementary books on every other subject; we have schools wherein are taught the rudiments of every science, schools of law, medicine, divinity, of fighting, dancing, and of every thing but of agriculture. There is something wrong in the national practice on this subject. We ought to give to the most important subjects, the highest degree of attention—we must graduate various branches of education, by the standard of their relative importance, and give to those having the nearest relation to our most important interests, the greatest share of favor. We ought to have the principles of husbandry taught in every common school and a chair of agriculture endowed in every college. And we think the first step to the introduction of this new branch of education is. to have the necessary elementary schoolbooks. We have many men in our country, eminently capable of compiling such works and adapting them precisely to the capacity of the schoolboy. And he who would prepare a set of works on agriculture for the use of schools, such as would give to the boys of the country destined for the pursuits of husbandry, a thorough knowledge of the principles and the outlines of the practice of agriculture, would do more for the general good and for his own literary fame, than in any other walk of science or learning. Let it not be supposed that we decry other branches of science or learning. We are in favor of all; and especially those which contribute useful aids in the practical labors of life. We would render all subservient to man's use; and it is only in this view that they should be appreciated. But it is admitted on all hands, that agriculture is the most universal, the most dignified, the most congenial, virtuous and productive pursuit of mankind—the substratum of all other pursuits—the life and soul of commerce and manufactures—the mother of the arts and sciences—the basis of civilization; and we insist, it is *not* seeking too much when we seek to give to her own child, the husbandman, a higher grade of education. Whatever description of knowledge, relates nearly or remotely, to the multifarious labors of the agriculturist, should be an object of his study and constitute a portion of his exercises at the primary school and the college, and employ his reflections in all the riper years of after life. One of the most absurd and mischievous errors of the day, is that of the father, who gives to the son destined for a farmer, an education inferior to that he bestows upon the one destined for a profession. The husbandman deserves a better education than a lawyer, or a doctor; because his occupation requires the exercise of more knowledge; but it is too generally the case, that he is only allowed some snatched intervals between the crops, "to learn to read, write and cipher"—and this is deemed education enough for a farmer! Oh, what a wretched, miserable error is this—what a foe to the improvement and dignity of the class! It ought, it must be banished, and the practice which results from it abolished, and a wiser and better one substituted. Now, however the remark may seem to censure the general opinion and practice on this subject, and although we may be even ridiculed by many farmers themselves, for the apparent ultraism of the sentiment, we are bold to declare, nevertheless, that the farmer *has need* of a better education, and he actually more often requires the aid of more various branches of science, in his ramified operations, than the member of *any* profession; and we sincerely believe, that if any discrimination should be made in the education of two sons, one destined for a farmer and the other for a profession, it should be in favor of the former. Let us not be misunderstood—the boy destined for a profession or trade, should be thoroughly educated in all branches pertaining to his distinct calling; while the boy intended for a farmer, should be thoroughly instructed in all the principles to which the intelligent and scientific agriculturist stands indebted for the successful result of his labors. We could easily show that these principles are drawn from a wider range of sciences, than are necessary to be consulted by one destined for any of the so-styled *learned* professions; and consequently it would be shown, that the husbandman needs a more extended education. A young man preparing for the bar, is ready to enter upon his legal studies, on attaining some smattering of Latin (or it may be Greek;) and many do not even go thus far, before taking up Blackstone. A short course of reading elementary works on the principles and practice of law, and the student enters on the practical field of his profession. The physician requires more preparation to qualify him for practice. He too, learns the dead languages and studies the principles and practice of his art, but those principles involve a knowledge of various abstract sciences and he is constrained to invoke the aid of anatomy, physiology, chemistry, mineralogy, botany, &c. &c., before he enters upon the practice of his profession. We are speaking of those studies only as they relate to the *professional* qualifications of the student, and of course we are not to be understood, as denying either the possession or the importance, of other branches of learning, to professional men. They, as well as agriculturists and others, in their social and political relations to community, are equally required to discharge the duties of *citizens;* and we hold that all classes should avail themselves of every accomplishment which learning or science can bestow, in aid of the performance of those high duties. But we need not array comparisons or illustrations on the subject; our opinions may be presented at one view. We would give to every one, of whatever pursuit, precisely the education adapted to it—and it should be thorough and perfect in all its branches, or at least so far as any or all the branches related to the peculiar pursuit adopted by the student. It should thus qualify him for the intelligent prosecution of the labors of his life and ensure his complete success. It would render the farmer as illustrious, and certainly as useful, in his sphere, as the profoundest statesman or professor. But the subject is too interesting to be treated satisfactorily in the narrow limits to which we are circumscribed; and we mean to pursue it. In the meantime, we submit to the board of education and to the commissioners of common schools, the propriety of early considering the importance of adopting a series of agricultural works, as text books in the schools about to be put in operation, under the excellent common school law of the state. They may do incalculable good to the children of Kentucky, which will flow to other generations, and they may render the system far more useful and effective, by seasonably directing their earnest attention to the subject.

From the Farmers' Cabinet.

PEACH PROSPECT.

We are happy to learn from Delaware, now becoming celebrated for its *fine peaches*, that although the cold weather and frosts have been most trying on the young fruit, and much of it injured, that there is yet *enough spared* to promise a fine crop—if no future frosts should occur to nip the tender blossoms just bursting from the bud. The great success of Messrs. Ridgeway and Reeves, near Delaware City, (and who does not remember their fine and luscious peaches of last summer?) will soon be followed by other equally enterprising gentlemen of Delaware and this city who have gone largely into the business.

On the Union Farms, near Wilmington, owned, we understand, by Dr. Thomson of that place, and Mr. M. Eayre of this city, we learn that about 100 acres immediately on the river Delaware, are now flourishing in peach trees, and that about one half will bear this year, and that by a late arrangement our esteemed fellow-citizen, I. Reeves, for whom peaches will always grow, has become a partner with these gentlemen in their large concern. Philip Reybold, Esq., the efficient President of the Delaware Agricultural Society, has also, we understand, set out this spring a large orchard. We sincerely wish all these gentlemen the success they merit. Some of the fine peach districts of Jersey, seem of late years to have lost their power of producing, and continuing long-lived, the tree that produces this best, in its season, of all fruits. We should like to hear from some of our Jersey subscribers, if they can give us the reason, why it is so—and if any clue has yet been found into that most insidious and fatal disease to the peach tree, *the yellows?* We hope this hint will be kindly taken, and that all the information that can be imparted to us may be given for the benefit of the readers of the Cabinet, on the interesting subject of rearing and of prolonging the existence of the peach tree. A full and generous supply of this luscious and wholesome fruit, is a matter of great interest and luxury to every one, and our populous districts and cities should not hesitate to hold out the highest premiums and inducements to those who propagate fruit and supply our markets with the finest varieties.

From the Farmers' Cabinet.

USE OF LIME.

Lockhart, in his Life of Sir Walter Scott, relates the following anecdote.

'There see'—he continued, 'that farm there, at the foot of the hill, is occupied by a respectable enough tenant of mine; I told him I had a great desire for him to try the effects of lime on his land. He said he doubted its success, and could not venture to risk so much money as it would cost. Well, said I, fair enough; but as I wish to have the experiment tried, you shall have the lime for the mere carting; you may send to the place where it is to be bought, and at the term day you shall strike off the whole value of the lime from the rent due to me. When the day came, my friend the farmer came with his whole rent, which he laid down on the table before me, without deduction. "How's this, my man; you are to deduct for the lime, you know." "Why, Sir Walter," he replied, "my conscience will not let me impose upon you so far—the lime you recommended me to try, and which, but for your suggestion I never would have tried, has produced more than would have purchased the lime half a dozen times over, and I cannot think of making a deduction."'

CUT WORM.

In some years these larvæ are very destructive to the Indian corn, and of all the contrivances for destroying them, which we have seen, that of Park Shee, of Delaware county, in Pennsylvania, is the most simple and the most expeditious. A pair of old wheels from a cart or wagon, are fitted with several projections like the cogs of a spur wheel in a mill, which are so formed as to impress in the earth a hole four inches deep. The smooth track which the wheel makes on the soft ground, induces the worm in its nocturnal wanderings to follow on till it tumbles into the pit. It cannot climb out, and the hot sun destroys it.—*Farmer.*

CHEAP ELEMENTARY AGRICULTURAL PUBLICATIONS RECOMMENDED. AGRICULTURAL BOOKS FOR SCHOOLS.

To the Editor of the Farmers' Register.

Caroline County, Va. May 23d, 1838.

From a communication which I made to you a year or two past,* you will discover that I had been for eighteen years endeavoring to improve my land—naturally poor—by pursuing Col. Taylor's non-grazing and inclosing system, &c. I was never convinced of the impracticability of that system on such lands, until I was led to read your 'Essay on Calcareous Manures.' From your remarks upon my communication in the Farmers' Register, your "five propositions" in the 'Essay' opened my eyes; and from that moment to this, I have never ceased to desire, that every farmer, both rich and poor, should become acquainted with that work. I believe I have induced several to purchase and read it, yet I do not believe there are as many as two in a hundred of our citizens, generally, who are acquainted with the first principles laid down and maintained in that work. I am fully convinced (were they well understood,) that an effort would be made by a great number of farmers, to improve their lands upon a proper principle. I can truly say, that my feelings, upon reading your 'Essay,' were indiscribable; first, deep mortification at having spent 18 or 20 years of my life, with all my youthful zeal in the cause of agriculture, to but little better result, than to be prepared to receive as truths the five propositions laid down in your 'Essay on Calcareous Manures;' and secondly to know how many thousands there were in this, our poor old Virginia, who were going on in the same or greater ignorance than I had been, and who probably would never, in your lifetime or mine, be any wiser for what you had written. As well as I can now remember, I think I had heard of a work written by you on calcareous manures—several years before I was induced to read it; yet the title appeared foreign from any interest I could have, and the work was left by me to those whom I thought interested in *calcareous manures.* This indifference to the work, (as you very well know) must have been owing to *ignorance,* when I tell you (had I then known its importance to every farmer,) that I verily believe I should have at once abandoned the idea of improving my lands altogether, and thereby have avoided heavy expenses, or have acted upon proper principles, and consequently would have reaped the reward of my labors and expenses, either in immediate profits or subsequent permanent improvement.

I have premised thus much by way of introducing a suggestion for your consideration, which is, that you should prepare a small work, embodying the principles contained in your 'Essay on Calcareous Manures,' with such illustrations as may be plain and forcible, also some hints upon the subject of making putrescent manures, and such uses of quicklime as you may have published in the Register, from the work of Mr. Puvis and others, and whatever you may have gathered upon the subject subsequently. Also such hints, in a short but plain manner, as you may think best upon the management of stock of all kinds, &c. &c. Let the work be in a small pamphlet form, in good plain type, and let the price be 25 cents, and have the title 'The Virginia Poorland Farmer's Friend,' or some such name. I believe such a work, with proper arrangements for distribution, might be sold almost as extensively as a common almanac, or Dr. Franklin's 'Poor Richard,' and other small, but important tracts, containing first principles, from which arise results, which never can be told until the final consummation of all things. Your Farmers' Register and other works you have, and are about publishing, will be more particularly adapted to the better educated, and the benefits arising from them must be extended to others through a tardy course of precept and example; but the work I propose commences at the root, and its healthy influence must ascend, and as this is the *course* in our country, it must be soon felt in the topmost branches. I have not made this suggestion upon the spur of the moment. I have had it under consideration for a year or two, and am fully convinced of its great importance. The mind of man seems constantly reaching forward and higher; and much of the usefulness of *many* to their race, is lost by their setting too little value to the inculcation of those things to which *they* have attained; 'tis so in religion, 'tis so in politics, and is it not so in agriculture? Some subjects require technicalities and high sounding words, and cannot be understood by the illiterate reader. Yet I am convinced that more plainness of speech than is frequently used, would be better upon most subjects. In such a work as I have suggested, the simplest and plainest language should be used, (I think your style generally very plain,) so that the common planter can understand; and, by-the-by, most of us are but grown boys, and none of us can be injured by plainness of speech; and a work of this kind should be prized in proportion to its simplicity. I think it was the celebrated John Newton, of Olney, (England,) who said, when he preached a sermon, he fixed his mind or eye upon one of the most illiterate of his congregation, and adapted his language to his understanding; knowing that if he were understood by such a one, the better informed would surely understand him.

I discover the managers of the Richmond, Fredericksburg and Potomac Railroad Company, have with commendable liberality greatly reduced "the freight on marl, lime, and gypsum, for the promotion of *agricultural improvement.*" Yet I have not observed it noticed in the '—— ——' which is more extensively circulated in the country than any other paper. * * * * * "Like priest, like people." How can we expect that interest to be taken in the *real improvement* of the state, so essential to her citizens, when the substantial nourishments of bread and meat are only set before us by yourself; while papers thought a thousand times more important

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* Published at page 612, Vol. II.—Ed.

than the Farmers' Register, are constantly serving up, and setting before us, the condiments of pepper, salt, and *vinegar*, and making us believe the more of them we swallow, the better will be our digestion; until, in fact, most of us have the dyspepsia so badly, that we shall be compelled to call in some "thumping" doctor, before we shall be able to digest "nature's food."

Your sincere well-wisher,

THOS. B. ANDERSON.

Editorial Remarks.

We fully concur with our correspondent in the opinion that an elementary treatise on agriculture, such as he describes, and desires to be furnished, would be highly valuable to the agricultural community, provided it could be widely circulated and read. But, putting aside the difficulties and labor of the author or compiler, and the expenses of publication, we doubt much, even if such a work were published, whether enough copies could be sold to pay half the printer's bill. It is almost impossible for any author in Virginia to publish and sell a book so as to make the smallest profit. The great publishing houses of the north have acquired a virtual but effective and close monopoly of the publishing business and trade in the southern states; and one of these houses, as, for example, the Harpers of New York, could sell the most worthless new work, (if well chosen for its *demerit*, to make this experiment,) to more purchasers, and at more profit, than any Virginian publisher could do with the most valuable and useful work. Their operations are effected, and objects attained, by combining the *credit system* and the *puffing system*. Hundreds of retail booksellers have credit from some one of the great publishing houses, on the condition of receiving a certain number of copies of every new book published by that house. Thus, an edition of 1000 or more copies of every publication is engaged before it goes to press. The next thing is to get off as many as possible of the dozen copies sent to each retail bookseller; for if this were not done, they could not long continue to buy. To this end, copies of every new work are sent to hundreds of editors of newspapers; and for so small a bribe, these gentlemen rarely refuse to give in return a *puff*, or complimentary notice of the work, which serves to aid the sale. If twelve copies of each new publication are sent for sale to each town, and, on the average, half, only, of the twelve are sold to readers, there will be no loss on the whole publication; and if nine are sold, there will be a sufficient profit. If *all* should sell, then there is a certainty of profit in disposing of another edition.

Without the aid of any such machinery and system, no one can now publish a work, except at loss. If the publisher is not a bookseller, and acquainted with the practical fair operations, and also with the tricks of the trade, and he distributes his copies among many different booksellers in various and widely dispersed places, to be sold on commission, he will scarcely receive enough money to pay for the expenses, losses, trouble, and vexation, incurred. Our own experience on this score has resulted in forming the determination never hereafter to send any publication for sale to booksellers, unless ordered by them as a purchase, and the transactions closed. The particular work of which our correspondent speaks with so much approbation, has been so favorably received by the public, as to leave the author nothing to complain of on that score. Nevertheless, by the first edition, which was *all* sold, he barely paid the expenses of publication—and by the second edition, which was on the cheapest plan, not half the expenses have been paid by the sales. Of the separate edition (600 copies) of Johnstone's 'Treatise on Draining,' recently published at this office, not 20 copies have been sold; and the whole edition has been offered, and in vain, to be sold for the sum actually paid for engraving the wood-cuts which illustrate the work. These statements are enough to show that any Virginian who publishes a book for sale, must count upon receiving his reward (if indeed any is obtained,) in "honor and glory;" but certainly not in profit.

We have long thought of the importance to agricultural improvement, and even to national economy, that might be found in a plan somewhat like that proposed by our correspondent, and which might embrace his proposition entirely. This plan is to furnish for all the common schools, in Virginia, agricultural works to be used for reading lessons. If the legislature would give the first start to this scheme by contracting for such cheap publications to be provided for the boys taught in the primary schools at the expense of the literary fund, (for which general objects $45,000 a year has long been spent, and mostly wasted uselessly,) that demand alone would be so large as to permit the printing of very large editions, and, consequently, the prices of such books might be put so low, that their greater cheapness alone ought to induce their substitution, in all common schools, for the ordinary reading books furnished from the northern publication offices. In this manner, if the publisher were secured against loss, by a state contract for 5000 or 10,000 copies of any one work, it might be sold at less than half the usual prices for northern school-books, and yet give sufficient profit to the publisher. In this manner, if no other benefit were found, there would be the great saving to the literary fund, and to all the parents of young pupils in Virginia, of more than half the price of books designed merely for learning to read; and the books substituted, would be at least as serviceable in that respect, and unobjectionable in every other respect, as school-books. As, therefore, the *patronage* of the state would cost it no money, but on the contrary cause to the treasury a considerable saving of the money now expended for school-books, it might be hoped, even from the legislature of Virginia, that *such patronage* to agricultural improvement would not be withheld. But the saving of money to the treasury, and the consequent hundred-fold saving to individuals, (if these cheap books were adopted in all the common schools,) would be the least of the advantages gained. A very far more important benefit would be the making on young minds impressions which are the most strong and indelible, of matters of useful agricultural instruction. Most of the boys thus instructed, in country schools, would afterwards be engaged in farming; and these early instructions would never be forgotten in after life. Besides—the school-book of the young pupil, when no longer used as such, would be left in his father's house, and would serve perhaps to engage the attention of, and to instruct parents as well as children. And in the far greater number of cases, both of the old and the young, the agricultural instruction thus afforded would be given to those who would otherwise be entirely destitute of every such advantage. The private and national benefits that would *certainly* be derived from having 10,000 or more of such persons, in Virginia, every year thus induced to read agricultural books, are beyond the powers of calculation. And there is no reason why the benefits should be limited to Virginia, as there would be nearly as strong inducements for attaining the same objects in the other southern states.

If such a general plan as this were adopted, the first and the most useful publications would be elementary treatises on different agricultural subjects, suitable to the least informed minds, and to the plainest understanding. But works of higher grade, and exhibiting more of scientific research, might well follow, though on the same cheap plan of publication; and indeed, some agricultural works might well be adopted as text-books in our colleges, even in advance of the future establishment (so much to be desired for agricultural and national improvement,) of professorships of agriculture or agricultural chemistry. Nothing is required but to guaranty to the publisher a sale of so many copies of a book, as to secure him from loss, and the price of those and all other copies may be made at not more than double the cost of so much blank paper.

We should be pleased to hear the opinions of others on this plan of introducing cheap agricultural tracts, and books, generally into common schools. If we were to find it enough supported by such opinions, it might induce the making a direct offer to the legislatures of Virginia, and other neighboring southern states, to furnish such publications in the manner spoken of above; even though that offer to furnish valuable and instructive works at less than half the cost of the common northern school-books, (worthless except merely for practice in reading,) might possibly subject the proposer to the charge of seeking his own gain only, at the public expense.

From the Genesee Farmer.

RUTA BAGA.

The value of this excellent root is rapidly becoming properly appreciated among farmers, and though the feeding out the roots is attended with some trouble, (the only objection we have heard made to them,) the advantages of their culture are so decided, that we may expect few farmers will be willing to forego them. That they can be fed out to any animal, or in any way, without some profit, we do not apprehend; and our experience would go to corroborate the many testimonies we have published from various sources of their excellence, and the ease with which, under ordinarily favorable circumstances, they can be cultivated. In feeding them to animals, the least favorable results have been obtained when given in a raw state to swine. In this respect, however, they have not greatly differed from raw potatoes; either of which fed in this state to pigs seeming to be of little value. The value of potatoes, as every one knows, is nearly or quite doubled by cooking, and some experiments would seem to indicate that a similar result is effected on the turnip by the same means.

Mr. Mayleet, near Montrose, Pa., who last year raised turnips at the rate of 1333 bushels per acre, boiled the roots, and with the addition of some coarse grain provender, fattened his pork upon them. The pork, he says, was excellent.

Mr. Bement of Albany, well known for his successful endeavors to introduce superior animals of different breeds to the farming community, particularly the Berkshire pigs, kept twenty of these hogs, mostly full grown, on six bushels of ruta baga and one bushel of buckwheat bran, a day, for the whole, divided into three meals, two fed raw and one boiled. Fed in this way for three and a half months of last winter, they were found to thrive as well as when fed on four quarts of corn, each, per day; which at the prices of grain at that time, would give a value of 28½ cents per bushel to the ruta baga.

Mr. Mather of Scaghticoke, a farmer of system and enterprise, instituted an experiment in feeding cattle with turnips, to test their value in comparison with other kinds of food, and the result, as communicated to the Cultivator, was as follows:

"I fed two yoke of cattle on turnips for two months—November and December; feed, five bushels a day a yoke. Average gain 115 lbs. a yoke per month. The same cattle were fed through the month of January on potatoes and meal, corn and oats, ground together in equal quantities; feed, two bushels of potatoes, one bushel of meal. Gain 60 lbs. a yoke. Estimate the value of the ruta baga by the price of corn, oats and potatoes, and the respective gains, and it makes the ruta baga worth but a fraction less than 18 cents per bushel."

For feeding or fattening pigs, we should, at present, prefer cooked potatoes to turnips; but when it is remembered, that on an average, three times as many turnips as potatoes can be grown on an acre, the latter, when cooked, may be found the most valuable in the end, and experiments in the case of swine, are needed to settle this point. As food for cattle or sheep, the turnip is superior to the potato; and for making fine beef or mutton, the ruta baga has scarce a rival. We, in this country, are yearly becoming greater imitators of the English, in substituting beef and mutton for pork; a fact we attribute to two causes;—the partial failure of the corn crop, without which it is generally considered impossible to make first rate pork,—and the increased culture of the ruta baga, which has produced beef and mutton of unexceptionable quality.

MARL IN SOUTH CAROLINA.

[The following article will serve, in addition to others before published in this journal, as evidence of the great facilities possessed by South Carolina for using calcareous manures; and also of the deplorable general ignorance of their value and proper application, as well as the failure to avail of this great source of agricultural improvement and national wealth. Could we be permitted to advise and direct a course to be pursued, we doubt not but that every judicious user of marl would thereby make a permanent clear profit of from 20 to 50 per cent. per annum, on his investment; and that the portion of the state marled would be at least doubled, and perhaps quadrupled, in agricultural product. Notwithstanding the great neglect and frequent misapplication of marl, and improper tillage after applying it, its use has already added millions of dollars in agricultural and money value to lower Virginia; and South Carolina, in a few years, might receive as much benefit from a like course—and ten times as much benefit, if a judicious and proper system were adopted and pursued.—Ed. Far. Reg.

[From the Southern Agriculturist.]

Mr. Editor—In your number for the month of May, you insert an article from the Farmer's Register, on the "marl of South Carolina," and its uses as a manure. To excite some interest in the importance of this subject, I beg leave to observe, that marl is found in great abundance in that part of our state which requires it most, and which has a soil peculiarly adapted to it. That marl is found in Barnwell, Colleton, Orangeburg, Charleston, and Sumter districts, I know to be a fact, and believe it to exist in all that section of the state, called the middle and low country. By manuring with it only once in five or six years, and then putting only a shovel of it in each hill,* I have been assured that the land yielded three times as much as ever had been obtained from it, by any other means. One gentleman, who obtained it at his landing on the Ashley river, assured me, that in the imperfect mode of his using it on a part of his field, the produce had been increased 50 per cent. over that of the rest of the same field. But that he afterwards sold the place, and the experiment was at an end. It is peculiarly suited to the flat, sour, poor, sandy soils, of this part of our state, where it is most easily obtained. On the banks of Ashley river, it is so abundant, that it is brought to Charleston, and used for filling up the streets; and yet they who own the fields adjoining, do not employ it as a manure, although required only once in five or six years for that purpose.† It is also found on the Savannah, the Edisto, Cooper river, Santee, and Wateree, but not used any where, that I know of, as a manure.

The fossil shells, and rotten limestone, found on the Santee, and in some other places, in immense quantities, are also of incalculable value as a manure. The marl is different from this, because it is a mixture of clay and sand, with lime. But the lime made from these shells is stronger, and will go farther as a manure, than marl, because of its greater purity and warmth. I believe the lime thus made, is peculiarly suited to the exhausted, cold *clay* lands; and one gentleman in Sumter district, who had used shell lime on his old exhausted lands, told me that it had rendered them more productive than ever they had been—more productive than the best oak and hickory land, which could be found. Who would not rather manure three acres of land, than clear one acre, even in the common troublesome mode of hauling manure? Lime made from these shells, gives but little trouble, compared with other manures, and old land so manured, affords more profit than the best new lands. I believe that lime is not suited to the light *sandy* lands which abound in this part of the country, but the rotten limestone and shells need not be burnt into lime—they may be only scattered unburnt over the soil, and put into each hill, like the marl. There are numerous instances in which the broken shells, old lime, and rotten limestone, have caused an extraordinary increase in the crop. One gentleman told me, that in ploughing an old field, he came upon several old lime-kilns, which had probably been burnt 40 or 50 years before, when indigo was cultivated, and wherever these half-burnt shells were turned up and scattered by the plough, the cotton was vastly finer than in the rest of his field. I did not ask him if he had profited by the discovery, and covered the rest of his field with shells also.

Pray, sir, let me suggest that the Agricultural Society should offer a liberal prize for three successive years, to the best series of experiments with these articles; in which the use of either marl, limestone and shells, or lime, can be proved to be beneficial; and which is best adapted to different soils. Q.

*Which is a very improper mode of application.—Ed. Far. Reg.

† More correctly, *once to last for ever.*

Remarks by the Editor of the Southern Agriculturist.

We commend to the notice of our readers, the remarks of our correspondent Q., on the plentiful supply and value of marl, in our own state, to be had by many, at only the cost of conveyance from its bed, to the point where it is intended to fertilize the soil. If Q. be correct, and we doubt not he is, we have within our own borders, a mine of incalculable wealth; and, with ordinary exertion, we can very soon wipe from our 'scutcheon the reproach, of importing the greater part of our provisions. Our correspondent has, in naming rivers, on the banks of which marl, or fossil shells, &c., abound, omitted the Pee-Dee. We take the liberty of adding that river to the catalogue, lest those living on, or near its banks, may excuse themselves, while they wonder others overlook and do not avail themselves of such valuable, and cheap manure. No observant man ever crossed Port's or Godfrey's ferry over the Pee-Dee, about forty miles above Georgetown, without remarking the mighty mass of fossil shells, &c., yet no man on the Pee-Dee ever (so far as comes within our knowledge) used this manure. The Pee-Dee country, was once, even without the application of this aid, a fine grain country—a country of *prime* bacon memory—a country happier than 'tis now. We say to the people of Pee-dee, in common with those on our other rivers—use and improve the gifts and advantages, of which nature has been so lavish, and you will soon find arguments against moving west.

CAPABILITIES OF SOILS. VEGETABLE PHYSIOLOGY.

Extract from Dr. C. T. Jackson's Geological Survey of part of Maine.

It is evident that plants are not endowed with creative powers, and consequently are unable to produce any new elementary substances; hence the various substances which enter into their composition, must be derived from the air, water or earth. All the saline and earthy matters which they contain are readily traced to their origin in the soil; while the carbon, hydrogen, oxigen and nitrogen that exist in them, are elements which they draw from air, water, and the animal and vegetable substances used as manures.

The atmosphere is composed chiefly of the two gases, nitrogen and oxigen; mixed together in aëriform solution, in the proportion of four-fifths nitrogen, and one-fifth oxigen; besides which gases there is always a certain proportion of carbonic acid gas, amounting to one-ten-thousandth part, and variable proportions of aqueous vapor.

From the carbonic acid gas of the atmosphere, plants derive a large share of their carbon, which is the basis of all vegetable matter. Some of it is also furnished by the fermentation of vegetable and animal substances, which decompose in the soil, and this gas is either decomposed by the leaves of vegetables, or is carried into their roots by aqueous solution and absorption. All fresh growing plants decompose the carbonic acid of the air, take up its carbon, and exhale oxigen gas, and this operation goes on more rapidly while the sun shines upon them. In darkness, plants give out carbonic acid, but the quantity is relatively small, when compared with that which they absorb during the day. So that if a plant is grown under a bell glass, containing air mixed with this gas, the carbonic acid is soon removed, and replaced by pure oxigen.

Thus vegetation is continually removing a substance deleterious to man and all animals, and replacing it by pure vital air—a gas absolutely necessary for their respiration. This beautiful law of nature should never be lost sight of by the farmer, nor should he ever forget the relation which the green woods and fields bear to the healthfulness of the country.

Seed will not germinate, without the joint action of air, water, light and heat. Without these essential conditions, the germ remains, as it were, asleep for an unknown length of time. Seeds, taken from the tombs of ancient Thebes, in Egypt, where they had remained in a dry, dark and sequestered spot for more than three thousand years, were found still to possess their vital properties, and when planted in a botanical garden in London, sprang forth, to flourish in the present age. How long a seed, thus immured in darkness, shut out from all the causes which would produce germination or decay, would remain alive, is wholly unknown; but from the known facts respecting spontaneous rotation of crops and of forest trees, it would seem that the seed remain buried in the soil for enormous lengths of time, before the circumstances necessary for their putting forth arrive. Dead leaves of the forest shut out light, and preclude, in some measure, the influence of the atmosphere, while the sombre foliage hangs over the soil, and serves, by its shade, as an additional cause preventing germination. Thus, I suppose, the seed, buried in the forests, remain dormant until the removal of the shade trees, or the burning of the leaves, gives free access to the causes requisite for germination and growth of the hidden plants; and we consequently perceive a new growth almost invariably follows the removal of the primeval forests. According to Decandole, plants exude from their rootlets certain substances, which have the property of eventually eradicating their own species, while they are not preventive of the growth of other plants; hence he accounts for natural rotation. It is probable, also, that one kind of vegetables may exhaust their proper nutriment, and thus render the soil incapable of supporting their kind, while there are other principles left, suitable for the support of different species. This subject is, however, the most obscure department of vegetable physiology, and one which demands the labor of modern chemists and botanists. Thus much we know, that the conditions above stated are essential requisites to healthy vegetation, and that the soil must furnish certain substances not attainable alone from air and water. When we analyze a plant, we always find a certain quantity of silex, alumina, lime and potash, forming a large proportion of the ashes which is left on burning the plant. All these matters are contained in the soil, in greater or less proportions, and some of them are essential to the growth of the plants. The coating of wheat, rye and barley straw is silex, and gives the necessary strength and hardness to the stalk.

The analysis of the grain of wheat gives a large proportion of the carbonates and phosphate of lime, and we know that this grain only thrives upon a soil containing calcareous matter. It was long ago observed in Massachusetts, and is also seen in certain districts in Maine, that wheat straw grows very well, but the grain does not fill and present a plump and solid appearance, but looks wilted, and is not heavy. This was formerly supposed to be owing to the climate, but on more careful examination it is found to arise from the want of lime in the soil. Many animal manures contain a little of this substance, and it accordingly appears, that where a farm is well manured, wheat will grow well upon it, but a large annual expenditure is required for the purpose. It is observed, that all the grain regions of the country have soils more or less calcareous, and we find, that, by adding lime to the soil, we may produce by art the material wanting; and it appears by the analyses here presented, and by the results of certain experiments which have been made in France, and repeated here, that a very minute proportion of lime is amply sufficient for the purpose. Thus one or two per cent. of carbonate of lime will answer the purpose, and this small quantity costs so little, that any farmer can well afford to apply it to the soil. Indeed, I do not see how he can afford to do otherwise, since he will be a loser, and his more skilful neighbors will be enabled to supply the market, while he will not be able to recover his seed.

It is a great mistake to suppose, that wheat will grow in any soil; for I know, that in many instances, the crop raised the past season, which has certainly been very propitious, did not equal in value the seed sown; and these instances all occurred where the soil was destitute of lime, and was not largely manured.

Unless you wish to waste your labor upon barren and unproductive fields, attend carefully to the nature of your soil, and supply those elements which are wanting, in order to render it fruitful.

From the Farmers' Cabinet.

ON STALL-FEEDING SHEEP.

Mr. Editor:—At a late quarterly meeting of the "Agricultural Society of New Castle county, Delaware," it was requested of the corresponding secretary to elicit from *practical farmers* throughout the state, such information and experience on matters connected with *agriculture*, as might benefit and advance the objects of the society, and when deemed of sufficient interest and importance, to publish the same for the use of its members. Many of them are subscribers to your valuable paper, and most of them interested more or less in sheep. The method Mr. Baynes adopts of making *fat mutton* will, no doubt, be interesting to some of them, and the information he imparts may be relied upon—founded as it is upon *experience*.

Yours, very respectfully,
James W. Thomson.

Wilmington, March, 1838.

CORRESPONDENCE, &c.

Mr. Thomas Baynes—

Dear Sir—I am induced from some practical remarks made by you in a late conversation on the subject of *sheep*, and particularly *sheep for stall-feeding*—to solicit from you still further information on this important branch of grazing—not only for the benefit of our Delaware farmers, (who, in the prospect of a dog-law, for the protection of sheep, from the next legislature, will go much more largely into the business,) but also for the sake of the agricultural interest of the country in general. In all our great markets, *fine mutton* is scarce, and consequently high—it is one of our most *wholesome* meats, and, if properly attended to, one of the most *profitable* the farmer can raise. But unfortunately for agriculture, the great and leading avocation of man—too few of its practical votaries impart their wisdom and experience to others by essays and lectures, who so much need their direction and aid. The experience you acquired in England, and the years of observation you have had in this country as the shepherd of that celebrated feeder of fine mutton, Samuel West, of Delaware county, Pennsylvania, will give great interest to any communications from you on the subject—and as Mr. Barney has given a reputation to Delaware *sheep*, which they richly deserve as—among the finest in the country—practical directions from you, for their treatment, and how they can be best improved and stall-fed, will be thankfully received by those who wish to emulate his example—and profit by his valuable enterprise. Below, I have proposed some queries for you to answer at your leisure, on the interesting subject of *feeding sheep*—without a wish however to confine you to them. Any other information than they ask for, and in your power, I feel assured you will impart, and by so doing, much oblige yours, &c.

James W. Thomson,
Cor. Sec. Agricultural Society.

Wilmington, April 8, 1838.

To James W. Thomson, M. D.

Esteemed Friend:—Thy favor on the subject of sheep was duly received, and I will comply with thy request with pleasure as far as I am able. Samuel West, to whom thee has alluded, a practical farmer near Chester, Pennsylvania, feeds about 100 sheep per year—he purchases them in September, and, if possible, selects a mixed breed of Bakewell and Merino, or Glade sheep. After getting them home, the first thing he does is to wash them in a clear stream of water, to cleanse them from dust or mud which they may have collected in travelling. They are then turned into a pasture pretty well eaten down for a few days, when they are changed to a better one. It is best to change their pasture every week, particularly if the fields are small. They will do pretty well on grass till December, when they should be housed (see directions in answer to thy 4th question.) The cost of sheep for feeding is generally from \$3 to \$5 per head, and will mostly sell for double the first cost when fat.

John B. Baynes, of Naaman's Creek, Delaware, keeps a *breeding stock*, of the fine quality of which thee has some knowledge. He allows thirty ewes to one buck, which is considered about the right number on a farm of one hundred acres—these ewes on an average will have forty lambs, which at 4 months old are worth four dollars per head. But I should recommend the yearlings kept over which would shear seven pounds of wool on the 40 head—equal to 280 lbs. at 40 cents would be,

	\$112,00
The 31 head of old sheep would shear 5 lbs. wool per head, 155 at 40 cents,	62,00
40 lambs, when fat, at 2 years old—\$12 per heap,	480,00
	\$654,00
The food will cost \$1 per head on the 40 yearlings,	40,00
Leaving,	614,00

The farmer's income from his *breeding flock*.

Ewes should be kept well through September and October, and the buck allowed to go with them on the first of October; after this time it is considered best not to keep them too high till towards March, when they should be kept better. Potatoes or turnips should be given them till grass comes. Sheep should be washed about the middle of May, if the weather is clear, shear them ten days after. Some of our farmers may not be prepared to purchase a flock of Bakewell sheep. A profitable business can be done, and at the same time a good stock raised, by purchasing a few good common ewes and a Bakewell buck—it will greatly improve the breed by changing the buck every year and selling off the old ewes. In three years the breed will be very nearly as good as full Bakewell. If two farmers in the same neighborhood could exchange bucks, it would answer as well and be a saving to both parties. I have endeavored to give thee all the information in this, and my answers to thy queries below, I now think of, yet that I have omitted some things I have no doubt, but am willing at any future time to answer any questions and impart any knowledge in my power, to aid thee and the valuable Agricultural Society of the county, whose advancement thee so ardently seeks to further. I remain thy friend,

THOMAS BAYNES.

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Queries, by James W. Thomson, the Corresponding Secretary of the Agricultural Society of New-Castle County, Delaware,—with answers by Thomas Baynes, of Wilmington, on the management and feeding of sheep.

Question 1.—What breed of sheep do you consider best, and most profitable for the feeding of mutton, in this and the adjoining states, to purchase, principally for the purpose of fattening?

Answer.—Half Bakewell and half Merino. A breed of sheep from the Glade country, State of New-York, answers very well.

Question 2.—What kind of sheep would best combine the fattening qualities, and yield to the farmer the most valuable fleece?

Answer.—*Bakewell*, viz:—Lambs at six months old, worth from four to six dollars, at 14 months, yield six to eight pounds of wool, worth 40 cts. per pound; at 24 months will sell for ten to thirteen dollars; if not sold, will produce from five to six pounds of wool, and have a lamb—continuing thus, till four years old, mostly decreasing in the weight of wool every year; at four, the fleece will not weigh more than four pounds, when they ought to be fed, and never kept older. It is a rule with good farmers, never to have their lambs before first week in March.

Question 3.—What should be the age of sheep to fatten best, and how is a farmer to know their age, and what length of time does it ordinarily take to make mutton sufficiently good for the shambles?

Ans.—From three to five years old. Their age is known by their teeth. At one year old they have two broad teeth in front; at two years old four, and at three years old six, or a full mouth; after this age their teeth begin to shorten.

They require three months to fatten, provided they are in fair order when purchased. Six weeks on grass, and six weeks on grain and hay.

Question 4.—What do you consider the best food for stall-feeding sheep, and how much food should be given to each sheep daily during the fattening process.

Answer.—Corn, oats and potatoes, with hay. It is necessary to be cautious at the commencement; the food should be three-fifths corn, to begin with half a pint to each sheep, daily for five days, increasing gradually to one pint for five days more, and one and a half pints for five days after, when one quart can be given with safety. It is best to give a few potatoes daily, say two bushels to every hundred head.

Question 5.—Is salt essential to sheep at this time?

Answer.—They ought to have it to go to at pleasure.

Question 6.—How many sheep, with advantage to the farmer, and their health, can be fed on a farm of from 100 to 300 acres, and how many can one hand feed and fodder?

Answer.—One hundred is considered a sufficient number for a farm of 200 acres, to be fed in three separate flocks. In England one sheep to every head of cattle is the rule. The labor is very trifling, one hand can attend 100 in one and a half hours—half hour morning, noon and night. *Be punctual to the time of feeding; it is of importance.*

Question 7.—Should fattening sheep be kept housed or suffered to run at large, and whether it is necessary to have any particular form for shelters, racks, or enclosures, for fattening sheep?

Answer.—Every farmer should have at least one sheep-house, to be two stories high; the upper story for hay in part, and to prepare their food in the lower story, open to the south with a yard attached to it twice as large as the house, or to contain twice as much ground as the house stands on. The rack and trough to run around the inside on the lower floor, four feet from the outside wall, to allow a passage; a small trough to be placed at the bottom of the rack, six inches broad and four inches deep, two feet from the floor. The racks must be perpendicular, to prevent the hay seeds getting into the wool, and slope the back of the rack; two feet will be sufficient for the height of the rack from the trough. The hay is given them from the passage over the back of the rack, but the food must be taken inside and carefully placed in the trough, even all along to prevent any one from getting more than his share. It is necessary they have water twice every day. If they go out to water never allow them to be out more than two hours at the time. The pen should be kept well littered.

Question 8.—What are the diseases to which fattening sheep are most liable, and what are the proper remedies?

Answer.—The disease most common is rot or lax—the best remedy known for it is half a pint of equal proportions of soot and salt. When sheep are feeding high they are subject to a disease supposed to be a species of cholic; the best remedy is to bleed at the eye vein, and give an injection composed of lard, molasses, and warm water; an injection is very good when they are too costive, but this never occurs when they have their proportion of potatoes, turnips or sugar-beets.

When sheep get torn with dogs, or by any accident rend the skin, the wound should be well washed with warm milk and water. Stitch up the place and bathe it with tincture of Cayenne pepper or spirits of turpentine.

Sheep are at times subject to foot rot or foul-claw; this can be mostly cured by placing in their path *quick lime* three inches deep, so that the lime will go well up between their hoofs. If this should fail, clean well their feet with a dry cloth, pare off the superfluous hoof, and apply butter of antimony; if it is still unmanageable they had best at once be sold, and then if care is not taken to clean well their pen, &c., the next flock will take it, as it is a contagious disease. Scab is a disease more common in Scotland and north latitudes; it is scarcely known in this country. The best remedy for it, is the oil of tar, placed in the wool on the back; a small quantity is sufficient.

THOS. BAYNES.

[The cautions given in the two following articles are well worth attending to in Virginia, where so much grass-seed is brought annually from the north. We already owe to the purchase of English and northern grass-seeds the introduction of several weeds which will never be got rid of; and it is surprising that we have so long escaped thus introducing the Canada thistle, the worst of all vegetable pests, and which never recedes from any ground on which it has been once permitted to encroach.]

From the Farmers' Cabinet.

CANADA THISTLE.

"Thou shalt not sow thy field with mingled seed."

Great mischief has arisen to our farmers generally, by sowing grass-seeds which were mingled with the seeds of noxious and pernicious weeds, by which means they have been disseminated throughout our country. The Canada thistle was brought from the northern part of the state of New York in timothy seed, and is spreading rapidly in some neighborhoods, to the great dismay of many farmers. I perceive that it has been noticed in your useful Cabinet, but I have not yet seen any thing stated in your columns that can be depended on as a remedy for eradicating it. I hope your correspondents will keep a close watch on this unwelcome intruder, and furnish you with the first successful experiment which results in getting rid of it. A farmer last season who had it among his oats, mowed it with the oats and burnt the whole together. This season it has made its appearance in his wheat, which will be destroyed by it in the part of the field where it has taken root. I hope you will excuse my calling attention to this subject, as it is one of great interest to many

FARMERS.

Bucks Co., June 1, 1838.

From the Farmers' Cabinet.

SOW PURE SEED.

"One year's seeding makes seven year's weeding."

It is very material when about to purchase seed, that we should select a seedsman of the first character, who has made the business his study, and obtained a thorough knowledge of it in its different branches, and not trust ourselves to transient dealers who may have their attention divided between many other articles of merchandise. Such persons may be strictly honest, and yet lack that information which every dealer in the article ought to possess. Always buy the best that is to be had, without regard to a small advance in the price over a common quality, and put plenty on the ground, as I hold it to be no economy to save a few dollars in the purchase of seed, at the risk of having it impure, or a less crop than the land ought to produce. It is also of great importance that we should become good judges of seed ourselves, or we may fill our field with weeds that will require years of trouble, and much expense to get rid of. Many are acquainted with the seeds of the most common weeds found in clover, timothy, orchard grass, &c.; such as wild carrot, daisy, (called underbloom by some persons, and Bensalem clover by others,) wild chamomile, (this also is called underbloom in some districts,) St. Johnswort, wild amaranthus, field sorrel, &c. &c., and as these pests are the common attendants of the grasses, their seeds should be known to us all. To attain this knowledge, I would advise every farmer to collect, when ripe, the seeds of every weed they meet with, fold them carefully in paper, mark and put them away in some secure and convenient place to refer to at any time, until they become so familiar with them that they can detect them easily when mingled with any seed they are about to purchase, and should there be any weeds unknown to any of us on our premises, it would be well to dry specimens of them carefully, and send them in a fold of paper, tied between two pieces of pasteboard, to the office of the Cabinet, where they would be marked by some one of the patrons of that work, and left for the inspection of all. In this way, there could soon be a collection made (to which the writer would contribute all in his power) that would enable the farmer to detect and extirpate many a troublesome weed, which would otherwise overrun his grounds.

To ascertain the true character of plants, they should be taken when they are in bloom, and they may be preserved simply by placing them in some large book with a sufficient weight to press them until they are dry, this will be accomplished in a few days.

FARMER.

From the Southern Agriculturist.

ON THE COTTON CULTURE.

Mr. Editor—In forwarding to you my annual subscription, I shall follow the laudable example of some of your subscribers by furnishing you a few practical remarks for publication. An emigrant from your own state, and the vicinity of your city, formerly engaged in the culture of the long-staple cotton on the main lands, conversant with the modes of culture prevalent there, and now engaged in growing the short cotton, upon the plans adopted throughout the whole western country, my experience has enabled me to detect some of the errors formerly practised by myself, and my neighbors in Carolina. My attention has been called to this subject by the perusal of an article in one of your late numbers, signed "An Observer," giving an account of the crop of E. Frost, Esq., in St. Andrew's Parish. Mr. Frost, it appears, planted, according to the low-country system, four acres of cotton to the hand, and each hand made 4,000 pounds seed cotton. This, the writer considers an extraordinary production —and for that region of country, so it is. It may safely be predicted that it will not soon be equalled by Mr. Frost, or any of his neighbors. With hands till lately accustomed to the same manner of working, I planted last year ten acres of cotton and ten of corn, to the hand. I never had a cleaner crop, and though the season was excessively wet, my negroes never performed their tasks with greater ease. The cotton crop, seriously injured by the worm, yielded 800 lbs. to the acre, and 8,000 lbs. to the hand. Mr. Frost's land exceeded mine in productiveness, yet my crop doubled his. His is considered so extraordinary, that it is held up as an argument against emigration—mine, was an ordinary crop, nearly doubled by many of my neighbors. But the question to be solved, is, how is the difference in the results obtained?

It is unquestionably true, that the soil and climate of the west, is better adapted to the growth of cotton—that here, a plant of the same size, and on a soil of equal strength, will send forth and retain a greater number of pods, than upon the sea-board. It is equally true, that the grass will grow as rapidly and as plentifully in the one place, as in the other. The difference in the soil and climate has not, however, as much influence, as is generally imagined, by residents on the sea-board. Would they adopt the same management, pursue the same modes of culture, which, somewhat modified, they unquestionably can, there can be no doubt, that though they could not obtain the success of the western planter, yet they would make some approximation toward it.

What then is this management and mode of culture?

1. The overseers are practical men and well paid for their services. Those most readily, as well as most generally employed, are such, as in addition to the general qualifications of integrity, industry and sobriety, have once tilled with their own hands their own soil, or have *cropped it* with others. They know what they have done themselves, and consequently what to exact of others; what the implements of labor should be, and most generally how to make and to mend them. It is with them common law, and almost universal custom, that they are to rise with the negroes, remain with them while they are in the field, and personally direct and inspect all that is done. They fear not labor, rain, or sunshine. To be seen attending to their business by negroes or employers, on *horse-back*, with *glove on hand* and *umbrella over head*, they would feel as a personal degradation and justifiable cause for "notice to quit." In general they will have no driver under them, by his example to teach others how to be drones, to do nothing himself, and to expect or exact little of others, and to divide responsibilities with them. In quickness of step, facilities, and despatch of business, their example, and theirs only is to be imitated. When the hands are necessarily divided, so that all cannot be under their direct inspection, they select one in each gang to be the foreman, and such a one, as will take a pride in being a leader, and will faithfully report all defaulters.

2. Negroes are well fed and clothed. They have their weekly allowance each, of three hundred pounds of bacon, or its equivalent, and as much hominy or corn flour, as they can consume, ground at the mills, delivered to them. When potatoes and peas are in season, they are permitted to use all they may want.

3. The horses, mules, &c., used on the plantations are of good quality, and well used. When purchased they must be recommended by their capacity for hard labor, and for the quickness of their step. If these are obtained, expense is a secondary consideration. The judicious planter does not act as though he thought that an animal good for nothing else fit for the plough. He will not use his broken-down carriage horses, mules worn out by harsh treatment, nor "old field tackies," which cost the catching of them, and waste the time of his negroes in following their snail-like steps. The description of horses and mules used under the charge of an overseer, such as has been described, ensures in a land of plenty, the greatest care and the best treatment.

4. But it is by the use of the plough that so much is achieved. By it, the beds are prepared for planting, the trenches or drills made, and the seed covered. By it, the most part of the grass is destroyed and the plant furnished with the requisite earth for its support and sustenance. By it the use of the hoe in a great measure may be dispensed with, and when used it will require comparatively but a small portion of physical strength.

It does appear to seem strange that the hoe-culture should ever have prevailed to the extent that it has on the sea-board, and more strange, that it should continue in this utilitarian and labor-saving age. Is it objected that the lands are low and intersected by drains and canals? There is indeed some force in this objection, but not enough to exclude the use of the plough. The lands in many places might be cleared and drained with a reference to its use. It may be safely affirmed, that there are few plantations, where the labor-saving machine could not be used, to the reduction at least of one-third of the manual labor.

It may interest some of your readers who groan under the pressure of their crops of eight acres of corn and cotton to the hand, and whose fears are alarmed lest the grass should overrun them, to learn how, by the use of the plough, twenty acres to the hand can be planted and the same crop secured. I will, therefore, give you in detail the arrangement of the crop on our plantation last year. There were, besides the regular crop, 75 acres of oats, potatoes, and slips, enough for the use of the plantation, and about 15 acres of wheat. The plantation worked 30 hands—15 at the plough, the rest with the hoe. In March, 300 acres were planted with corn, on land previously well ploughed and checked. In the first week of April, 300 acres of cotton were planted. The land was prepared by throwing together, with a turning-plough in the alleys of old cotton-fields, four furrows. Thus bedded, the drills were opened with a small scutter, or bull-tongue plough, in which the seed was sown; they were covered by a board fastened on the plough-stock, in the place of the mould. The drilling, planting and covering, occupied four days and a half. There was an excellent stand, and no replanting necessary. The ploughs and hoes then went into the corn-field. These were well ploughed and hoed by the time the cotton was out of the ground and required work. The cotton was four times ploughed, and as often hoed, and when laid by in July, a hat would have held all the grass that could have been found. The corn was twice more ploughed, and once hoed. The grass was constantly kept down by the ploughs. The daily task of a hoer was 100 rows of cotton 100 yards long. The first and second hoeings, when the cotton had to be chopped out and reduced to a stand, proved good, though not severe tasks; the other hoeings were light, and the workers were often out of the field by 12 o'clock. The crop was well worked, and with ease, by low-country hands, who would think it the worst calamity that could befall them, to be compelled to return to the place of their nativity. The mules and horses were in as good, if not better condition, than when the ploughing commenced.

In this exhibition which I have given you, of the management and mode of culture adopted by western planters, and of the working of a single crop, it appears to me that a stronger argument can be found against emigration from your shores, than can be deduced from the plans of Mr. Frost, or the suggestions of "An Observer." C.

Houston County, Ga., April, 1, 1837.

From the Genesee Farmer.

EFFECT OF NATURAL CAUSES ON THE AGRICULTURE OF ENGLAND AND THE [NORTHERN] UNITED STATES.

The question has been, not unfrequently, asked, how far are farmers in the United States justified in following the example and practices of British agriculturists? This question assumes an importance it would not otherwise possess, were it not a fact, that we look with great interest to the results of agriculture in that country; that most of our standard agricultural works are from that side of the Atlantic; that the wealth and resources of England are such as to render that island a great theatre of experiments; and, that the arts and the sciences which can be brought to bear on the cultivation of the soil, are far more extensively diffused and better understood there than here. Having the same Anglo-Saxon descent, the influence of England is felt in every department of our social condition; in our religion, literature and law; and perhaps is as potent as any where, in the usages and practices that belong to the cultivation of the earth. In our implements used on the farm, we copy from English models; in improving our breeds of horses, sheep, and cattle, we look to stock imported from England; in our horticulture and floriculture we follow the example of English planters and gardeners; and in our farming operations, in culture, and in selection of grains, the influence of that country is paramount. It is necessary then to inquire how far we may safely follow such an example, and in what respects we ought to deviate, or when it becomes necessary to do so.

To determine this question correctly, it is necessary to take into consideration the position of the two countries, so far as regards climate, soil, and population, and their influence on plants, and the prices of labor. In general, it may be laid down as a correct position, that the difference between the soils of the two countries is not of a kind to render any difference of culture important. The analysis of soils effected by Sir Humphrey Davy; the geological structure of the British Islands; and the extensive and minute reports made on the soils in the agricultural surveys of the several counties, show that there is no essential difference between the composition of the greater part of the British soils and ours. Peat and bog soil, alone, is found more extensively diffused than with us; but this has but little influence on the general progress or course of agriculture.

Population, by justifying or rather compelling English farmers to adopt peculiar systems of farming, may be said to create a wider difference between the agriculture of the two countries than any arising from the soil. Owing to what may be termed an immense surplus population, the price of labor is reduced to the lowest possible rate at which bare subsistence can be procured, and in consequence, many methods of farming are there adopted, which could not, at the prices of labor and products, be otherwise than ruinous here. For instance, weeding wheat and other kinds of grain is a very common practice there, and multitudes of women and children earn their bread for a considerable part of the season in this manner. It is clear that this operation cannot be introduced among our farmers, though its effects in keeping the soil clean, and in increasing the amount of the crop, must be evident. Another consequence too of the cheapness of labor, is, that many operations are performed by hand, and at a far greater expense of time, than are accomplished by the aid of implements here, and in one-fourth of the time. This no one can doubt who is in the habit of employing on the same farm English and American laborers; and of which an illustration is given by Mr. Bement, in his history of the culture of the ruta baga, in the Cultivator for January, 1838.

But it is to the climate that the principal points of difference in the agriculture of the two countries must be traced; and this is the thing that should be kept most distinctly in view, when comparisons between English agriculture and our own are instituted. England, though in the latitude of Quebec, has a milder climate than our middle states, and this fact should not be lost sight of in adapting the agriculture of that country to this. In the United States,—we speak particularly now of the northern and middle states—as it is these that are more influenced by English agriculture than the south,—the summers are much hotter and the winters much colder than in England; hence some plants, that require a great degree of heat, will succeed better here than there; while many plants will bear the winters of England in the open air, that perish when exposed without protection to the intense cold of our winter months. A great number of thermometrical observations show that the average temperature of the three months of January, February, and March, in England, is about 37°, 42°, and 47°, and that of the three months of June, July, and August, to be about 63°, 66°, and 65°. The average difference between the highest and the lowest temperature per month will not exceed more than six or eighth degrees, those sudden and extreme changes to which our climate is subject being unknown there. In the valley of the Genesee, near the Ontario, the average for the three winter months gives about 24°, 26°, and 36°, and the three summer months an average of 71°, 73°, and 72°. The mean average of several years is 49°, and the range of the thermometer about 100°. In this country we have changes of from 30° to 40° in twenty-four hours; there the greatest rarely exceeds six or eight. The thermometer range in the United States is more than 120°,—in England not more than 45°. There the thermometer rarely descends but a few degrees below the freezing point; here it is below for weeks or months. Indeed it is probable that, in the colder parts of the United States, the thermometer falls below 0°, as often as in England it does below 32°.

This statement will show that there must be a material difference between the agricultural operations proper to two countries so situated, so far as those operations can be affected by climate. To give one instance;—Indian corn it is ascertained cannot be grown in any country where the thermometer for more than one month is not above 70°, and that in a temperature of 75° or 80° it arrives at its greatest perfection. This is the reason why, notwithstanding all the efforts made to introduce corn into Great Britain, it has proved a complete failure. It is not killed with the frost there as here, but the degree of heat will not bring it to maturity during the summer months. Cobbett was confident he should succeed, and did grow some tolerable crops of early Canadian, but like some trees which flourish and mature their seeds here, but will not ripen in England, the corn would not in all cases mature so as to vegetate, and, spite of his boastings, he was compelled to abandon the culture. On the contrary, wheat is a crop that requires a lower temperature than maize, and is not adapted to a hot dry climate. Great Britain is therefore one of the best wheat countries on the globe, and perhaps produces, in proportion to the land in tillage, a greater amount than any other. The low temperature and moist climate of England is found to agree with this plant perfectly. Scotland is too cold; but no part of the Island is too hot, as is the case with no inconsiderable portion of our southern states.

In another important respect the climate of the two countries exercises a decided influence, and that is the planting and growth of timber or ornamental trees. Mr. Prince of the Linnean Garden at Flushing, remarks on the acclimation of trees, "that the *deciduous* trees of Portugal, Italy, and Spain; and of South Carolina, Georgia, and Louisiana, will endure the winters of New York, when the *evergreens* from the same places perish if unprotected. Though in England where the winters are moderate these survive and flourish, while from the want of heat in their summers, many of the deciduous trees do not ripen their wood sufficiently to support their climate in winter; whereas beneath the powerful sun of our country, the wood becomes so well matured, that it, in many instances, resists the rigor of our winters uninjured. A consideration of these circumstances, and effects of climate, may greatly aid those concerned in the acclimation of trees." In the work on Planting published in London, speaking of American forest trees, the following remarks are made. "But the oaks of North America, claim the deepest attention of the ornamental planter. Ranging through many degrees of latitude, and growing at different elevations, consequently under much variety of climate, some of them are hardy with us, some tender, but all abhorrent of wet or clayey soils. Deprived of the cloudless sun, and high temperature of an American summer and autumn, they cannot ripen their shoots sufficiently to be frost proof except in warm places and soils of a light nature."

As an instance of the effect of climate on trees we may mention the *Platanus occidentalis*, the common sycamore, or buttonwood, of our forest; a tree which every one knows fringes the margin of most of our streams, and rears its majestic trunks in the rich alluvion of all parts of our country, one of the hardiest and most rapid growing forest trees of the northern states; yet of this tree, the work on planting to which we have referred says, "that it has proved incompetent to withstand the spring frosts, sunless summers, and clouded autumns of England. About twenty years ago a great proportion of the individuals in England, without respect to age or bulk, were killed outright by a spring frost. Since then we have seen them repeatedly injured, and, when half recovered by the operation of a summer of more than average warmth, again replunged into the same state of debility."

To this difference in climate must be attributed the difficulty we have found in the United States of growing hedges from such shrubs or trees as are used in England for this purpose. From witnessing their excellent effect, and beautiful appearance there, it was perfectly natural that we should adopt the same plants for the same purpose here, but after the repeated and persevering efforts of fifty years, it may be questioned whether there are five miles of tolerable hedge from imported varieties of thorn or holly plants, in the United States. The difference between the moist, temperate, and equable climate of England, and the hot, dry, variable climate of this country, seems to have been overlooked; when a recollection of this fact would have convinced any one acquainted with the physiology of plants, that our seasons must be fatal to English hedges. Whether there are any of our native plants that will supply this desideratum, remains to be seen.

Not immediately connected with agriculture, but still closely associated with its prosperity, is the effect of climate on roads. In England all the principal roads are Macadamized or covered with a thin layer of finely broken stone, that uniting by its own angles forms a pavement of rock impervious to water and smooth as a floor. Vast sums of money and labor have been spent in this country in attempting to give some of our principal roads such a surface, but mostly without success. The frosts of our winters penetrate below any coat of metal that can be applied, and the lifting and heaving thus produced will break up and destroy the pavement annually. There can be no doubt that more labor and stone broken, has been applied on the Seneca turnpike between Utica and Canandaigua, than on any similar road in England; yet while one is as smooth as if composed of solid rock, the other for some months in the year is almost impassable. This is owing to the greater intensity of our frost; and in constructing our roads, by overlooking this difference of climate, or not properly guarding against it by deep and effective draining, we have followed a system not adapted to our country. Against this additional difficulty our lines of rail road must contend, and any system of construction that shall place them beyond the action of frost, will be a national benefit.

The worst effect which our variable climate and intense cold has on our agriculture, when compared with that of England, is its influence on our wheat crop. Such a thing as winter killed wheat is scarcely known in that country; while in many parts of this, especially where clay predominates, wheat in all seasons is more or less liable to injury, and in some years has more than two-thirds perished. The heaving out of the roots of wheat and clover plants by the expansion of frost, and which is here the most fatal in the spring of the year when it thaws the surface by day and freezes it by night, is something which agriculturists in that country are rarely called to guard against, and which of course never enters into their calculations in the preparation of their soil. Here it is advisable in all cases to guard against the evil, by such a system of ploughing and manuring as shall most effectually obviate the danger arising from this source.

In reading or adopting the modes of English farmers in the preparation and application of manure, the influence of climate should not be forgotten. If any thing has been established by agricultural chemistry, it is that all manure loses in value exactly in proportion as the fermentation and decomposition goes on in the open air, by which most of the volatile and finer parts of the manure is lost to plants. In a high temperature, such as our summers possess, yard or stable manure will ferment rapidly, and if left as it generally is, exposed to the rain and sun, its value and efficiency is much lessened. If piled in large masses, as is practised by some farmers, and then allowed to stand through the summer, a custom followed to some extent in England, it must be remembered that fermentation and decomposition go on here with a rapidity unknown there, a fact depending on the greater heat of our summers, and hence the more necessity of guarding against the loss of the fertilizing gases thus liberated. The proper place for the decomposition of manure is beneath the surface of the earth; but where it is desirable, as it sometimes may be, to keep it over the summer for fall application, the manure should be piled in layers alternating with earth, (and if this is partially combined with lime so much the better,) which will absorb the volatile salts and parts thrown off by the decomposition and fermentation which in our climate must take place, and the quantity and quality of the manure will be greatly increased, over what it would be if left to ferment in the yard, or heaped, but uncovered with earth.

It appears then, that in things relating to the soil alone, its preparation or amelioration, the application of animal or mineral manures, or the artificial arrangement of crops, American farmers may with safety copy the example of British farmers, and derive important advantages from the perusal of English works on agriculture. So they in general may, in all things relating to the preservation of crops from insects or diseases, such as the grub, cut-worm, blight, mildew, wheat-worm, &c., as these are common to both countries, and the balance of experience is altogether in favor of Europe. In every thing relating to wheat they are entitled to a hearing above all other men; as in no country is the culture of that valuable grain carried on so successfully; and this is owing in a great measure to the skill and science that has been brought to bear on the production of that crop. In raising cattle, and the common and improved breeds of middling fine wooled sheep, English farmers are exceeded by none, and on all these topics they may be considered as qualified to instruct us. Fine-wooled sheep, however, notwithstanding the pains taken with them have never succeeded in England. The imported Merinoes from Spain and Saxony have deteriorated and wasted away; and their place with the English farmer is supplied by the hardier and heavier Leicester and South Down. The immense quantities of fine wools used in the English factories, are imported from Germany, France, and Spain; and hence in the management and growth of the fine-wooled breeds of sheep, we have little to learn from them. There is no doubt that the production of fine wool is at the present moment far better understood in the northern states than in England, and there are more Saxon and Merino sheep in Vermont and New Hampshire, than in the three kingdoms.

But it is mainly on those points of agriculture where cheapness of labor, and the influence of climate can be brought to bear, that we find British agriculture to cease from being suitable models for us, and are thrown on our own resources of observation and comparison. Because corn cannot be grown in England is no reason why the farmers of the United States should not plant; and on the other hand, because the whin and the holly make a durable and beautiful fence in England, it furnishes no conclusive proof that such results would ensue in our country. English farmers use little or no precaution against the winter killing of wheat, or the destruction of roads by frost; but here such precautions are essentially necessary, and based on reasons, respecting which the English farmer knows nothing from experience, and therefore must be illy qualified to instruct.

A comparison of English experience in farming, with our, in some respects, ruder methods of proceeding must be always advantageous, as suggesting hints for improvement, and enabling us to correct errors into which, for want of such experience, we are prone to fall. But to infer that any course would, as a whole, be successful here, simply because it has proved so there, would imply an ignorance of the causes that are operating to produce great differences in the methods of culture there and here, which should not exist; causes which may be traced to the powerful, but too frequently overlooked operations of temperature and climate, and which are therefore ever acting and permanent.

From the Journal of Commerce.

CLIMATE AND PRODUCTS OF EAST FLORIDA.

St. Augustine, April 17th, 1838.

MR. WM. VIBER,

Sir—Gen. Peter Sken Smith has handed me yours of the 3d of March, making inquiries respecting the climate and productions of East Florida. He states that his various engagements will make it inconvenient for him to answer you. I have consented to do it, and the more readily as I can trust to the publicity which you propose to give the facts communicated, meeting the eyes of those who have made similar inquiries of me. I would thank you to procure the publication of the answer in the Northampton (Mass.) paper.

I will adopt the course suggested by you; taking the liberty to vary some of your questions, and to add some put by others: For the satisfaction of those interested in silk growing, I send you the enclosed impressions of leaves: one of the Chinese mulberry, one of the native mulberry, and one of the Italian; all taken on the 4th of April inst. and which, if you please, you can give with this article, by a wood cut, at a trifling expense.

Is St. Augustine a healthy summer, as well as winter, residence for northern people? It is pronounced not only perfectly healthy, but agreeable, by many northern people, who have spent the summer here, and by many northern families who have settled here permanently.

What is the general effect of the climate of St. Augustine on northern invalids? Persons laboring under pulmonary, asthmatic, bronchitis, or dyspeptic complaints, may find a cure here if they come in the early stages of those diseases. In many cases it would be necessary to remain through the summer, and in some a permanent residence would be indispensable to a perfect cure.

Is Florida as a country healthy? Many places in the interior are unhealthy in summer.

What extent of country can be found on the coast where northern families could reside during the summer free from fear of southern diseases? The country between the ocean and the St. John's river, embracing a district of one hundred miles long and twenty wide, is generally healthy, and so are many points on the Gulf coast.

What is the quality of the soil? The pine barren is somewhat similar to the land between Albany and Schenectady. The hammock is low land covered with live oak and other timber. When drained and cleared it makes the finest sugar land. The shell lands, lying on and near the margin of salt water rivers, are those soils where oyster shells have been deposited, which gradually mix with and enrich the soil. These lands produce corn and cotton. Some of them have been cultivated since the settlement of the country in 1565 without manure—and the best portions of them will produce from thirty to forty bushels of corn to the acre. Two crops of Cuba corn can be raised in a year. Since the war commenced the average price of corn has been $1 50 per bushel.

What is the relative profit of cotton compared with corn crop? About threefold from Sea Island, which grows well in every part of Florida.

Is there any particular skill required to raise cotton and prepare it for market? None that cannot be readily acquired by any intelligent man.

Is cotton growing carried on wholly by negroes? It is often raised by white labor, and plantations vary in size, as at the north, from a few acres up to a thousand.

What is the relative value of sugar crops compared with corn, and can it be raised to profit in small quantities? Good hammock land well reclaimed ought to yield a clear profit to each hand, at present prices of sugar, $400, and there is no reason why it should not be cultivated by white labor in small lots. Indeed it has been common for the small planters of this country to raise their own syrup and sugar. Live oak answers well as a substitute for iron rollers to grind cane. The cost of a wooden sugar mill is about the same as that of a cider mill. Sugar produced by white labor will, I presume, command a ready market and higher prices from those abolitionists who will consume nothing raised by slave labor.

Are rice, tobacco, and indigo, raised in Florida? Rice can be profitably raised only where the rise of the tide flows back the fresh water rivers so as to submerge the land. East Florida cannot therefore be called a rice country. Havana tobacco has been, and can be raised here, to great profit, and is a sure crop. Indigo was once extensively cultivated, but at the present prices would not pay for expenses.

Is the country well adapted to oranges? Few places in the world where the orange tree has grown to so great perfection, and none where the fruit is better. The frost of 1835 destroyed the trees, many of which had stood nearly if not quite one hundred years. Extensive groves have been set out, and they begin again to bear. A few were produced last year, and there are some now in blossom. The trouble of raising orange trees here is about the same as raising apple trees at the north. The average produce of a tree ten years old would be five hundred, of one twenty years old, a thousand oranges. Many trees produce annually twenty-five dollars. Light sandy soil is required for oranges; and as the tree advances, shell or manure can be added to hasten the growth of the tree if desired.

Are the wild oranges (said to abound in the wood) the same as the cultivated, and are there in fact large groves of them? They are as large as the cultivated oranges, many of them palatable, though generally acid or bitter. They are found in such quantities that ship loads might be gathered from a few acres of land.

Is the mulberry a native of the country? Has the Chinese mulberry been tried there, and if so, how does it succeed? The native mulberry abounds in the woods, but the Chinese can be produced so easily and abundantly, that it must be preferred to any other kind tried in this country for silk worms; and besides it puts forth leaves more than a month earlier than any other mulberry here.

Will Florida become a silk growing country? I believe it will. A few worms have been raised yearly for the last few years. Several thousands are now on hand. They appear to do well, and I believe would thrive in the open air, if protected from the winds. Those who attend them say that they pass through the various stages of their growth in fine health, and are great eaters. Some hatched on the 27th of February, completed their cocoons on the 9th inst. My ignorance of silk-raising admonishes me to give you facts rather than my opinions. So far as mulberry leaves are connected with silk business, there is perhaps no place where they can be raised in so great quantities so cheaply as here. The Chinese mulberry will grow from a slip over ten feet in one year. Mr. Ephraim Hart, of Utica, can testify to this fact, who made the experiment last year. They grow well on the pine barrens. I have made the experiment with white labor, and find that slips can be put out after the ground is prepared, for thirty-seven and a half cents per thousand, including cutting of the slips. Suitable lands can be purchased for $3 per acre. If twenty thousand dollars (the sum said to be laid out by the Genesee company for mulberry alone) were expended in this country in purchasing land and putting out the Chinese mulberry, it would be sufficient to purchase four thousand acres, and plant a slip on every square yard. The Chinese mulberry will grow as much here in one year as it will in western New York in three; and the difference in the production of leaves is still greater, as here successive crops of leaves may be picked from the same tree. Minorcan children would offer in hundreds, if required, to collect leaves, or perform such service as would be necessary in a silk establishment.

What is the price asked for lands suitable for corn, cotton and oranges, in the vicinity of Augustine? Good farms can be bought for from four to ten dollars per acre. The abandonment of all the plantations from fear of the Indians has been the cause of the present low prices. Plantations on the North river, (which is navigable from eight to twelve miles from this city) can be bought for from four to seven dollars per acre, the soil well calculated for cotton or corn, and as good as can be desired for oranges. These plantations contained fine orange groves before the frost of 1835.

What other fruits can be raised to profit about St. Augustine? Figs, peaches, pomegranates, plums and citrons thrive well here, and can be raised to any extent.

Are potatoes easily raised there? The sweet potato is much cultivated and is a sure and very profitable crop. Its quality is superior to that of the potato raised farther north. The Irish or common potato grows well here. Two crops can be raised in a year. The plantings of February will come in for use the last of this month. Small parcels are already offered in market.

What is the state of society in St. Augustine? A. The majority of the inhabitants are descendants of emigrants from Minorca, Smyrna, Port Mahon, and other places on the Mediterranean, who settled in this country during the British occupancy. They are a peaceable, inoffensive people. The women are remarkable for neatness and industry. They are Catholic in their religion—observing the Sabbath in the manner of the Spaniards, but otherwise orderly and obliging. Of the Americans, there are many intelligent and enterprising men with cultivated families. They are of the Episcopalian, Presbyterian, Baptist, and Methodist faiths. The two former sects have each a settled minister and a good house of worship. The Baptists and Methodists have neither. The Catholics have a church and schools. A college has recently been established in the city.

Is East Florida capable of supporting a large population, and what are the prospects of a speedy settlement? A. The proportion of good land suited to the growth of cotton is greater in East Florida, than in South Carolina, and as great as in Georgia. There are very large tracts of sugar lands, equal to those of Cuba. Lands too light for either cotton or sugar, are well suited to the orange and other fruits, the raising of which will give profitable employ to a large population. From the peculiar advantages presented by the soil and climate of Florida to emigrants, the country must settle with a rapidity equal to Michigan or Wisconsin, and in a few years East Florida will become a state, and will furnish, at no distant day, a supply of sugar and fruits to the United States. The whole country is interspersed with navigable lakes and rivers, and there is no region of the United States, where good roads can be made at so small an expense, except it be the prairie country of Illinois.

In answer to several questions relative to families of small property being able to obtain as comfortable a living here as in the north, they can by referring to the facts before stated, decide for themselves. Much will depend on industry and economy in this as in every other country. I will, however, remark, that I have nowhere seen poor people live so comfortably with so little labor as some of them do here. This is owing, in a great measure, to the absence of winter, the abundance of fish and oysters, and the ease and cheapness with which vegetables are raised. Northern men intending to settle in this country, should know that since the war commenced no lumber has been cut in East Florida, or bricks made. All building materials for the present must be obtained from the north. Should you desire further information in relation to Florida, address me at Buffalo, during the summer, and I will answer you with pleasure. Yours, &c.

SAML. WILKESON.

[The foregoing article was accompanied by the representations (referred to above) of mulberry leaves of the natural size. Measuring these by their longest *straight* lines, the sizes are as follow:

Chinese mulberry *(Morus multicaulis)* length		$8\frac{1}{2}$ in.
Native or Red mulberry *(Morus rubra)*		$3\frac{3}{4}$ in.
Italian (White) mulberry,		$1\frac{3}{4}$ in.

If the design of this exhibition was to show the general comparative sizes of the leaves of the several kinds, it is delusive; and so are most other statements of comparative sizes. The sizes of leaves are very different at different times, and situations, not only of the same kind of mulberry, but even upon the same plant. Young trees, and in the most succulent state, and during the most forced and rapid growth, have much longer leaves than afterwards. The leaves of the Chinese mulberry are certainly larger than those of other kinds; but few of us, however, have ever seen any of that kind, except in very young plants, rapidly forced by rich soil and careful culture—and therefore, the leaves are much longer than will be found in after times, and with proper and economical culture. We have seen leaves of young and succulent trees of the native mulberry, grown in the woods, as large as a breakfast-plate—and measured one which was more than twelve inches on its longest line. Yet the same individual would afterwards probably bear leaves not half so long.—ED. FAR. REG.

IMPORTANT TO FARMERS.

A machine has been invented by Milton Dayton, of East Hampton, Long Island, by which he thrashes his own grain, at the rate of fifteen bushels per hour—grinds it at the rate of two bushels per hour—saws his own timber at the rate of one foot per minute, and dresses his flax in proportion. The machine is carried by two-horse power. The expense does not exceed three hundred dollars, and a mere trifle will keep it in repair. It will be of great advantage to farmers, and especially in neighborhoods denied the advantages of water-power.—*Farmers' Cabinet.*

From the Southern Agriculturist.

ON GRASSES.

Athens, Ga., March 6, 1837.

Dr. James Davis:

Dear Sir—I have to day read, with great pleasure, your article, in the Southern Agriculturist, "On Grasses for South Carolina;"* because, in it, you speak, I think, in proper terms of the Gama-grass. I began my experiments with it, about the same time with yourself, and very soon became convinced of its exceeding great value. My attention was directed to it from the conviction, that we must look among our native grasses, if we wished to procure plentiful supplies of forage for our cattle.

You remark, that the only objection you know of to this grass, or rather the only difficulty attending its culture, is the difficulty and tardiness of propagating it. Allow me to suggest, most respectfully, that your "objection" is very easily obviated. All you say of the difficulty of collecting the seed, I have found to be exactly true. I attempt not, therefore, to collect seed; but let it drop; and dig over the surface of the soil in the fall to cover the seed where it may happen to lie. In the spring following I find it comes up thick; and taking advantage of a moist day, I take up the young plants, and set them out where I want them to remain. They are so tenacious of life as to occasion no loss in transplanting.

I have tried another mode of propagation with equal success. I take up the old bunches early in the spring, and divide them; and set them out again (just as shallots are divided and set out); and I have found that they grow without any difficulty. I have taken up a single bunch, one year old, that when divided gave me *seventy* plants.

In either of these modes, if diligently pursued, there is really no difficulty of propagation to complain of; when we consider the very great value of the thing when it is done: and its very great durability; as you may easily prove by figures.

An acre set 2 by 2 feet, will contain about 11,000 plants. Suppose a bunch one year old, when taken up and divided, gives only 30, instead of seventy offsets. To plant an acre the second year, you have to begin with 366 plants. Taking both modes together; that is, dividing the roots, and taking up what comes up from the seed, and half that number of plants would be enough to begin with. But suppose it required double the number; I think tardiness of propagation should not be an "objection," especially as an acre once planted will last a man his lifetime, most probably.

As to duration, the only information I have is derived from a gentleman of Alabama, who states that *nineteen* years ago he enclosed a lot of it, as he found it growing on his land; and that now it is better, and yields a greater crop than when he enclosed it.

I have ascertained satisfactorily, that *thirty thousand* pounds of green grass to the acre, is a moderate crop. Carefully dried, the loss is as 17 to 5: that is, 17 pounds of green grass will give 5 pounds of well-cured hay.

No man who has the slightest regard for the independence of his own state, or for his own comfort, should lose a moment's time in getting a few acres well set with grass. For hay, or green food, or soiling, both in ease of cultivation and in value, it is as far above the clover and timothy of the north, as our cotton is above their onion crops; and the only thing that can prevent its universal cultivation here, will be our over propitious climate: adding another to the many facts already existing, going to establish the truth, that where nature is over bountiful man is always a spoiled child.

If the hints I have given shall be of any service to you, I shall be particularly gratified.

Very respectfully,

James Camak.

Columbia, S. C. March 11, 1837.

Dear Sir—The testimony you add in your esteemed favor of the 6th inst., in favor of the culture of the Gama-grass; and the suggestions you offer for surmounting the difficulty of its propagation, are particularly gratifying. Fully persuaded as I am of the vast importance to this state, and, I have no doubt, to Georgia likewise, of cultivating the grasses in conjunction with the cultivation of our favored staples, I cannot but hail, as a happy presage, every effort that is attempted in furtherance of that object. And as the gama-grass must assuredly hold out a fair promise of a rich reward, I think every intelligent patriot discharges one substantial duty, when he encourages the extended cultivation of it.

Your suggestions for facilitating the propagation of this valuable grass are striking; but still I am afraid they do not remove the difficulty, so far as we would wish.

You speak of letting the seed drop and lie, and digging the surface of the soil in the fall, to cover them. When they come up in the following spring, you transplant them where you intend them to grow. Now, according to my observation, this plan, in the usual close way of planting, is only practicable during the first and second years of its growth; before the grass has spread much, and before it has taken on its wonted luxuriance. On my lot, which is high sandy land, and not very rich, after the second year, if I do not cut it, but leave it to go to seed, the sward becomes so rank, and covers those spaces between the drills so densely, that it would be absolutely impracticable to dig the ground under it in the fall. Indeed, it is with no inconsiderable trouble that we can wade through it to gather the seeds from their spikes. And moreover, if I ever had a crop of young plants in the spring, under the deep and heavy bed of dead grass that covers the ground,

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* See Farmers' Register, vol. iv. p. 581.

it would cost a good deal of labor and pains to remove it, and get at them. As I before said, therefore, it seems to me this plan will only succeed during the first and second years of its growth; and whilst it is yet not very prolific of seed. Or perhaps the difficulty may be obviated by planting in rows very wide apart, in a lot purposely set apart for the purpose of raising young plants.

Your other plan of taking up plants of two or three years' growth, dividing and transplanting them is, doubtless, perfectly practicable. I have, myself, divided a tussock into seventy good plants. But as you say, if they will only furnish thirty, then, twenty-nine-thirtieths of seed will be dispensed with: or one bushel of seed may be made to plant as much in this way, as thirty bushels when planted from seed in the ordinary way.

This plan, although not difficult, must, nevertheless, be rather tardy; but, as you justly remark, when we consider the great value and durability of a lot, when once set with it, the objection dwindles into insignificance.

The whole tenor of your letter is so apposite to the subject, and so well calculated to encourage the culture of this grass, that I must beg your permission to send it to the Southern Agriculturist for insertion. And as articles of this description lose nine-tenths of their value and authority by appearing anonymously, I hope you will permit it to be published with your name.

I am, dear sir, respectfully, your most ob't.

JAMES DAVIS.

From the Farmers' Cabinet.

CAPONS.

In the last number of your highly useful periodical, I observe an article very properly recommending the production of capons, by our farmers and others, for the city markets. Your correspondent has the merit, so far as my knowledge extends, of first publicly noticing this important matter of agricultural economy. I say "publicly" noticing this matter, inasmuch as several gentlemen of my acquaintance have in various ways endeavored to accomplish this desirable object; but, I regret to say, without the least approach towards success.* Fowls have been by them operated upon in the West India mode, by puncture, and in the Chinese and European manner, by incision, but so far the result has been death to the animal, or its nature unchanged. They have endeavored to get information from books, and have even had the assistance of those who *say* they performed the operation frequently in Europe, but notwithstanding all of their attempts at mutation, the object has not, in a single instance which I have heard of, been effected. I am aware that in the West Indies, China, Western Europe, and other countries, women and children are successfully employed in this kind of surgery, but it somehow happens that I have never seen a capon in this country; although I must confess that I have frequently heard of them, and with your correspondent "Civis" understood that the art was "easily acquired." Mrs. Glasse, in her directions for cooking a turbot, says, you must "take him;" and I should, by parity of reasoning, suppose that to eat a capon you must first *make* him. Now will our friend "Civis" put us on the right tack between this and next August, by which we may, in the course of another year, both take and *eat* of this delicious bird. If he feels the same interest which myself and many others do, he will doubtless comply with the request. I also agree with "Civis" that it may be made a profitable business in this country, and may hereafter endeavor to point out the mode whereby persons with a very small capital, near our great cities, may make a livelihood, if not a fortune, in an easy manner. It should be remarked, that the operation is not confined to the dunghill fowl, but that it is successfully extended to the turkey, goose and duck, both male and female. Should your correspondent find leisure to give us his experience and the *modus operandi* in your next or the succeeding number, I shall then endeavor to offer some suggestions which may be profitable to our farmers and others.

RUSTICUS.

* See Cabinet, Vol. II. page 145

From the Farmers' Cabinet.

PEACH-TREES.

Sir--By an error of the press, the latter part of the communication at page 308, "on planting peach-trees," is rendered unintelligible; the manuscript reads thus:—"The subsoil of Jersey is ferruginous and acidulous; lime and the calcareous earths, are correctors of these evils."

The worm in the root of the peach-tree and the excrescence on the branches of the Morello cherry, are not the *cause*, but the *effect* of disease, which arises either from a poisonous subsoil, or an exhausted surface; the cure might be effected by carefully removing the soil about the roots to a considerable depth and distance, and replacing it with fresh rich mould, with which lime or calcareous earth has been well mixed. The *old folks* understood well the advantage of this treatment, for at the 7th verse of the 13th chapter of Luke, we find the dresser of a vineyard petitioning the owner to let the fruitless fig tree stand another year, "till I shall dig about it and dung it;" and I knew an excellent farmer, who, at the time of killing his hogs, reserved the blood, with which to dress his fruit trees; and this he did, by opening the ground about the roots, and pouring it upon them, closing the earth over it. And when, through age or infirmity, he found it necessary to remove a tree, he was careful to take away the earth in which it had grown, to a considerable depth, and replace it with the best mould he could procure, always mixing lime with it, and into this the young tree was planted. I have even known him to lay a pavement in the bottom of the hole before filling, if he found that the roots of the old tree had penetrated to a wet and sterile subsoil, to prevent the young tree from throwing its roots so deep. And for this man also, as well as for Mr. J. Reeves, (see p. 297) *peaches would always grow*. His trees were so strong and healthy, and full of foliage, that they could bear a little frost, and throw off an attack of blight, which would be sufficient to prostrate the hopes of his neighbors for the whole year. The disease called the "yellows," I am confident, arises from the cause above mentioned.

AN OLD FARMER.

From the Farmers' Cabinet.

POULTRY.

"She that won't stoop to pick a pin,
Sha'n't stoop to pick a bigger thing."

For many years past, there has been a great demand for poultry and eggs, at high prices, and it seems likely to continue; for the causes which produced it are still in operation and are likely to continue and increase. The increase of steamboat and railroad travelling in our country has produced an increased demand for all the luxuries of the table, beyond the current means of supply at moderate prices; it therefore becomes the interest of farmers to devote a little more attention to producing those articles which always sell readily and at a good price; particularly as the labor connected with the rearing of poultry, if labor it can be called, is light, and can be performed by the younger members of a family, without infringing on the time devoted to the more important labor of the farm. It is an agreeable relaxation, if engaged in in a right spirit, and has connected with it many pleasant associations.

It should be the care of those who engage in the business of rearing poultry on a large scale, to study sound economy in feeding them, otherwise they may be disappointed in the expected profit. With some there is great carelessness and waste apparent, particularly in feeding with food of a more expensive character than is necessary. Having seen large quantities of poultry raised and fattened for market principally on boiled potatoes, I take the liberty of directing the *girls*, who are your readers, to it; hoping that daily, when they boil potatoes for family use, they will put enough in the pot, over and above what may be necessary for the family, to feed the chickens till the next day, and so continue it from day to day, occasionally alternating it with other kinds of food for a relish, and depend upon it you will find,

"That a penny saved, is two pence earned."

Q.

From the Genesee Farmer.

TURNIP DRILLS.

The expense or difficulty of procuring good drilling machines, induces many to sow their turnips broadcast, and thus in some degree to diminish the crop, by the want of evenness or regularity which attends broadcast sowing. Others, with considerable labor, drill all their turnips by hand, without the assistance of a machine. In this case, the most tedious part of the operation is dropping the seeds evenly. Where hand drilling becomes necessary, this part of the work may be greatly facilitated by a method described in a former volume of the Genesee Farmer. A hole is made in the bottom of a tin cup, of just such size as to allow the seeds to pass freely through when it is shaken; this cup is fastened to the lower end of a wooden rod about two and a half feet long, which serves as a handle, and the operator passes along the drill with an even pace, shaking the cup constantly and thus dropping the seeds evenly and expeditiously. The disadvantages are, that it is requisite to draw a furrow previously, and afterwards to cover with a hoe. If the land is well prepared, several furrows may be drawn at once by means of a horse attached to an instrument for the purpose, somewhat resembling a large heavy rake head, with short blunt teeth. The teeth of a cultivator, inserted into such an instrument, are still better. In this way a man may plant from one quarter to one half an acre a day, the quantity varying with the distance of the drills from each. But with a good drilling machine, he may sow and cover the seeds equally well with one-tenth of the time and labor.

Many entirely neglect the culture of turnips from the difficulty of procuring suitable drills; and on the other hand, this difficulty is owing in a great measure to the very limited extent to which they have been cultivated. Attention has not been sufficiently directed to their construction. Nearly all the patent machines which have hitherto been offered for sale, without possessing any very decided and exclusive advantage, or any thing truly valuable but what was known long ago, have been offered at unreasonably high prices. It is true there is always an advantage in purchasing implements and machines ready made, as when made by the quantity they can be furnished much cheaper; but a turnip drill, sufficiently good, need not in any case to cost more than two or three dollars. A good mechanic can easily make one for this sum. To enable the farmer if necessary to contrive and construct one for himself, or under his own direction, the following imperfect suggestions are furnished.

Drills, for sowing turnips, are driven by the hand, and sow one row at a time. They resemble in form a light wheelbarrow, being pushed before the operator. As but little strength is required, and as lightness is indispensable to ease in working, the circumference of the wheel may be of stiff hoop iron merely, and kept to its circular shape by the usual number of spokes from the centre. The contrivance for dropping and covering formerly consisted of three parts, one for ploughing the furrow, a second for dropping, and a third for covering the seed. These parts are kept separate in some drills now constructed. But the most simple contrivance is where these three parts are united. This is effected by making the dropper, or hollow wooden piece through which the seed descends to the earth, similar in shape to the coulter of a plough. Two or three inches of the lower extremity runs in the earth, and is cased with sheet iron, so as to be more easily pushed forward through the soil. This, being open at the bottom and behind for an inch or two upwards, suffers the seed to pass freely out, below the surface of the earth, and as soon as the dropper passes the earth falls upon the seed and covers it. The depth of planting is regulated by the operator by means of the handles of the drill. Most drills, both in England and in this country, are now constructed with these three parts thus combined.

A contrivance for more completely covering the seed consists in adding several short chains to the drill, which, by dragging after it upon the seed; effectually rake them in. Unlike a toothed harrow, these chains do not become obstructed by sticks, straw, &c.

In most drills, the dropper immediately follows the wheel; but in some it precedes it, the wheel being made broad serves as a roller to press the soil upon the newly sown seed.

The chief difference in drills, that which constitutes the chief variation in the different patents, and which is still least perfected, is the contrivance for dropping the seeds evenly from the hopper. In one of the simplest, the vessel for holding the seed, is a short cylinder with a horizontal axis, made of sheet tin, and with a number of holes in its circumference for the seed to pass through; this cylinder is kept constantly revolving by the motion of the drill. An improvement in this, consists in making the seed box of the shape of a very short cylinder terminated at each end by a cone; and the dropping part consists of a separate ring or short open cylinder of tin, sliding closely on the cylindrical part of the seed box. Several rings, with holes of different sizes, for different kinds of seeds, may be thus used on the same machine. Rotary motion is given to this cylinder in two ways. In one the machine has two wheels, the seed box being placed on the axle between them and revolving with them. This is recommended for its great simplicity. In the other, a strap passes from a small wheel on the axle of the main wheel, to another wheel on the axle of the seed box. The motion of the seed box may be increased or diminished by varying the size of the strap wheels. This contrivance is well adapted to sowing all kinds of round smooth seeds, as turnips, peas, &c.

In another contrivance, a circular brush, kept constantly revolving, sweeps against the seed holes, and keeps them from becoming clogged by driving the seed through. In Robbin's planting machine, this principle is modified by substituting a snapping wire spring for the brush. This is adapted to irregularly shaped seeds, as mangel wurtzel and corn. But it is liable to get out of order. A simple and certain method of throwing out these seeds evenly, is yet a desideratum.

J. J. T.

From the (London) Mechanics' Magazine.

SMITH'S EVER-POINTED STONE-CUTTING CHISEL.

The ordinary chisels used for dressing and cutting-stone very frequently want sharpening, which is an operation requiring time, judgment, and expense; having, when blunted, to be forged and sharpened and afterwards hardened and tempered. A machine-maker of the name of Smith, in this town, has lately invented an ever-pointed chisel, which will, I think, soon be generally adopted, provided it be made cheap. It is in fact an application of the principle upon which Messrs. Mordans' (or rather Mr. Hawkins') ever-pointed pencil is constructed. A thin plate of well tempered steel, of the width of the chisel required, is placed between two cheeks of iron and held tightly between them, by means which I shall describe. The point of the thin steel projecting beyond the ends of the iron cheeks, forms the cutting edge of the chisel; and as soon as the edge which projects is worn away by the friction of the planing stone, the steel is advanced between the cheeks, and the edge is thus immediately renewed. To prevent the steel plate from slipping sideways, there are studs on each side of it, on one of the iron cheeks, which go into corresponding holes in the other cheek. The whole is held together by a collar or mortise slipping over, and hammered up tightly, the cheeks being of a wedge shape. When the mortise, or collar, is driven properly home, a groove therein coincides with a groove in the cheek of the chisel, and a wedge being put into the hole thus formed, holds the whole chisel tight; and prevents the mortise from being shaken off by the blows of the mallet.

At the top of each cheek, on the inside, is the half worm of a screw; between these, a screw is inserted, the end of which touches the top of the steel plate; and on being turned down with a screw-driver, or otherwise, forces the steel out from between the cheeks for renewing the working edge.

I hope I have described the thing clearly enough to be understood by my brother masons and your readers, without the aid of a drawing: my hands are too rough and stiff with handling the mallet and chisel, and moving our hard native stone, to attempt the draughtsman.

I am, Sir, yours respectfully,

A STONEMASON.

Bradford, Yorkshire, Nov. 28, 1837.

From the (London) Mechanics' Magazine.

EFFICACY OF LIGHTNING RODS, OR CONDUCTORS.

By F. Maceroni.

I perceive that a question is mooted at the meeting of the British Association for the Advancement of Science, whether in the case of a certain "monument 140 feet high, erected on the summit of a mountain 1,400 feet high, augmented safety or danger, would be the consequence of attaching to it a conductor or paratonnere?" I am induced to call the attention of your intellectual readers to this passage, as I am very sure that the subject is of great importance to society. About six months ago (vol xxvi. p. 367) you honored me by giving insertion to my account of a safety gunpowder magazine, in which I speak of lightning conductors, and to which I would request your readers to refer. There is just now a gentleman, one Lieutenant Green, of the Royal Navy, who is endeavouring to convince the public by his writing, that conductors are prone to cause the damage they are intended to avert. I must say, that I regard this statement as a mischief, for I have seen too much of the saving power of conductors not to wish that every house in Great Britain were protected by one.

Lieut. Green, in his anti-paratonnere pamphlet, lately published by Tanner, of New Bond street, tells us of fifty churches in this country having been lately struck by lightning, because they had metal vanes! To be sure—but metal vanes are not conductors; and conductors should not be formed of a wire scarcely bigger than a bell wire. In my above quoted article, I have stated, that a tube is better for a conductor than a solid rod, because it is to the surface of bodies that electricity adheres. Nothing could be fitter for the purpose than iron gas pipes: but their connexions and attachments, down the building must be of stone, or other non-conducting materials.

Previously to the church of St. Peter's, at Rome, being protected by numerous conductors, by the French government, damage was continually being done to the upper part of that stupendous edifice; but never was the least injury inflicted after the application.

It must be borne in mind, that an elevated and efficient conductor will give its protection more frequently in perfect silence, and unobserved, than by conducting into the ground, or water, a positive discharge of electric matter, accompanied by a flash and thunder. The many-pointed conductors will silently draw off the electricity from a passing cloud, without any discharge, properly so called, so that the blow has been parried if it be not a *bull* to say so, before it is struck.

During my several sojourns at Rome, I have made particular inquiries into the effects of lightning on St. Peter's church. After the numerous substantial, many-pointed conductors were affixed to the summit, and most substantial, and most prominent angles, by the French in 1808, an electric discharge was not known to have fallen upon it more than three times, and then it did no injury. It appears that the clouds, in passing over the church, are deprived of their plus electricity by the conductors, just as a Leyden jar is silently equilibrized by the presentation of a metallic, pointed conductor. How many ships would be saved from damage, conflagration, and, perhaps, instant submersion, by properly constructed vehicles for conveying the electric fluid over the sides into the water? What inconvenence could be felt, from a branched rod and a chain from the mast-head, hanging along the shrouds into the water! All the failures of conductors arise from their want of sufficient mass of metal. A zinc chain, or tube, would be far less liable to oxidation than iron; and, as I have before remarked in the case of a powder magazine, &c., the metal might easily be kept with a clear surface, by an occasional rubbing with a brick-bat. About London we see conductors not thicker than a quill, applied to shot towers, tall chimneys, &c., whereas they ought to be gas tubes of at least an inch in diameter. The top ought to be formed in the manner of a branch of a tree, with five or six points of copper gilt, the extreme points being of pure gold or silver, as are those at Rome.

In some volcanic districts, over which it would appear that the solidified crust of our globe, which covers the yet incandescent mass, is thinner or more porous, than at other points, the electrical exchange of compliments between the earth and atmosphere, are almost as frequently directed upwards from the earth to the clouds as in the contrary direction. Even against such upward discharges, the conductors inserted in the earth and ascending to the summit of the building, will preserve them from injury. I have witnessed a great many instances of ascending streams of electricity, some of which I have remarked upon in your pages, particularly in Nos. 401 and 402; and I am induced to think that we should see many more exhibitions of the process, were it not for the trees which act as silent conductors, both upwards and downwards. Electricity is the real food of plants which they absorb through the innumerable points of their leaves and branches. On the same principle should a lightning-conductor be constructed with as many points as convenient.

Lieut Green says, "seventy-nine churches in Great Britain have in a few years been struck, some of them destroyed; many, after being furnished with from one to four conductors. All of of those struck had metal vanes." How "many out of the seventy-nine churches, were furnished with conductors, this opponent to Benjamin Franklin does not tell us. He only shows the danger of metal vanes inviting the lightning, without a conductor to take it away. A bit of wire attached to the walls by iron eye bolts, or staples, is certainly more likely to cause mischief than to give protection. A proper and elevated conductor will generally carry off the electricity silently, without any apparent discharge.*

From the Farmer's Cabinet.

INJURY FROM DESTROYING BIRDS.

The culture of the earth is the most primitive, natural and extensive employment of civilized life. It brings with it cheerfulness and affluence, and fosters them under its broad wing; never deserting nor weaning them from its parent protection. Every wise observer of cause and effect can tell that its increase in honor as an employment, and in profit as a support and source of individual and national prosperity, is a great result and criterion of refinement. A vagrant life and subsistence, like beasts of prey, by the uncertain toils of the chase, are the untaught evidences of ignorance and barbarity; hunting and fishing, but the instinctive resorts of human nature in its wildness.

The teeming dust from which Omnipotence framed the wonders of our animal economy is a fitting and proximate source, whence we might hope to derive its nourishment. The savage of the wilderness permits the land over which he roams to lie fallow; only because ignorance has sealed to him the letter and effect of that revelation which declares, "God formed man out of the dust of the ground." The unfoldings of that revelation, its diffusion, and the gradually increasing light of its expanding beams, have been ever the heralds, and cause of civilization, and with this agriculture goes hand in hand. The past, in all its manifold views and bearings, gives the proof of experience to the remark; futurity will sustain it by bringing to pass the prophecy concerning Christianity and the effects of its spread; "they shall beat their swords into ploughshares, and their spears into pruning-hooks."

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* *Note.* The above article is inserted because the fact stated respecting St. Peter's Church is deemed important; it otherwise assumes as facts what requires to be verified.—*Ed.*

But agriculture is not only the most natural, it is also the most alluring and pleasant of the myriad pursuits of humanity. The variety of the apartments and furniture of nature, the glory of her colorings, the fragrance of her odors, and the ever varying hue and aspect of her seasons, are the great fountains of a variety, without which the existence of a changing and change-loving creature, would be a terrible monotony. It is pleasant too to plant in hope, and to watch through years of youth and bloom to decay. It is pleasant to train the vine, to pluck its ripening clusters, and to repose in the shade of its spreading greenness. It is pleasant to anticipate through winter, the flowers, the dew, and the bright sky of spring. It is delightful to view the waving fields ripen unto the harvest. And though in turning the rank and reeking soil we may remember with a sigh that we are moving the wasted mould of many a one once as free in thought and life as him who guides the plough, the next flower that attracts the eye will chide our useless melancholy.

But we would not run wild with a general view of a theme so enticing to thought and fancy; we would but pursue a branch, a single, small, but important and prolific branch of this extensive subject; one which, though in its mention it may seem paltry and trifling, richly deserves a discussion among other branches which have received attention, to the exclusion of this, only because they are more superficially apparent.

This subject naturally presents itself in the two following divisions—and they will embrace the consideration of the whole object which we have in view. 1st. The intimate connexion which exists between the interests of agriculture, and the increase and diminution of our indigenous birds, and the injury resulting from their wanton and indiscriminating destruction. 2d. The best means of putting an end to this injury with its cause—and as far as possible in the limited space which is allowed us—we will endeavor to prove that these topics are not by any means to be overlooked and slighted in the different views of the general subject of agriculture.

Those who believingly adopt the atheist theory of a chance creation, must in consistency discard that ultimate doctrine of Christianity, that every thing, however diminutive it may be, is formed for some end. We are glad that we differ from them. We rejoice in believing that every existence, animate or inanimate, is a member of a vast and united family of servants and worshippers, that nothing is formed in vain, that every atom has its task to perform, as surely as every spirit an account to render. Idleness is an unnatural word coined to describe an unnatural propensity. In the wide sense of subservience to a divine design, the world knows not the term, nor the trait which it describes. There is nothing idle, for good or for evil, for weal or for wo, rearing or casting down, building, or bringing to nought, for judgment or in mercy, creation is a vast and faithful agent doing the biddings of an Almighty and Omniscient Governor. Our subject is intimately connected with the idea, let us apply it more practically.

We think we may say, without fear of contradiction, that none of the birds of the air, not even those which are now most sought, for that purpose, were originally created expressly for food, and yet that seems to be the only light in which we regard them. Our first parents and their posterity, till after the flood had ravaged the earth, and changed our race and the laws of life and conduct under which they were created, were forbidden to eat of that which had life. The whole animal kingdom was interdicted as food; a fact which modern epicures may believe with wonder. And even now, when by permission rather than command, the primitive rule is abandoned, and we destroy life to appease the cravings of hunger, thousands of species, both of beasts and birds bear, whether rightly or through mere caprice, the character of uncleanness. Nay, even of those of the feathered creation, which do not come under the latter class, a vast number are too small and worthless to be seriously sought for as food, too diminutive and paltry in appearance and availability as conducive to subsistence, to reward the labors of those who would look to them for a supply of their wants—unavailing as far as any direct influence upon man is concerned but to please his eye, and thrill his ear with their melody, and yet it is with these smaller members of the tribe that we have now, chiefly, to do, in pursuing our subject. These diminutive and seemingly worthless, though pretty creatures, are, strange as it may seem to those who think that to kill them is so pleasant and agreeable a sport, of immense advantage in the great design and economy of nature. That these species, then, were created at first, or are now permitted to exist and increase, merely to supply food to our race, is an idea, which any one but he who is endowed with a Lilliputian mind or appetite will discard. For what then were they formed? for certainly they are the work of design—the produce of a hand whose omniscience covers at an onward glance, the whole existence of the object he is framing. What is there in the great business of the universe? With the solution of this question we open up our subject to the reader, and give it forth to the agriculturist from its obscurity, as a subject worthy, at least, of thought.

The nature and habits of birds, are as widely different, as those of the more familiar, because more accessible beasts, and therefore we would not be understood as saying, that all, even of these more diminutive species, are useful to the farmer. It is not so. Some are of no use, others decidedly injurious, and with the latter we would hold no terms; we would say, destroy them in any manner, which in itself would not do more injury than it would prevent if successful—but a large number of these creatures are most useful and faithful servants of the tiller of the ground. And that is not all; their labor is manifold. A great multitude unite with some of the beasts and larger birds, in doing the vast and indispensable duty of removing the impurities of decaying vegetable and animal matter which but for them would be a much more prolific source of miasma and disease. They are the great unpaid and unthanked scavengers of the earth. While myriads, as we have said before, are the assistants and ready instruments of the farmer, and through him of mankind. Let him who would derive information to stengthen our remark and his own convictions, consult the natural history of this curious and beautiful race—and his doubts will vanish and give place to a light which should long since have shone upon him and guided him in reference to this matter. He will find that almost all our most common and numerous birds nourish themselves and their young by the insects which are so destructive to greenness and fruitfulness—a very few species, to which we have referred before —destroy the useful produce of the earth, and even they do not half the injury which is caused by the trespasses of their paid slaughterers. But their ravages are far overbalanced by the multitudes, and they the most persecuted because the most inoffensive and exposed, whose sole occupation is the rearing of their broods and the instinctive search for and destruction of these insect enemies of vegetation—the worm which consumes and corrodes the thriving and spreading root—the fly which wastes the green and shady leaf—and the myriads of other tiny but baneful creatures—the almost microscope vermin of our fields and gardens, which canker, decay, and disease, if they do not devour, the tender and budding plant—and which are only less in number and less formidable than the locusts of Egypt because of the services of the race which some look upon as only made to be destroyed.

But let us further inquire, if we would have still larger and more impressive ideas of the importance of our subject, what are the most numerous and general causes of the great and distressing fluctuations in the quantity and quality of the produce of our fertile and almost illimitable country, and the necessarily consequent variations in those branches of our commerce of which agriculture is the more direct and immediate parent, and even in those which are more remotely connected with it. What destroys, year after year, the growing fruits of many a faithfully wrought garden, the luxuriant and hard earned grain, of many a waving field, nipped in their bloom and consumed in their beauty and promise by some untimely, and, alas, increasing cause. The great staples of many of our states are wasted and ruined too often to allow of supineness upon the subject. We would point a finger, which would warn while it instructs, to the teeming answers to the questions we have proposed, which stand forth in the numberless paragraphs which the journals of many a season of want and hunger unfold, and which tell sadly of a cause and effect, in regard to whose prevention we are powerless, without the aid of the persecuted tribes whose services we have been eulogizing. And what is still more alarming, as the hum of business and settlement increase, as the mouths which are ready to devour the produce of the soil become more numerous and clamorous—the cause of this want is increasing, and its only remedy becoming every day less proportionate in power to the duty which it performs. It is a gloomy thought, but gloom is not enough; the evil is serious, but like other evils whose progress is slow, and whose causes are minute and ramified, hey are not duly appreciated; the subject needs combined reflection and steady action. Let our remarks especially impress on the young the thought, that every missile aimed in sport tends to take food from the mouths of the poor and famishing—that if successful in its aim it destroys its pretty victim, however small in proportion may be its immediate and perceivable effect—it deprives the agriculturists of the life-time labor of one faithful servant at least, perhaps of more who perish in a deserted nest. Let them make him remember that every swallow which pierces the air, so long the sprightly mocker of his ambitious sportsmanship, so long aimed at in hope, but perhaps in vain while on the wing, but slain in revenge when it alights to rest, is making more sure and effective the seed of the sower, is surely increasing the bread of the reaper, and food for industrious poverty and national wealth. The race was not formed in vain. Each one has its task to perform; we sin in wantonly destroying them, first against him who made them for his glory, then against ourselves, willingly ignorant of their untaught "labor of love."

We would apeal, then, to the young, to most active and thoughtless enemies of the feathered creation: to the rising generation, the hope of the country, who are unwillingly, and perhaps, as far as motive is concerned, innocently doing that country which it is their high ambition to serve, an injury, which is irreparable, and deep. And what is more directly interesting to themselves, though perhaps not so deserving of thought, they are by every act of destruction, injuring that disposition, and those sensibilities, which are so lovely in many of the young, but which is lost as manhood steals apace, perhaps by the united indulgence of this and other hardening habits. If to such an aspiring youth, joyful and giving joy, in the glad hope and promise of future usefulness, the soft intercession against cruelty, of a tender mother or a fond sister, come in vain, or are derided and disobeyed, as the weaknesses of feminine hearts, we would offer the higher and more sacred consideration, that if they are too manly to yield to such mild petitions, they should be manly enough to feel and to be proud to feel, a responsibility for their country's welfare, breaking in with every ray of knowledge, and beating with every pulse of young and buoyant life. They are not too young to be gladdened and ennobled by the thought that even they are contributing their mite, and that in a comparatively important way, to national honor, growth and advancement. We appeal to all their warm and peculiar feelings which can be brought to bear upon the subject, that we may induce them to give, if not their positive assistance in helping on the work of reformation in this respect, at least their negative aid in restraining their own strange propensities and temptations to slaughter, for amusement, this useful race.

If then, these creatures, when considered collectively, are of so much advantage and profit to the cultivator, and have so important a connexion with the agricultural interests of the community—if their destruction is so widely and inconsiderately carried on, and their decrease so rapid and alarming—if the fact presses upon us that even in this the youth of our government, when our jubilee of republicanism has scarcely passed, and in this thinly settled state of our country, we are fast losing from eye and ear the flight, the song, and especially the services of these feathered fellow-workers in the culture of the soil—if they are fast disappearing from among us and around us, fast yielding to the hum and the danger of crowded settlements and busy and wanton life, and leaving their annual work undone—we must awake; as a great agricultural people we must awake, and look to our interests; we must protect these servants in their old habits and employment

—or we will gradually, but irrecoverably lose their services. With these reflections we are brought to the remaining part of our subject—is there no remedy for the evils we have described?

And first we would propose the attainment of this great object, to the parents, guides and preceptors of the young—they are the great fountain head of effort, the sources of deep and well directed endeavor. We would propose it to them as patriots, as friends and upholders of the stalwart farmers of our country, the strength of the community, the honor of our government, and especially as affectionate well-wishers to the youth over whom they have the charge and oversight. They must feel its importance; let the feeling guide them in social counsel, training and government. Let them teach, with other more usual branches of instruction, the sin and folly of the species of cruelty which constitutes the injury complained of; and we need not look beyond their labors for the remedy of this evil. They are supreme, each in his own circle. Let them in kindness, but with unyielding steadiness, perform toward their offspring, this with other family duties, and the work is done. But we are not over sanguine in this view of the subject. United and combined effort in this quarter, cannot be reasonably expected. Truth may take root and flourish here and there; but as for a general and immediate attention to the object proposed—it is scarcely thought possible, at least it is improbable.

Again we would appeal to the self-interest of owners and cultivators of land. They must, surely, be ignorant of the injury which is in progress, when they allow it to go on unreproved before their eyes. We would appeal even to their own selfishness and love of gain, if no higher motive will reach them, and entreat them as their influence gives them opportunity, to give themselves to a work, the first consequence of whose success will be their own welfare, the second the welfare of their country. They are supreme, each one over his own territory, be it large or small. Let them resist and punish every trespass of the wanton slaughterers of birds—let them declare war against the whole tribe of truant murderers, whose daily sport is the spoiling of the nest, the invention of new and the use of their old and destructive snares, and the more immediate devastations of gun and bow, and missile. Let our sturdy farmers hold themselves forth as steadfast resisters of every such act, and more particularly of every entry, for this purpose, upon the lands for which, as stewards of our country's prosperity, they are more immediately responsible; let them do this work with all their might, and again we say we look not beyond them for ultimate success. To encourage such an action, to make it more universal and more strong, to embody public sentiment, to warm to feeling and exertion by comparison of views and mutual counsel, to reciprocate alarm and warning, to give a salutary tone to public aim, and to throw a greater light upon the subject, the assembled strength of our agricultural community might do wonders. Let them meet in their power and give a start to the object in view, a fair experiment to the means which lie in their own power as teachers of the young and possessors of the soil, and some good may be done—the ball of reform may be set in motion. But as we have said before we are not over-sanguine in our hope concerning the success of any or all these schemes and appeals; we look high for the source of assistance and remedial action, to which we think the way lies clear, our readers will pardon us if we retrograde in presenting it.

To foster and protect the agricultural interests of the community is a high and sacred duty of every government, but especially of one which boasts itself republican. Agriculture, to use the language of another, "is the breast from which the state draws its support and nourishment;" and we may add, it is the great index of prosperity and refinement. It is the great popular pursuit. The resource of indigent, but enlightened industry; the reservoir of large and busy, but stable capital; the mild seducer from idleness and worthlessness; the quiet and honorable retreat of reformed or high-minded poverty, the first love of those who grow weary of the crowd and hum of a city, the last love of those who retire upon wealth or a competency. It should be the protegé of those in power, the representative of constituents who are its zealous votaries.

We look then to legislative enactment for our remedy. It protects game for sportsmen, who disregard all fear of trespass in its pursuit. In many states it offers a large reward for the destruction of the noxious birds, whose numbers are small, but whose paid destruction is of evident injury to the farmer! Those who take advantage of the bounty offered being, usually, miscreants who care no more for the laws of property, than for the lives of the myriads of serviceable birds which fall in common with the prescribed species. We look to legislative power for the uprooting and extermination of this evil. Will not our representatives protect their constituents and their country?

We will not stay to specify the particulars of the law which we would wish to be fulminated against this evil. We would only say that with half the ingenuity which is yearly expended upon more favorite enactments, the power of offended government might be readily brought to bear upon offenders, by a well-contrived system of rewards to discovery and prevention, and punishments to transgression. This, united with and enforced by the labors of possessors of the soil, and trainers of the young, would soon be effectual, in the attainment of our object.

In concluding these remarks will the reader pardon us in again reiterating the importance of the subject. The evil done by insects is often unseen and unknown, but enormous; the number of their destroyers is fast decreasing, and can never be renewed; without them we are helpless; and agriculture deprived of servants and services which cannot be replaced.

From the Journal of the Franklin Institute.

ON THE INCREASE OF TEMPERATURE IN THE INTERIOR OF THE EARTH.

M. Arago has lately communicated to the Academy of Sciences the result of the thermometrical observations which he made, on the first of May last, in the well which is now being sunk at the slaughter-house (Abattoir) of Grenelle. The boring has now reached the depth of 1312 English feet. The bed of chalk in which they have for so long been engaged, is not yet traversed, but the numerous flints, which were unceasingly met with at lesser depths, have now disappeared. The city of Paris has determined that the boring shall continue to the depth of 2295 English feet, if the spouting water be not found sooner. It is presumed that the water which will issue from so great a depth will possess a temperature of between 93°2 and 95° Fahr., and, in that case, it might be employed for hot baths, &c. But however this may be, we shall now adduce the thermometrical observations which have been made at the depth of 1312 English feet. On the 29th of April, at 7 P. M., four instruments were sent down, viz. two of M. Bunten's self registering thermometers, one a *diversement* thermometer, which M. Magus, of Berlin, had recently sent to M. Dulong, and another of the same construction, manufactured by M. Walferdin. The two first were contained in a copper tube, in which they were secure from the pressure of the water; the third was open at the top, but in such a manner that the pressure could not alter its form; and the fourth was enclosed in a glass tube, which was hermetically sealed. These four instruments, after having remained for about thirty-six hours in the well or bore, were removed from it on the first of May, about 7 A. M.; they then indicated the following temperatures:—

The first thermometrographe of M. Buten, - - -	74°.3
The second, do. - -	74°.21
M. Magus' thermometer, á diversement, - - -	74°.30
M. Walferdin's do. - -	74°.66

Assuming, then, 74°.3 Fahr. as the temperature at the depth of 1312 English feet. if you subtract from this number that of 51°.08 Fahr., which indicates the mean temperature of the surface of the earth at Paris, 23°.22 will remain for the increase of temperature, corresponding to 1312 English ft. of depth, or, what comes to the same thing, 1°.8 Fah. for 101.2 English ft. If we take the case of the observatory as the starting point for the temperature where it is at 53°.06 Fah. 21°.24 Fah. will then be given as the augmentation for 1222.5 English feet, which corresponds to 103.348 English feet for each centigrade degree.

From the Farmer and Gardener.

BUILDING STONE FENCE.

Much error has prevailed in the manner of building stone fence, and error in this matter is attended with serious loss to the farmer, since there is no kind of fence, in ordinary use, so expensive, and if well built, so cheap in the end. A few observations upon this subject may not be amiss to those who are desirous of constructing this fence.

The first material error, but too common, has arisen from giving to the wall too wide a foundation, as much as 3 feet, $3\frac{1}{2}$, and sometimes 4 feet, and then by drawing it in, or to use a mason's term, battering too much. Two evils spring from this mode of building; the fence is very apt to bulge, or split in two, and the facility for sheep or hogs to run over it, is as obvious as the fact itself is common. Again: fence built after this manner takes more stone than is really necessary, and however abundant the material may be, the mode of construction is radically wrong. The fence, which I have as yet built, about 200 yards is after this fashion: $2\frac{1}{2}$ feet wide at bottom, and $1\frac{1}{2}$ at top—height $4\frac{1}{2}$ feet—a trench over $2\frac{1}{2}$ feet wide, and about 5 inches deep, is first made, and rarely more so, unless on ground liable to wash, as by a road side, ascending a hill, where a deep gully has been made: on stony ground, it may be dispensed with; but otherwise it is safe to dig a shallow foundation, as the action of the frost is thereby prevented, and which, I am very confident, has proved injurious in a high degree, when this precaution has been overlooked.

A fence of these dimensions, of good stone, and built by a skilful workman, I feel well assured, may endure for ages. But the laying of the stone aright is an object of the greatest importance; without especial care in this, serious mischief will follow. As a general rule then, indeed almost invariably, the stone ought to be placed crosswise and not lengthwise of the fence (a very common practice to give it a pretty facing) and although in comparison, but few will be found long enough to go through and thus serve as *binders* yet many will pass more than half way, and so by overlaying alternately from side to side, the middle will be kept well bound, and the whole structure solid and compact. It is obvious to reason, as it has been often proved by experiment, that by laying stones lengthwise of the fence, and filling in the centre with small pieces, speedy dilapidation must take place. In short, with some modification, the rules, which govern in masonry, should be observed in the construction of this fence. Now the only material variation, which I would suggest, is this: the masons (to adopt their terms) use *stretchers* chiefly and *headers* occasionally to bind the wall; but they use mortar, and that without stint, to consolidate the structure. As masons use stretchers to give a handsome facing, and mortar to impart strength, let the stone fence builder use headers altogether, or nearly, as he cannot he allowed any cement. Let me give an example. Take a stone 15 inches long and 4 wide, or 2 feet long and 6 inches wide, and put them across the fence, instead of lengthwise; is it not manifest, that they will be infinitely less liable to be displaced? I grant that stones may be placed lengthwise with great safety, provided especial care be taken to have the next course put on transversely; but it should be borne in mind, that it is not easy always to procure stone for this purpose of sufficiently good quality, for in this case, the stone should pass entirely through, whereas if all pass inwards or across, stone of an inferior quality will make a very substantial fence.

Thus you have the breadth at bottom and top, and the height and mode of building as practised by myself. Some of my fence has been built 9 years, and is as good in all respects as when first made. In passing, it is to the eye apparently perpendicular. No animal will attempt to leap over it. On top I place flat stones the width of the fence; this prevents the smaller stones from being knocked off. If stakes and rails were put on, they would serve nearly the same purpose; in which case, the height might not be quite so great, say 4 feet 2 inches. The cost is greater than post and rail, but if *well built*, there is an end to future labor, expense and repairs.

June, 1838. A VIRGINIA FARMER.

VALUE OF DURHAM CATTLE.

The inquiry is often put—'what can justify a farmer in giving the enormous prices demanded and obtained for Durham cattle? We could easily give a number of reasons which we deem satisfactory; but at present will offer but one, which we think sufficient. A thorough bred bull may be bought, say $500, which we may assume as a fair averaging price—for the prices range from $300 to $1000. Now the point of the question is, how can a bull pay back in substantial benefits, the $500 paid for him? We will give a fair answer to the question; and show that the sum is returned, not merely in blood or pedigree, but in the actual improvement of those qualities in the animals produced from the bull, which every cattle raiser most desires. A good bull can safely serve 50 cows a season without injury to himself—and many have served from 80 to 100—but let us take 50. To put the proof to the severest test, we will suppose that these 50 cows are all of common stock, and that their calves are all destined for the butcher and not one kept for breeding. The question then is—'will the fifty calves pay in beef, a fair return for the sum expended in the purchase of the bull?' We answer yes; and, without going into any tedious calculations to show how much more beef they will make in a given time, than the common stock—or how much earlier they will mature—or how much time, risk, food, money and interest, are saved—we will demonstrate the truth of our opinion in the statement of the fact, that the large graziers of Fayette, Clarke and Bourbon, will give ten dollars a head more for half blood Durhams, at two years of age, merely for fattening for the butcher, than they will for common cattle at the same age. Now these graziers know perfectly well, the value of every description of cattle in the country for fattening, and they would not surely pay so much more for the half blood Durhams, than for others, if they were not justified in doing so by making a better profit from them. It is to be recollected, too, that these large graziers buy their young cattle—for none of them can breed one in ten of the number they fatten and sell. Now here are fifty calves, the produce of one season, whose superior qualities at two years of age, pay $500 (the price of the thorough bred bull) more to the breeder, than the same number of common cattle. It is needless to run out the demonstration further. Every farmer can calculate for himself the advantages of breeding several years from the bull—the greater the number of calves he could get than that we have assumed—the superior value of the heifer calves for breeding instead of butchering, &c.; and we believe no one who will candidly examine the subject, can doubt the economy of procuring, even at their high cost, this invaluable breed of cattle. When this breed shall become so widely diffused as to constitute the general stock of the country, then, and not till then will their price be graduated, like that of other cattle, by their intrinsic value merely for milk and beef.—*Franklin Farmer*.

From the Genesee Farmer.

SUBSTITUTE FOR SPAYING.

A new mode has been adopted, (I do not know when or by whom,) as a substitute for spaying, which is of great importance to the agriculturist. From a number of contradictory reports, and from a want of the knowledge of operating, the system met with few advocates, and for the best reason—because the instructions were to use shot, which did not answer the purpose. Instead of shot, a bullet is now used, which fully and completely answers the desired object. I have the best assurance of its efficacy, and with pleasure make the communication to the world.

Mr. Hannock Davis, my near neighbor, has tried the experiment, and the result was complete and satisfactory; so much so, that he has operated on all his young sows, to the number of fifty; they are all healthy, thriving and fat, and as barren as if they had been spayed, showing no inclination for the boar. He performs the operation by hanging the sow up by the hind legs, in the manner of spaying, and through a reed or any other tube, introduced two or three times into the *vagina*, a small rifle bullet is deposited. Any farmer can perform this simple operation with ease and perfect safety, without hunting the neighborhood for a person skilful in the art of spaying. * * * My mode of operation on a cow, and which I think would be successful, is this:—Tie your cow or heifer by the head and horns in a narrow stall, and if disposed to kick, tie her hind legs together; have a smooth stick or probe prepared, with a cavity in the end sufficiently deep to cover half the bullet, in which you will place it; introduce the probe four or five inches, elevate and draw it out, and the bullet will be left where it was designed. It may require a larger bullet for a cow or heifer, than the size used for *bulleting* sows.

From the Genesee Farmer.

DON'T BLAME YOUR SEEDSMAN.

Few things are more common than for farmers to purchase seeds at the shops, either Shaker or imported, put them into the ground in the garden or the field, and because they do not all vegetate, the seeds are denounced as worthless and the seedsman is compelled to bear the blame of the transaction. Now we venture to assert that nine times out of ten, when the seed has been purchased of a well established seedsman, the failure should be charged upon the buyer instead of the seller.

How many packages of the yellow locust seed have been put into the ground without previous preparation, and when not one in a hundred has grown, the seed has been called bad, and the seller a cheat. Now if the buyer had turned boiling water on his seed till they were swelled, perhaps not one in a hundred would have failed, and a fine nursery of trees, and a handsome profit, would have been the result.

How has the purchaser of mangel wurtzel been disappointed in the germination of the seed, and fancied that he had been imposed upon, perhaps discouraged from any farther attempt at growing this valuable root, when, had he let the seed soaked in water a little warm for twenty-four hours, nearly every one would have grown. The same remark will apply to the common beet, and various other seeds that frequently fail of germinating.

A farmer buys a quantity of ruta baga seed and sows it on stiff clay. The crop is of course a failure, but instead of placing the blame where it should be, to his inattention to the fact that such soils are entirely unsuitable for turnips, or any tap rooted plant, he condemns the seed as impure or imperfect, when, if sown on the proper soil, a deep sandy loam, the produce would have been first rate.

We have given these instances to show that when a man purchases seed, he should know how to sow them, and where to sow them, if he would be saved from disappointment. Scarcely any two kinds of seeds will succeed equally well when they receive the same treatment, are planted in the same kinds of soil, or to the same depth. Ignorance, or inattention, here frequently end in disappointment, and the vender of valuable seeds frequently receives blame, when his efforts to accommodate the public deserve the highest praise.

From the Franklin Farmer.

CHARCOAL FOR DISEASED LUNGS IN HOGS.

Mr. Editor—As the rearing and fattening of hogs has become a business of great importance to the west, and especially to our own corn-growing state; and as new and terrible diseases have made their appearance within the last few years, among that class of our domestic animals, I, as a common sufferer with my brother farmers, have been trying to ascertain the cause of, and remedy for, the one which I have suffered the most by, and which I shall call your attention more particularly to. It is admitted, I believe by pathologists, that diseases may, and do change their type in the same latitude, and become more and more malignant as population becomes more dense and the country becomes older; thus our own intermittent has degenerated into the more deadly typhus fever; thus that which we once called quinsy or swelling of the throat in swine, has now assumed a more malignant type, and requires a different treatment; the cause is the same, but the effect is not always instantaneous or accompanied by the same symtoms or results. I think it may be safely assumed that most of the diseases, if not all, that hogs are liable to, are produced by sudden transitions from heat to cold; and as they do not, like most other animals, perspire through the pores of the skin over the whole surface of the body, but through small orifices on the legs and throat, which are constantly liable to obstruction, especially in the winter season, when the animals in large numbers bed together, producing great heat and free perspiration for a short time, but from the restiveness of their nature they are often changing the position first assumed, all tending to clot the mediums of respiration, and thus lay the foundation of disease and death by alternating between heat and cold through the winter. Ordinarily the weak of the herd are the first to die. This may be chargeable to their inability to change positions, subjecting them to the crushing weight of the whole number in the bed; or to their long subjection to the great heat engendered by the common mass, until they are called to partake of the morning food. This, as we have stated, formerly produced enlargement of the glands of the animal's neck, which often ended in inflammation and death. Now, the same cause produces a very different effect, and although it is still strangulation, yet the inflammation falls with its whole weight upon the lungs, and if both tubes of that organ are affected, death instantly ensues; if only one, the animal may live a long time, but never recovers unless the remedy that I shall presently suggest, or one equally potent, be applied. The symptoms where the attack is violent, are a seeming sense of suffocation, great indisposition to move, a deep crimson color, approaching to purple, all over the body, and if forced to move only a few paces, the animal will pant as if worried by dogs in hot weather. If the attack is less violent, they will take more exercise with seemingly less pain, will throb in the flanks, in much the same way that a horse will when exhausted by fatigue and hard usage, are generally inattentive to their company, are inclined to eat earth rather than their accustomed food; such generally live a long time, but never recover. I now proceed to point out the way to prevent the disease and to cure it if taken in time: Do not suffer your hogs to herd together in large lots in cold weather; never suffer them to sleep in hollow trees; if you have sheds for them to sleep under let them be set so low that they cannot in great numbers heap together; in dry hard freezing weather let them have some succulent food, such as apples, potatoes, or turnips, but especially let them have plenty of salt and charcoal; this last is a cure for the disease above described, if administered before they entirely refuse to eat. It is known to almost every one, that charcoal is a powerful antiseptic and absorbent, and that hogs will search for and eat it with eagerness, and especially in banks of leached ashes, and so they will unassociated with ashes, if at first you will break it up into small lumps and pour a little salt and water over it. I have tried the various means in common use, such as tar, antimony, sulphur, &c., and never had one to recover its health until I tried the charcoal, and I have every confidence that it will succeed with others as it has with me, and if it does, I shall be well paid for this communication, feeling as I do, that no man ought to live for himself alone.

W.

From the Philadelphia Farmers' Cabinet.

CITRON PUMPKIN.

This most excellent and delicious article was introduced into this country by Commodore Porter, who gave a few of the seed to Lieut. Gamble, then at the navy yard in this city, who cultivated them successfully. Lieut. Gamble was transferred to the navy yard at New York, at which place he continued the cultivation, and it gradually spread over Long Island and along the banks of the Hudson.

In the wheat-growing districts of New York, it has almost entirely superseded the common pumpkin. It possesses all the good qualities of the pumpkin and squash, it is neither watery nor stringy, makes a most delicious pie, far superior to that made of the former, and goes much farther. It is also served up at table with meat, in the same manner as the squash, and, if not superior, it is certainly equal to the best of the species. For all culinary purposes it is a most superior article, and as it contains a vast proportion of saccharine matter, we are persuaded that it would be highly beneficial to cattle, especially milch cows. Another great and very decided advantage is that the citron pumpkin may be readily preserved throughout the whole winter, provided they are kept free from the influence of frost.

The seed may be planted at the usual time of planting the pumpkin in the spring. Wm. P. Jenny, of New Bedford, in a letter to a gentleman in this city on the subject, says, "They require a rich, moist soil; I planted in beds six feet across; they require considerable room, as they are great runners as well as great bearers. I have seen the ground literally covered with them. With us they frequently grow to the weight of thirty to forty pounds, and I have no doubt that they would, with proper attention in the culture, reach the weight of seventy to eighty pounds. They are in deservedly high repute with us." They resemble in shape a melon, have no neck, are easily cultivated, and in great demand, all brought to this market last fall being immediately bought up.

From the Journal of the Franklin Institute.

RUSSIAN GOLD MINES. IMPORTANT DISCOVERY.

The St. Petersburgh letters are much occupied with a discovery relative to the working of the Russian gold mines, which, if truly stated, may come to have some influence on the precious metals. A letter of the 26th ult., says, "There has been found out, it is said, in the Ural Mountains, a new mode of extracting gold from the earth, sand, or ore. The sand, or earth, has been put into a blast furnace and melted, and the most extraordinary results obtained. By washing, the method hitherto pursued in Russia, one and a half zolotnicks of gold were produced, from 100 poods of sand, &c. the expenses were about covered; two zolotnicks per 100 poods were worth working. Fine sand, or earth, rarely produced more than three zolotnicks, and five zolotnicks were quite uncommon. By the new process, on 100 poods of melted sand, they obtained sixty zolotnicks, in some cases; in others, forty to fifty zolotnicks, and on melting 100 poods of previously washed sand, they got forty to fifty zolotnicks of gold. There is little doubt of the accuracy of these statements, but what the comparative expense of the two modes is I cannot tell you, nor whether the Ural grows sufficient wood for fuel, and whether coal can be found there. One pound Russian contains ninety-six zolotnicks; 100 poods are about 3,550lb. English weight."

The Editor of the Mining Journal adds:

The importance to be attached to the new process, by smelting, of extracting gold from the ores, or deposits, in the Ural Mountains, is so considerable, from the increased quantity obtained, as will be observed by reference to a paragraph, extracted from the columns of a contemporary, and inserted in our present number, that we are induced to direct the particular attention of our readers to the subject, while it will be our province to endeavor to obtain more detailed information of the plan adopted. The vast outlay of capital in Brazil, where attention has been directed to the gold districts, and the numerous veins which are found in Virginia and in the neighborhood of Charlotte, in the United States, renders the subject one deserving of the first consideration. The process of smelting, as applied to gold ores, is not novel in theory, although we believe the present to be the first instance of its successful practical adaptation; and, if we are to credit the statement that the produce has been raised from five to fifty, or ten times the amount obtained, merely by the introduction of an improved mode of reduction, while the halvans, or refuse, have been found to contain a large produce, it is an epoch in mining, which will tend much to revive the spirits of the shareholders in the "Union Gold Mining Company," and others of a similar nature, and proves that this peculiar department of mining is in its infancy. We expressed our opinion at the time of the announced failure of the success of the "Union Gold Mines," that an improved mode, or one perfect in itself, so far as improvements then had taken place, would doubtless have yielded profitable returns, and we sincerely trust, that the present discovery will be found applicable to the ores of America, which, however, are, if we mistake not, of a different character to those of the Russian possessions.

We have here, then, an additional evidence of the affinity and importance of science being combined with practice—of the association and the advantages derived from the application of chemistry to the operations of the miner; and hence further proof of the advantages which may be fairly calculated upon from the establishment of a "School of Mines."

New process for Extracting Gold.

To the Editor of the Mining Journal.

SIR:—The following information respecting the extraction of gold in the Russian dominions, I have lately received from an intelligent and well-instructed officer of mines in the Emperor's service, and as you are properly anxious to be informed on the subject, I send it to you:—

"Knowing very well the deep interest you take in all scientific discoveries, especially in the mining and metallurgical departments, I thought it might be agreeable to you to be informed of a new discovery made in the Uralian Mountains, in the method of extracting gold from the alluvial deposits. In the official letter received in Paris, I learned that the following curious comparative experiments were made in the extracting of the gold from the sand, by Mr. Anossott:—

1. "By the common method of washing used in all countries having gold (stream-work.)

2. "By the amalgamation—the method similar to that employed in Hungary in gold mines.

3. "By the damp way, or dissolving the sands in acids.

4. "By melting the sand in the blast furnaces.

"Those experiments were made by the order of the Minister of Finance, Comte Kancrin, to the end of ascertaining the exact quantity of gold contained in a given quantity of sand. and extracting the gold from the very middle of the grains.

"By the second method; they obtained eight times more gold than by the first (common system.)

"The third method produced four times more gold than the first; but by the fourth method, that is to say, by melting the sand, twenty-four times more gold was obtained than by the washing system.

"In that process, the produce of the melting is an alloy of cast iron and gold (fonte aurifere,) from which the gold is separated by means of sulphuric acid. By putting this last method into practice, we shall obtain yearly 8000 poods (sixty-two poods equal to one ton) of gold instead of 400, from the same quantity of alluvial deposit. But the conservatory principle, applied to the national wealth of the Government adopts the plan of only a moderate increase of the annual produce of gold, and securing thus a longer existence to the alluvial deposits."

The statement as to the difference produced by the modes of treatment may appear startling at first, but it may be considered as more probable if we take into account the nature of the substance in which the gold is enveloped. The produce of smelting, we see, is an alloy of cast-iron and gold, indicating that, as is very usual, the substance accompanying this gold is iron. Now, to say nothing of the very imperfect results which can be obtained by the old method of washing, if we consider the ingenious application of amalgamation which is mentioned, we shall at once perceive, that every particle of gold which is wrapt up in iron must infallibly escape the action of the mercury, and it is not difficult to imagine, that a very considerable proportion may be so defended. Let the whole, however, be reduced by fusion, and all the metallic part will then be brought together and separated at once from the earthy part, and consequently, little or none of the gold can escape. Thus, we may account for a very considerable difference in the results of the processes that have been employed. The separation of the gold from the iron by sulphuric acid, is not likely to produce any waste of the precious metal.

It is anticipated, I know, that this improvement may be extended to other gold-producing countries, and I have no doubt but it may in due time; but it should be recollected, that smelting is a very expensive and tedious process in some of these countries, partly from scarcity of fuel, and partly from very imperfect methods for producing the necessary blast, by which it happens that the degree of heat required is difficult to obtain. Improvements may be made so as to remedy some of these defects, and one important one, I believe, would be, the application of the hot air blast; but those who know what the difficulties are in making alterations in established processes in some of the countries to which these observations are applicable, will see that considerable time may be required to accomplish the object, and the selection of very judicious and well instructed agents to carry the necessary measures into operation.

To any one who may be considering the subject with a view to adopting the use of this discovery, I would also suggest, that the chemical separation of the metals, is an operation which must be directed by one possessed of considerable skill and experience, and that it can only be done where sulphuric acid, or substances not easily transported, can be supplied in sufficient quantities. If the alloy be rich enough to bear the charge of carriage it might be better to send it to places where the requisite skill and materials can be had with facility, but here again, the fiscal regulations of different countries may oppose an obstacle.

I merely throw out these hints that persons who may wish to avail themselves of the advantages held out by this process, may be prepared to meet the difficulties that present themselves, and to set about the undertaking in a manner most likely to ensure success.

I am, Sir, your obedient servant,

JOHN TAYLOR.

Chatham Place, July 6.

NEW MODE OF APPLYING STEAM.

The editor of the New York Herald, in one of his recent letters from London, says—

A new mode of applying steam has been invented, which will do away with horse power entirely on canals. On the day of the launch last week, a small boat of forty tons was passing and repassing the river, without paddles or sails. She had a high pressure engine on board—and there she went through the water, puff, puff, puff, puff, without indicating any other symptom of motive power, or even a single ripple disturbing her course.

It seems that she has under her bottom, a single paddle, in the shape of a screw, with one turn only. To this screw is given a rotary motion by the steam engine—and its motion propels her through the water without creating a single ripple on the surface, around the boat. An experiment was made last week on the Surry canal, and it succeeded beyond all expectation. I saw the little boat myself, moving like a living creature, over the dirty bosom of the Thames. There is now no doubt of the entire success of the plan, and in less than a couple of years I expect to see the whole length of the Erie canal navigated by steam power, without injuring at all its banks. One such steamboat as I saw could take a train of thirty canal boats, at a speed of six miles an hour.

From the Genesee Farmer.

PROGRESS OF AGRICULTURE.

When the bill providing for a continuation of the Agricultural Survey of Massachusetts by the Rev. H. Colman, came up before the legislature of that state a few weeks since, a dead set was made upon it by a few individuals, who included in their denunciations, not only the survey, but all legislative measures for the promotion of agriculture, all societies, ploughing matches, fairs, &c. They maintained that it was absurd to stimulate men to attend to their own interest—that legislation was improper—that agricultural and geological surveys are expensive—in short they were wholly on the "let us alone system," a system which will do very well to talk about, but which in practice is found frequently to produce results any thing but favorable.

Their remarks called out a most triumphant refutation from Mr. Prince of Roxbury, who has from the first been connected with the most effective and prosperous agricultural society in the country, that of Massachusetts; and who for some twenty years has been secretary of that State Institution. Mr. Prince showed most conclusively that the first introduction into the state, of all the improved implements of husbandry, those that have entirely superseded the clumsy contrivances of the earlier farmers, were owing to agricultural associations, and exhibitions.

The first ploughing match in America took place at Brighton, in 1817, under the patronage of the Massachusetts Agricultural Society, and then was introduced there for the first time, Wood's patent cast-iron plough, made by Freeborn, a plough which in its various modifications has superseded all others, and so far as ploughing is concerned, (and all will admit that this lies at the very basis of husbandry) has effected a complete revolution in the ease and facility of the operation. At the Brighton show in 1836 there were twenty-two ploughs in the competition, all of which were of iron. He showed that such had been the fact with regard to drills, cultivators, machines for sowing seeds broad cast, hay and manure forks, and numberless other implements of great value to the farmer. They were first introduced by such societies; they were tested, and their operation shown at the shows and exhibitions, and they were thus brought to the notice of thousands of farmers at once, many of whom might otherwise not have heard of them for years.

The Merino, and the Durham cattle, were introduced many years since by the president of this society; and it is mainly through the influence of this and similar associations, that the beautiful McKay, Berkshire, China, and Byfield pigs, have in that state mostly superseded the long-nosed, impossible-to-fat swine that formerly devoured the corn of the bay state. This improvement in pigs alone was many years since, by one of the most extensive dealers in pork in Massachusetts, estimated at more than a hundred thousand dollars.

It gives us pleasure to state that the bill to continue the appropriations of the state for such purposes was sustained by a vote of more than twenty to one. The course of the Massachusetts legislature is one honorable to their patriotism, and a proof of their intelligence. Their bounty on wheat, will cause the production of a handsome crop, we have not a doubt; we only regret that such quantities of wheat have been sent to eastern farmers, under names to which it has not the slightest pretension. The "staff of life" should not be subjected to such petty speculations and deceptions.

FIBROUS-LEAVED PLANTS, AND THE MODE OF PREPARING THE FIBRES.

To the Editor of the Farmers' Register.

Washington, D. C., 2d July, 1838.

Dear Sir—You may have perceived in the newspapers, that on the 12th June, the bill to encourage the introduction and cultivation of Tropical Plants, was passed in the senate by a vote of 26 to 11; the majority including the names of the most distinguished senators, of all parties, in their seats on that occasion. You may also have seen that on the 28th ult., the committee on agriculture of the house of representatives re-reported the same senate bill without amendment—a measure upon which they unanimously agreed two weeks before. The committee on agriculture has but two bills to be acted on—viz: said senate bill, and the bill to establish an agricultural department in the Patent Office, and although that committee, ever since the establishment of the government has not ever asked its right to be heard by congress, it has not this session been able to obtain a single hour for the consideration of its humble bills.

On Saturday last, Gen. Jesup spent an hour in the committee room, in the examination of the specimens of foliaceous fibres of fibrous-leaved plants adapted to both the *arid* and the *humid* surfaces of Tropical Florida. He stated that all Southern Florida from 28° N. L. to Cape Sable, had now been explored by himself, officers, and soldiers, and that they still re-affirm the fact, that for our actual staples the whole district is not worth the expense of surveying; that my suggestion alone can render valuable the country hitherto considered uninhabitable and uncultivable, and that the government ought to grant the whole territory below 28° to actual settlers and cultivators on the conditions of the aforesaid senate bill. That bill you will see merely admits the prospective sale of one or more sections, not exceeding thirty-six in all, for the most valuable considerations ever offered to any government or people for the actual settlement and cultivation in valuable plants, within eight years, in a district officially affirmed to be uninhabitable and uncultivable, unworthy of the expense of a survey, or even of the cost of medicines requisite to conquer it. Although my heart sickens with hope deferred, after eleven years' laborious absence from my family, yet I shall still have some consolation, provided public attention will thus be excited towards the propagation of our *indigenous fibrous-leaved plants alone*. The Hon. H. Wise thinks that he recognizes, in the Agave Virginica of my plates, a familiar plant in his district, there called silk grass, of which slips of the leaves have long been used for economical purposes—especially for straps to suspend hams, &c., without suspecting that they contained strong glossy white fibres, which may be profitably extracted for sale or manufacture. The economical uses of the Yucca filamentosa or bear-grass, i. e. of the unscraped leaves or slips of leaves, have been known from time immemorial, in all our southern and south-western states. The Hon. R. Hawes, of Kentucky, informed me that the name of Bear-grass Creek, in his state, was taken from the abundance of the Yucca filamentosa on its borders. Nuttal tells us that it inhabits the banks of the Missouri, from the confluence of the river Platte, to the mountains—and hence at one point near the junction of White-earth river, it must extend to 48° N. latitude. Mr. Catlin, the painter, also says he met it abundantly during his travels in the far north-west.

On the other side this plant is becoming acclimated in our middle and north-eastern states. In 1831-2, I found it during the winter in open gardens around New York, and then predicted to the committee on agriculture that it would become a superior substitute for flax on the steril soils of the adjoining states. The Yucca filamentosa was there introduced from the southern states as a merely ornamental plant of the gardens of the northern states, where they have accidentally discovered that it propagates itself, and passes through their bleak winters without injury. Even in the garden of David Thomas, Cayuga county, New York, the bear-grass grows through the coldest seasons, without any prejudice to its green-living leaves; and in Princeton, N. J. in January last, several leaves were cut, and dressed in a common flax mill—and the fibres sent to this room, where they are now before me. They, however, still retain a greenish color, and are comparatively feeble, because they were *bruised* instead of being *scraped*.

I hence trust that you will consider the subject of fibrous-leaved plants sufficiently important to your readers, to justify the publication in your periodical of the last twenty-two pages of the report of the committee on agriculture of the house of representatives. Should you coincide in my opinions of their immense value to all the poorest soils of our southern states, you will, doubtless, be pleased to request from your readers, information concerning the localities and quantities of each indigenous species within their respective districts, with such additional observations as they will probably be equally glad to communicate. Should your periodical thus make public the location of any considerable quantity of our indigenous Yucca or of our indigenous Agave; it will, no doubt, excite our ingenious machinists to transport themselves to the spot, and invent labor-saving machinery suitably modified to scrape the leaves of each species. Although not born in New England, I had Yankee blood enough to invent, many years ago, two forms of machinery adapted to separate the foliaceous fibres from the green living leaves of the Sisal hemp agave, and of all analogous plants. Of the simplest form, an idea may be obtained by comparing it to a common grindstone moved by a treadle with the foot. A wooden wheel of six feet diameter, when once set in motion would have its velocity so aided by its momentum, that a single revolution would scrape the one side of any leaf or leaves applied to its circumference. For the leaves of the Sisal hemp, at an average of four to five feet, a curve of one-fourth of the wheel would suffice.

The curved compresser would be retained near the surface of the wheel by spiral or other spines. The perphery of the wheel would be crossed by straps of hard wood, or of iron, with blunt edges, for scrapers. The wheel once in motion from the foot of the laborer, he would take the but-end of a leaf in his hand, and insert the point between the compresser and the wheel, which would thus carry down the leaf as far as the but, still retained by the hand. One-fourth of a revolution would thus be spent in simply carrying down the leaf between the surface of the compresser and of the wheel; but the leaf then being held fast by the hand, the other three-fourths of the revolution would be a scraping process alone. As the fibres thus exposed would not then offer any resistance to being withdrawn, the leaves are then pulled out, and the unscraped side is next inserted; and the foliaceous fibres will thus be separated on both sides to a short distance from the but-ends. Even that may be advantageously left as a bond of union to the mass of fibres, and thus save the labor of tying them into knots. But as our countrymen will not be satisfied with the labor saved by such a machine, I invented another to be moved by portable horse power. This will consist of two pairs of cylinders, to be called feeding cylinders and scraping cylinders. The upper cylinders to be smooth and to move slowly; the lower cylinders to be grooved and to move swiftly, and the leaf or leaves to be inserted perpendicularly into the feeding cylinders, and to be thus conveyed perperdicularly through the scraping cylinders. Hence, both sides of the leaves will be scraped at the same time; and the offal will fall to the ground without being entangled in the fibres. With this machine, however, there will also remain unscraped a portion of the but-ends; but with me it is a question whether it will not be more advantageous than injurious, to let it remain as a bond of union to these long straight parallel fibres.

I enter into these details to save a world of speculation and of labor to other inventors, and cultivators. Their first impulse always is to seek some analogy with common flax and hemp. They will talk about rotting and breaking these *green-living leaves*, as they have been accustomed to treat the dry hard barks, from which they extract flax and hemp. After having gone through the whole routine of inventions and experiments, they will, however, all finally arrive at the conviction that simple *scraping* only, is the cheapest, the easiest, the speediest and the healthiest of all possible processes to obtain foliaceous fibres from the green-living leaves of fibrous-leaved plants.

I have the honor to be, sir, very respectfully, your obedient servant. H. PERRINE.

[The bill granting to Dr. Perrine 23,000 acres of land in Florida, for the purpose stated in several foregoing publications, finally passed on the last evening of the session of Congress just closed.—ED. FAR. REG.]

PREMIUMS AWARDED BY THE AGRICULTURAL SOCIETY OF CHARLOTTE.

[Published by request of the Society.]

At the annual exhibition of cattle and other stock, belonging to the members of the Agricultural Society of Charlotte county, held at the Courthouse of said county on the 12th day of October, 1837—premiums were awarded to the gentlemen whose names are hereto assigned.

To Mr. John Marshall, for the best milch cow, by Col. Marshall's Pompey, out of a Devonshire cow.

To Mr. John Marshall, for the best heifer under two years old, by Cardwell's Durham, out of the Pompey cow.

To Mr. John Marshall, for the best brood mare, Whittleberry, by Roanoke, out of Wakefield, by Sir Hal.

To Capt. Henry A. Watkins, for the best yoke oxen.

Do. do. do. do. mule.

To Mr. Henry Carrington, for the best beef.

Do. do. do. do. do. heifer under three and over two years old, by Col. Richardson's bull Powell.

To Mr. Henry Carrington, for the best filly one year old, by imported Claret, out of Blanch, by Gascoigne, g. d. Miss Ryland.

To Mr. R. I. Gaines, for the best bull.

Do. do. do. do. Saxon ram.

Maj. William Gaines, for the best two-year old colt, by Carolinian.

Mr. Thomas F. Merryman, for the best foal, by imported Emancipation.

To Mr. Wyatt Cardwell, for the best saddle horse, out of Amy, by Gracchus, by Gascoigne.

Communicated by order of the Society,
HENRY CARRINGTON, *Sec'ry.*

From the Cultivator.

MINERAL MANURES.

Although there is much to please and interest the mind in practical farming, yet, devoid and apart from the theory, it is little else than a routine, suited to the capacity and ambition of uncultivated minds. An active and enlightened mind seeks to understand the cause and effect—to apply the sciences; in short, it is restive, until the queries embraced in agriculture, are disposed of and determined upon sound philosophical principles. 'Tis this constitutes theory; and 'tis this theory, that unfolds a world of beauties to the scientific agriculturist, of which the mere prejudiced practical farmer, the mere tyro and novitiate, must remain ignorant, and that too, of the highest branch of the profession which he follows.

The improvement which has been effected within the last twenty years in several of the eastern counties of Pennsylvania, (and especially in Chester,) is almost incredible. And the whole is mainly attributed to a regular and judicious use of lime as a manure. To me, it has been matter of astonishment, to find this inestimable restorative meet with so little favor in the minds of the conductor and correspondents of the Cultivator. My farm is situated in a district of secondary formation, and the soil is principally calcareous, yet I have seen the most surprising beneficial effects attending the free use of lime and plaster; the latter apparently reacting on the former, and consequently, the greatest benefit is derived by using them together. The crops, not only on my own farm, but on others in this vicinity, have been doubled by a free use of mineral manures. When a farm has been improved so as to produce heavy crops, there will be such a corresponding increase in the quantity of stable manure as to insure its future fertility. I look upon the immense beds of limestone in this region as an inexhaustible store designed by the wise Governor of the world to keep up the strength of the land, in all time to come. I regard the limestone of Pennsylvania as a mineral, which will confer more real benefit on posterity than any of her other mineral treasures. The aid which it promises to contribute to the support and improvement of her agriculture cannot be easily overrated. Some idea may be formed of the estimation in which lime is held here as a manure, by the fact, that farmers come from 25 to 30 miles, i. e. from Maryland and the poor district of primitive formation in the southern part of Chester county, bordering on the Maryland line, to my limekiln and others in the neighborhood; the lime costing those farmers 25 cents per bushel when delivered. To the farmers in that quarter, lime is the "anchor of hope;" there it has already made the barren and desert place glad, and is fast putting a new and improved face upon the country. The farmers, even there, with this far fetched means of improving their land, prefer bettering their condition by liming near a good market, rather than migrate to the exuberant soil, and realize the utopian dreams and fairy tales of the "far west."

On part of my farm, 300 bushels of lime per acre have been applied within 30 years, at the rate of about 100 bushels per acre at a dressing, and always put on fresh, and slaked, then immediately spread. I am not inclined to believe that lime should become carbonated before it is applied. I adopt Sir Humphrey Davy for my prototype, in every case involving agricultural chemistry. I shall be encouraged so to do, until some modern wiseacre can clearly demonstrate that Sir H. is wrong. Doubtful points in Davy's theory have become demonstrable truths with me, after being aided and enlightened by the lamp of experience. Lime, in its fresh caustic state, only while an alkali, acts as a decomposing agent in the soil; rendering vegetable substances soluble—but when a mild carbonate, it operates only like marl, in improving the texture of the soil, according to Davy, whose authority is unquestionable, and the theory, at all events, may fairly challenge contradiction; hence the advantage of applyng lime, like stable manure, in a fresh state.

With regard to the theory, or the manner, in which gypsum operates on vegetation, an accidental circumstance which occurred in my practice or under my own eye, goes further to establish the truth in my mind, than all the ink which has been spilled on the subject; even the adopted theory of Prof. Low and British Husbandry to the contrary notwithstanding. In April, 1832, I sowed half a bushel of plaster on a small piece of land in the middle of a wheat field, for experiment in order to ascertain whether the plaster would have the slightest effect even of changing the color of the wheat. The result answered my expectations; there was not a shade of change in the color of the wheat in the future stages of its growth. In autumn following, the same field was again ploughed for wheat and the plaster course turned down, the field was deeply ploughed, say 7 or 8 inches—the spring following the field was sown with clover seed; the secret then was speedily developed; when the wheat was cut in harvest the growth of clover on that same land which had been sown with plaster, was so luxuriant as to interfere with the cradle in cutting the wheat. —Soon after harvest, the clover on the said land flowered, and a heavy swath might have been mown on it in September following. The adjacent parts of the field, with the same soil and culture, exhibited a sickly contrast. In the autumn of 1833, the clover on said land was trodden down by stock, returning manure to the soil, and by that means the plaster indirectly prepared the ground for a sure crop of wheat. This one single and simple fact serves to overthrow the theory that plaster must be sown on the plants, to be absorbed through the pores of the leaves—attract moisture from the atmosphere, &c. This mooted point I consider settled, and the soil and roots made the laboratory instead of the leaves and the atmosphere.

Although my agricultural career has been only short, yet the great object, improvement, has been ardently and zealously pursued—sufficiently, indeed, to create a most utter and implacable abhorrence against all vague and unfounded theory, which is the bane of the agricultural press. The mere conjecture of a writer, if in error, will do no harm; but 'tis the positive declaratory assertions, where wrong, that do mischief, inasmuch as many believe and adopt what they read.

Quere. Why is it that lime and plaster act much more efficiently when both are applied to the soil, since the base of both is lime?

WM. PENN KINSER.

Pequea, Lan. Co., Pa., April 15, 1838.

USE OF LIME IN NEW HAMPSHIRE.

One of the shakers recently told me, they had been in the habit of buying the best of Thomaston Lime, which with transportations cost them at least $3 a cask; of breaking and slaking it, and mixing it with mud collected from bog-holes or turfs from the sides of the highways, in proportion of four or five casks to a hundred common ox loads; and after due fermentation and mixture, they have found this composition not less valuable than an equal quantity of the best of stable manure. If the above remarks are correct, and no doubt they are, as I find them corroborated by various writers on this subject, it is an easy and cheap method of obtaining manure and well adapted for top-dressing.

The Hon. John Wells of Boston, who has made several experiments with lime in the preparation of compost manure for a top-dressing, recommends that it be prepared by first placing a layer of mud or loam, as the case may be, then a layer of unslaked lime, and so continue until the materials are used up; and in twelve or fourteen days, shovel it over and it will be fit for use. From what I am able to gather from this gentleman's experiments, he made use of lime in proportion, of about one cask of Thomaston lime, to five loads of loam or mud, and that he annually, for more than twenty years made use of lime, 'for agricultural purposes to the extent of more than one hundred casks.' He further says:—'To my surprise I found the effect produced to be equal to what is usual from common compost manure!' Lime as a top-dressing on a wheat crop is undoubtedly valuable on many kinds of soil, especially where there is a deficiency of calcareous matter.

Benj. Cutter, esq., informs me that he has made use of lime at the rate of twenty bushels or more to the acre, as a top-dressing, by sowing it on in a fine pulverized state, when the wheat was a few inches high, and considered himself well remunerated in the wheat crop. The Hon. Levi Fisk, observed to me, that he used two tierces of Thomaston lime last spring by sowing it on nearly two acres of wheat, leaving a small piece in the same field unsown, and is confident he realized twenty-five per cent. more wheat in consequence of the lime. The above and other similar experiments, are conclusive evidence in my mind, of the importance and value of lime as a manure.—*Conant's Cheshire Address.*

THE COLLEGES OF VIRGINIA CONSIDERED AS WORKS OF "INTERNAL IMPROVEMENT." WILLIAM AND MARY COLLEGE.

The colleges and schools of a country are among the most important and valuable means, as well as results, of its general improvement. Nor is the improvement thus reached merely intellectual and moral. The physical improvement of the country, the enriching of its lands, the increase of its agricultural products, and the amount of pecuniary profit to the cultivators, all are essentially aided by providing, and properly using the facilities for education afforded by schools and colleges; though the design and direct operation of these institutions should be confined exclusively to literary and scientific instruction, and without any view to the physical or economical improvement of the country. And the effects so produced, in their turn become causes; and help, in an important degree, to sustain literary and scientific institutions. In strict accordance with these views are found the practical results, wherever they have been permitted to be produced by the action of causes continued sufficiently long, and with sufficient intensity. In the country which surrounds and sustains Hampden-Sidney College, there is found a population, whose intellectual and moral worth, economical and industrious habits, and whose marked success as farmers and men of business, prove beyond doubt or cavil, the great profits, individual and pecuniary as well as general and national, which the people have derived from their liberal and long-continued support of that college. We are less acquainted with Washington College; but have been informed, and believe, that similar and equal effects have there been produced by the operation of similar causes. Randolph-Macon College is yet too young an institution to have given such manifest evidences of its value as a work of "internal improvement;" but it is doubtless annually producing these valuable results; and requires only as much time, with equal good management, to exhibit as strong evidences of value.

This manner of viewing the subject will prevent any objection to the propriety of treating of our colleges in this journal, of which the second object is to sustain and aid all public works for the improvement of

Virginia; nor will the subject be deemed unconnected with the first or principal object of the Farmers' Register, which is especially agricultural improvement.

The colleges referred to above, highly beneficial as they are to the commonwealth, as well as to the people more especially interested in them, are local institutions—principally sustained by, and in return sustaining and elevating, the surrounding and adjacent, though an extended region of country. And it is because of this local action, and yet very general operation within such limits, that the improvement made in the people and in the country can be so easily traced, and so clearly exhibited and proved. The University of Virginia, from its rich endowment, its identification with national interests, and its other peculiar and great advantages, is diffusing knowledge and improvement to every part of the state, and to far remote states; and the benefits thus produced are not the less certain and important, because, from their wide diffusion, they are less susceptible of being accurately estimated, and duly appreciated.

William and Mary College at present partakes of both these characters. Formerly it was the state or principal institution of Virginia, and even of all the southern and western states then in being. Yet, in its former days of prosperity, (as they were then deemed,) and when receiving students annually from every region of Virginia, and some from perhaps five or six other states, still the number of students in the scientific classes ranged between 60 and 90, and rarely, if ever, exceeded the latter number. The boys in the school for Latin and Greek, are not counted under the name of "students," in this institution, and are not so included in these or any of the following remarks; though all such boys, in the middle and higher classes, *are* so counted in most other colleges; and thereby serve to swell their apparent numbers, and, by the comparison, to make the number of students of William and Mary appear fewer in comparison. In making comparisons, this difference should not be overlooked.

From that condition, William and Mary was struck down to the lowest state of depression, first by the war, which brought an invading enemy into its near neighborhood, and for two years caused frequent calls upon every student of military age for military service in the field. Under such circumstances, the continuance of regular or even profitable study and collegiate duties, was rendered impossible; and parents either kept their sons at home, or sent them to distant colleges, which were free from such continual alarms of invasion, or marauding incursions from the British fleets. There were afterwards transient returns of prosperity to the college, but of no long continuance; as other and different blows, not necessary here to particularize, fell upon it in rapid succession, and served to impair its interests, and to thin its ranks. These changes and fluctuations will be passed over, to the session of 1833-4, when the institution seemed to be so nearly prostrate, that the loss of any one valuable professor was feared as a blow too heavy to be then borne; and an evil impossible to repair, owing to the small remaining inducements to attract or retain able professors. That session, the whole number of students amounted to no more than seventeen. Not long before, more than two years had passed without a quorum of the board of visiters being got together, and of course without a meeting or any action of that body—those members who were present, and ready to act, having been rendered useless by the non-attendance of others.

During that time the important professorship of mathematics remained vacant; and though its duties were performed by the extra service of another professor, still the vacancy and its cause could not but greatly impair the public confidence in the management and usefulness of the institution. This neglect of the visitors to attend, and act in convocation, was the great cause, out of which grew all the minor and auxiliary causes, of the decline and threatened extinction of the college. In July 1834, a meeting of a bare quorum (a majority of the visitors, as required by the charter,) was, with difficulty, obtained; and a system of reform and improvement was then begun, which has been zealously continued to this time, and which has produced the most remarkable and manifest improvement in the number of students, and in the value of the course of instruction. So far as the increase of number of students may serve to indicate increase of prosperity and value of the college, these will strongly enough appear in the following statement of the numbers for the five last courses.

In session of	1833-4,	there were	17 students.
	1834-5,		48
	1835-6,		69
	1836-7,		113
	1837-8,		112.

When the universal pecuniary difficulties and losses of the last fifteen months are considered, the last number, though a little less in amount than that of the year preceding, is, in fact, a stronger evidence of increased public confidence in the institution, than the previous rate of progressive increase of numbers. And this high eminence will be justly deemed the more remarkable, when considered in comparison with the previous and long continued depression—in comparison with the former state, when William and Mary had not a rival in this or half a dozen adjacent states—and considering that now there are three other colleges deserving and drawing their shares of students, and still more the University of Virginia, in a state of high prosperity, and having from 200 to 240 students during each of the last three years.

While we wish the greatest possible success to all our institutions of education and learning, it may be permitted to us, without being obnoxious to the charge of being sectional in feeling, or wanting in good will to others, to set forth more especially the claims of William and Mary College as the now local institution of the tide-water region, in addition to its other and strong claims of a general nature. It has ceased to be the principal college of this and other states, not because of diminished value of its instruction (for that has been greatly increased—) but because of the establishment of sundry other institutions, by public or private endowment, which circumstance has recently changed the aspect in which each one must be now considered. William and Mary, as much as any other college, deserves the support of the whole country; and in consideration of its mild and delightful climate, perfect healthiness during the whole time of the course, *and peculiar suitableness to the constitutions of southern young men*, there are strong reasons for its being preferred, for all such pupils, to any colleges of equal scientific grade situated in more northern or elevated regions, and in a more rigorous climate. It is too true that this comparison is seldom made, and that danger to the health of southern boys sent to bear northern winters is scarcely thought of. Even the people of our low country are themselves accustomed to acquiesce in the general understanding that an unhealthy region is one where bilious or autumnal diseases only are to be feared; and that if these are absent, or very rare, a country is healthy, no matter how much its people are scourged by catarrhs, consumptions, rheumatisms, and pleurisies. By one or more of these latter diseases, the constitution of many a southern youth has been seriously injured, or destroyed, at northern seminaries; and even if he escapes all these, he is rendered, by a northern residence, unfit to revisit his southern home, in autumn, without danger; and if, to avoid that danger, he remains away for years together, he acquires a northern constitution, and is as unfit as if born in the north, to live at his proper and intended future home.

But putting aside this important consideration, and viewing William and Mary merely as a local institution, the tide-water region alone can and ought to furnish it with enough students to triple its present number. And when we say *ought*, it is not meant that the obligation should extend further than would be limited, on full knowledge of the circumstances, by the private and individual interests of the parents, not only as parents, but as residents and property-holders of the low country. It is not their general interest to prefer this college unless it deserves a preference for the value of its instruction and training of youth, and on the grounds of the moderate rate of price at which the benefits are to be obtained.

The course of classical instruction, or the school for Latin and Greek, is very defective when compared to most other colleges of high rank. Until the last session, it was a grammar-school, upon the ordinary footing of common schools for teaching Latin and Greek; and was the more liable to objection because of its connexion with a scientific institution of high order. Better instruction in the higher classical studies was in part provided for, a year ago: and by another year, it is hoped and expected that William and Mary will exchange the grammar-school for a system of classical instruction suited to more advanced pupils and regular students. When this is properly done, there may be justly awarded to the whole institution, the high commendation which all the other departments now well deserve. The professorships are well filled; the course of instruction is excellent, and is designed to be of practical application, no less than it is of high scientific character. The government and discipline of the students is parental, though sufficiently strict; and, while no known offender is permitted to pass unpunished by the laws of the institution, still the means to govern, and the prevention of offences, are more generally and effectually found in a reliance on and appeal to the sense of honor and propriety of the young men; who are reminded at every step, and in every hour, by the general purport of their training and association, that the first duty of a student is to preserve, in every particular, the character of a *gentleman*, and man of honor and truth. This most powerful aid to the statute book, (and without which mere enactments and punishments are of little avail,) has been strengthened and brought admirably into operation by the tact of the present faculty of the college, and by the respect and regard of the students which the professors fortunately possess, and the consequent influence which they can exercise. And this mode of governing, by appealing to the best feelings, instead of merely punishing the fruits of the worst, is further strengthened by the tone of the private society in which students here may freely mingle, and are received with welcome, and which, while it softens, refines and cultivates manners, and guards against vicious pleasures by substituting innocent relaxation and amusement, also, by approbation or censure, increases the inducement to do good, and to refrain from evil. Much good has always been done by the society of the inhabitants of Williamsburg to the students of William and Mary; and, it must be confessed, also some harm—and in former times *much* harm. But the evils of this kind, which have existed, have been clearly seen, and are now guarded against, by example and precept, of all belonging to the best society. And, though imperfections and evils will always exist to some extent, it may now be safely asserted, that the influence of society in this place was never so beneficially exercised, as now; and its influence is, in the general, decidedly and greatly beneficial to the students. Either the total exclusion from private association with well-bred people (and especially from female society,) or the mingling with the fashionable and often debauched society of large cities, and sharing in their vicious pleasures, are conditions very different from that of the students of this college, and the operation of either of which is always greatly to be feared.

The result of all the measures of reform adopted by the board of visitors, and admirably executed by the faculty, and of the influences thereby and otherwise produced, has been the attainment of a degree of moral and intellectual improvement in the students in general, for the last two years, and more especially during the course just ended, which furnishes to the friends of the institution very far more cause for congratulation, and ground for auguring still increasing prosperity and success, than merely the rapid and continued increase of students. During the last course, the conduct of all but a very few of the young men, has been throughout orderly and correct, and gentlemanly in all respects; and when taken altogether, the abatement necessary to make for the few of other habits, will not prevent the general conduct of the students being considered in a remarkable degree free from the offences of disorder and vicious habits so usual in colleges. Far otherwise was the state of things in former times; and much prejudice still remains against this college in the minds of many who know and believe nothing of the true condition and high value of this institution, and who, as erroneously, in regard to this and to all other colleges, charge the vicious propensities of every student, which are generally caused by the improper indulgence of his own father, to the college which has in vain struggled to prevent the evils thus caused by more powerful counteracting influences. There is no cause to fear detriment to the virtues or good habits of any youth who may be now sent to this college, unless caused by the fault either of his incurable evil propensities, or otherwise, as is most usual, by the error of his previous training and the continued improper indulgence of his parent. Almost every case of a student proving either extravagant in expenditure, dissipated, or vicious, is caused by his being furnished with too much money. If a youth receives even $20 more than a sufficiently liberal allowance, the excess must do injury to his habits; and when that excess is carried to $300, merely because the father is rich enough to afford the expense, he almost invariably and greatly injures, and perhaps ruins his son, by such unjustifiable indulgence. The money thus annually wasted at most colleges of high grade, to the injury of all parties, is usually as large as all required for the necessary and proper expenses. The parent, who, in spite of all warning from the college authorities, will commit this common error, has no right to charge the vices or idleness of his son to any other than himself. The necessary collegiate expenses of a junior student at William and Mary College, for professors' and other college fees, (and as many as can be usefully paid,) board, books, and every other necessary expense, amount to $228, if the student boards in college, or $248, if in a private family. Add to this what is safe and proper for pocket-money, (and that certainly ought not to exceed $50, for a young and new student,) and every expense for the junior course is provided for, except the purchase of clothing, and that is not a collegiate expense. The *necessary* college expenses of the senior course are still less than those of the first year. Few boys, just freed from the restrictions of a school, or their fathers' guidance, can be safely trusted at one time with even $50, to be retained and used as pocket money for the coming time of nine months. To their inexperience it would seem a sum so large that they will scarcely get through it; and in a month, perhaps, they find that it has slipped through their fingers, and left a newly created appetite for ten times as much. In such cases, it is the father, much more than the son, who is to be blamed. What then is to be said of the parent, who, merely because he is rich and purse-proud, sends far from home an inexperienced youth, totally unused to the ways of the world, with several hundred dollars in hand more than needed for early expenses? It is almost a miracle when it does not do great injury to the student; and often it corrupts and destroys the man for ever. The sons of the richest parents are generally the least worthy or profitable students—and often, their attendance is a loss, even in a pecuniary point of view, to the college which they enter.

The propensity of students to contract debts is encouraged, first, by the extravagance engendered by parental indulgence, in giving too much money, and next, by the seductions and enticements of the rapacious harpies and sharpers among the shopkeepers, tavern-keepers, and others, some of whom are as sure to be found about every college, as vultures will be seen flocking to a carcass. An excellent regulation of the visitors of this college, which has now been two years in operation, has already done much good in restraining this abuse; and it would have been effectual, if parents had properly seconded and sustained the law, and the authorities of the college. At the last session of the legislature a general law was passed for this purpose; and it is hoped that this infamous practice will be more effectually checked. It is a fraud of the worst kind; for it preys upon the sufferers' precious time, morals, and future prospects of usefulness and happiness, as well as upon their money, which alone is the object sought by these tempters and destroyers of heedless youths.

The regular course of study, here necessary to obtain the degree of A. B. (Bachelor of Arts,) is of two years' continuance. This does not include instruction in the Latin and Greek languages; which, it is presumed that the student has acquired at school, more cheaply, and far more profitably, than he would at college. To obtain the degree of A. M. (Master of Arts,) a more extended course of study, and higher attainments, both classical and scientific, are requisite; and to this end, profitable employment is furnished for one or for two years longer. Thus, although the scientific course proper of the college may be and ought to be passed through, and its honors obtained, by every properly prepared and diligent student, in two years, (which is a great advantage, and economy of time and money to those who can better prepare at lower schools,) still, if such classical preparation as makes part of the regular course at most other colleges, be added to the account, it would add one or two years to the beginning of this; and for the course necessary for A. M. one or two years more must be added at the end. Thus, the course of study may be two years, or it may be four, or even six, and all well and fully occupied, according to the circumstances and attainments of the student. The diplomas are conferred only for a proper degree of proficiency, to be shown upon strict examination; and in no case upon the ground of having merely passed through the whole time of the college course, and paid all the fees; which will entitle every student at most or all northern colleges to a diploma, as a matter of course. Honors thus conferred, no matter how exalted in reputation and merit may be the college conferring them, are in most cases awarded without being deserved; and any institution thus granting them, is guilty of a despicable fraud upon the public. The same and only correct and *honest* mode of conferring honors and diplomas as has always been the practice at William and Mary, that is, upon full examination and evidence of proficiency, has likewise been pursued at the University of Virginia. And consequently, a student who would not even dare to ask for a degree at either of these institutions, from being conscious of not deserving it, would receive it, as a matter of course, if belonging to a northern college of the highest rank and character. Upon this deceptious system, the whole senior class graduates; or it is a very rare and remarkable occurrence if any one of the class should be refused his degree. Therefore, if rightly viewed, the large number of degrees annually conferred, would show their very small average value; and every one, of the small comparative number, where they are conferred on proficiency exhibited, ought to be so much the more highly prized.

We have just returned from a session of four days of the Board of Visitors, and attendance on and observation of the closing scenes of the last course of William and Mary College. The evidences of the very orderly and correct deportment of the students generally, the rareness of the cases of opposite conduct, and the fruits of labor and profitable instruction shown in that portion of them who earned the honors of the college, were all highly gratifying. These extended remarks show our own individual and entire concurrence in the unanimous expression of approbation of the Board of Visitors, as copied in the proceedings below. And we assert, without hesitation, that if the people of lower Virginia alone who now send their sons to northern colleges would give their support instead to William and Mary, the gain would be not only great and important to that institution, but far more so to the students and to their parents, and to the commonwealth of Virginia. We would never send a son, or advise other parents to do so, to an inferior school, because it was in Virginia. But if equal or superior advantages are available at home, as is certainly the case, then both patriotism and economy ought to concur in causing the institutions of learning in Virginia and the south, to be encouraged, rather than those in the northern states.

ED. FAR. REG.

PUBLIC EXERCISES OF WILLIAM AND MARY COLLEGE, JULY 4TH, 1838.

The public exercises at the close of the late session in this institution, took place on the 4th inst., as usual.

At 10 o'clock, A. M., the Visitors, Professors and Students, attended by the Volunteer Companies of the place, commanded by Captains Armistead and Durfey, (who politely tendered their services on the occasion,) moved in procession from the College to the Church, where the exercises were commenced by a prayer from the Right Rev. Bishop Meade. Then, after fine and appropriate music, for which the audience were indebted to the kindness of the ladies, the exhibition by the graduates was for a moment suspended, while the President read the following resolution of the Board of Visitors:

"Resolved, unanimously, That the Visitors of Willam and Mary College, have learned with undissembled satisfaction of the flourishing condition of the College, and of the orderly and correct deportment of the students during the session which has to-day terminated: and that the President be requested publicly to express in the Church, to the young gentlemen of the institution, the warm and decided approval felt by the Visitors of their exemplary conduct."

After which the following Orations were delivered:

1. Oration on the formation of National Character, by Samuel S. Henley, A. B. of King & Queen.
2. Oration on the rise and prosperity of the United States, by Tho's. B. Donnelly, A. B. of Williamsburg.
3. Oration on Internal Improvement and its effects on the condition of Virginia, by William L. Henley, L. B. of James City.
4. Oration on the influence of Literature on Society and Government, by Herbert A. Claiborne, A. B. of Richmond.
5. Oration on the influence of William & Mary College on the Literary, Moral and Political condition of this country, by James A. Clopton, A. B. of New Kent.
6. Oration on the inefficiency of Governments to conduce to their proper end, with war as their prevailing spirit, by Gawin L. C. Salter, L. B. of York.
7. Valedictory to the Members of the Franklin Society, by Robert Tyler of Williamsburg.

The President then proceeded to confer the Degree of Bachelor of Arts on the following twelve young gentlemen of the senior classes:

Herbert A. Claiborne of the city of Richmond.
James A. Clopton of New Kent.
Benjamin F. Dew of King & Queen.
Elias Dodson of Halifax.
Thomas B. Donnelly of Williamsburg.
John Finney, of Powhatan.
John M. Galt of Williamsburg.
Edward Gresham of King and Queen.
Samuel S. Henley of King and Queen.
Archibald C. Peachy of Williamsburg.
Robert G. Scott of the city of Richmond.
John O. Steger of Amelia.

And the degree of Bachelor of Law upon the following:

William L. Henley of James City.
Gawin L. C. Salter of York.

The President then bestowed upon the following thirty-nine young gentlemen, of the junior classes, certificates, under the college seal, of proficiency and good conduct.

William Blankenship of Chesterfield: National Law—Rhetoric, Logic and Ethics—Chemistry—the Junior Mathematical Course—History.

John B. Cary of Hampton: Natural Philosophy—Mathematics—Political Economy—National Law—Rhetoric, Logic and Ethics—Chemistry—Civil Engineeriug.

James L. Clarke of Gloucester: National Law—Rhetoric, Logic and Ethics—Chemistry—the Junior Mathematical Course.

Nathaniel C. Cocke, of Prince George: National Law—Rhetoric, Logic and Ethics—Chemistry—the Junior Mathematical Course—History.

John A. Coke of Williamsburg: Natural Philosophy—Political Economy—Metaphysics—National Law—History.

William Cole of Prince George: National Law—Chemistry—History.

William W. Crump of the City of Richmond: Political Economy—National Law—Rhetoric, Logic and Ethics—Chemistry—History.

Edwin H. Edmunds of Brunswick: Chemistry—History—Junior Mathematical Course.

William H. Fitzhugh of Prince William: National Law—Rhetoric, Logic and Ethics—Chemistry—Junior Mathematical Course—History.

Benjamin F. Garrett of Williamsburg: National Law—Rhetoric, Logic and Ethics—Chemistry—History.

John J. Gravatt of Caroline: Political Economy—Metaphysics—National Law—Rhetoric, Logic and Ethics—History.

William H. Gwathmey of King William: National Law—Rhetoric, Logic and Ethics—History—Chemistry.

Henry Harrison of Charles City: Mathematics—Metaphysics—National Law—Rhetoric, Logic and Ethics—Chemistry.

Jas. B. Jones of Chesterfield: National Law—Rhetoric, Logic and Ethics—Chemistry—Junior Mathematical Course—History.

Alexander Jones of Chesterfield: National Law—Rhetoric, Logic and Ethics—Chemistry—Junior Mathematical Course—History.

Warner T. Jones of Gloucester: Natural Philosophy.

William McGowan of Petersburg: Natural Philosophy—Political Economy—Junior Mathematical Course—Civil Engineering.

Nicholas Mills of the City of Richmond: Natural Philosophy—Rhetoric, Logic and Ethics—Civil Engineering.

Charles P. Moncure of the City of Richmond: Metaphysics—National Law.

Thos. B. Montague of Gloucester: Rhetoric, Logic and Ethics—History—Chemistry.

Chas. W. Montague of Gloucester: Rhetoric, Logic and Ethics—Junior Mathematical Course—Chemistry—History.

Woodson C. Moody of Williamsburg: National Law.

Wilson N. Nicholas of the City of Richmond: Natural Philosophy—Political Economy—Metaphysics—Rhetoric, Logic and Ethics—Chemistry—History.

George U. Nottingham of Northampton: Junior Mathematical Course.

William M. Overton of Lunenburg: Mathematics—National Law—History—Civil Engineering.

William R. Pierce of Williamsburg: Chemistry.

William P. Richardson of New Kent: National Law—Rhetoric, Logic and Ethics—Chemistry—Junior Mathematical Course.

Powhatan Robertson of the City of Richmond: Natural Philosophy—Chemistry.

Moore Robinson of the City of Richmond: National Law—Rhetoric, Logic and Ethics—Chemistry—Junior Mathematical Course—History.

John W. Rochelle of Southampton: Chemistry and Civil Engineering.

Julian C. Ruffin of Petersburg: National Law—Rhetoric, Logic and Ethics—Chemistry—Junior Mathematical Course—History.

Peter S. Smith of Nottoway: National Law—Rhetoric, Logic and Ethics—History.

William M. Sutton of Hanover: Political Economy—Metaphysics—National Law—Rhetoric, Logic and Ethics—Chemistry.

William B. Taylor of Prince George: Junior Mathematical Course—Chemistry—Civil Engineering.

William A. Thom of Culpeper: Rhetoric, Logic and Ethics—Chemistry—Junior Mathematical Course—History.

William Waller of Williamsburg: National Law—Chemistry.

George Wingfield of Norfolk: Natural Philosophy—Junior Mathematical Course—Civil Engineering.

John J. Wright of Essex: Junior Mathematical Course—History.

William B. Wynn of North Carolina: National Law—Rhetoric, Logic and Ethics—History.

PUBLIC EXERCISES OF THE UNIVERSITY OF VIRGINIA, JULY 4, 1838.

At the close of the session, on Wednesday, the 4th July, 1838, the following public exercises took place.

The exercises were opened with prayer by the Rev. A. P. B. Wilmer, Chaplain of the University.

The names of the students who had distinguished themselves, at the public examinations held during the present session, were then announced (in alphabetical order) by the Chairman of the Faculty.

Diplomas were then delivered by the Chairman, to the following students, who had been admitted by the faculty, to graduate in the several schools mentioned:

Latin Language and Literature.

John W. Clay, Alabama.
Wm. H. Glascock, do.
Thos. J. Hungerford, Westmoreland.
P. Thornton Lomax, Fredericksburg.
Fielding L. Marshall, Fauquier.
Thomas L. Reynolds, South Carolina.
Wm. W. Roper, Richmond.
C. R. G. Slaughter, Charlottesville.
Henry Spencer, Charlotte.
Chapman J. Stuart, Richmond.
L. M. T. Wickham, do.

SCHOOL OF ANCIENT LANGUAGES.

George H. Gnerard, South Carolina.
Donald M. Harrison, Amelia.
William H. Jones, Mecklenburg.
Wm. M. Swoope, Augusta.
Lewis Turner, Louisa.
Charles D. Wharton, Goochland.
Isaac R. Watkins, Charlotte.

SCHOOL OF MODERN LANGUAGES.

French—

Richard W. Bushnell, Rockingham.
John Critcher, jr., Westmoreland.
John W. Clay, Alabama.
Thomas O. Dabney, King William.
Eugene Davis, University of Virginia.
Donald M. Harrison, Amelia.

James A. Jones, Mecklenburg.
William H. Jones, do.
Hunter H. Marshall, Charlotte.
Lewis Turner, Louisa.
Thomas Towles, Louisiana.
Thomas H. Watts, Alabama.

Spanish Language and Literature—
Robert L. Brown, Nelson.
Richard W. Bushnell, Rockingham.
Thomas O. Dabney, King William.
Eugene Davis, University of Virginia.
Donald M. Harrison, Amelia.
Wm. H. Jones, Mecklenburg.
James M. Morson, Fredericksburg.
Thomas H. Watts, Alabama.

Italian Language—
George W. Blæattermann, University of Va.
James Alfred Jones, Mecklenburg.
Lewis Turner, Louisa.

SCHOOL OF MATHEMATICS.
Richard W. Bushnell, Rockingham.
Solomon Carr, Nansemond.
James Alfred Jones, Mecklenburg.
James M. Morson, Fredericksburg.

SCHOOL OF NATURAL PHILOSOPHY.
Richard W. Bushnell, Rockingham.
Wm. S. Barton, Fredericksburg.
Solomon Carr, Nansemond.
Eugene Davis, University of Virginia.
Donald M. Harrison, Amelia.
William J. Harris, Powhatan.
Wm. W. Roper, Richmond.
Wm. B. Stanard, do.
Dabney Carr Wirt, do.
Charles D. Wharton, Goochland.

SCHOOL OF CIVIL ENGINEERING.
Wm. S. Goodwin, Southampton.
Matthew M. Harrison, Brunswick.
Calvin D. Jones, Albemarle.
George W. Randolph, do.
Wm. H. Woodis, Norfolk.

SCHOOL OF CHEMISTRY.
John B. Baldwin, Staunton.
Wm. S. R. Brockenbrough, Hanover.
George H. Guerard, South Carolina.
James Alfred Jones, Mecklenburg.
Benjamin B. Minor, Spottsylvania.
Wm. H. Phillips, Charlottesville.
Wm. R. Skipwith, Richmond.
Wm. B. Stanard, Richmond.
Thomas H. Watts, Alabama.

SCHOOL OF MEDICINE.
With the title of "Doctor of Medicine."—
Wm. F. Robertson, Alabama.
George W. Rothwell, Albemarle.
Wm. R. Skipwith, Richmond.
Wm. D. Willis, Albemarle.
Wm. P. Whiting, Cumberland.

SCHOOL OF MORAL PHILOSOPHY.
John B. Baldwin, Staunton.
James M. Browning, Alabama.
John Burruss, Louisa.
John Critcher, jr., Westmoreland.
Thomas O. Dabney, King William.
John M. Garnett, King and Queen.
Robert S. Goode, Amelia.
Thos. J. Hungerford, Westmoreland.
Wm. H. Macon, Hanover.
Benj. B. Minor, Spottsylvania.
Alfred H. Powell, Winchester.
Elverton A. Shands, Prince George.
Joseph D. Shields, Mississippi.
Wm. B. Stanard, Richmond.
Thomas H. Watts, Alabama.
Dabney C. Wirt, Richmond.

SCHOOL OF LAW.
Richard L. T. Beale, Westmoreland.
Mordecai Cooke, Norfolk.
James T. Dillard, Bedford.
Terrisha W. Dillard, do.
Wm. N. Gregory, King William.
Wm. T. Joynes, Accomac.
Peter K. Skinker, Fauquier.

PROFICIENTS IN MEDICAL JURISPRUDENCE.
Alfred H. Powell, Winchester.
John D. Wright, South Carolina.
Wm. R. Roberts, Albemarle.
Charles Carter, Hanover.
Prince M. Watson, Albemarle.

PROFICIENTS IN MATERIA MEDICA.
William S. R. Brockenbrough, Hanover.
James Norris, Charlottesville.
Wm. H. Phillips, do.

PROFICIENTS IN PHYSIOLOGY.
Wm. S. R. Brockenbrough, Hanover.
Charles Carter, do.

PROFICIENTS IN POLITICAL ECONOMY.
John B. Baldwin, Staunton.
John Critcher, jr., Westmoreland.
Benjamin B. Minor, Spottsylvania.

The following students, having graduated in the schools of Ancient Languages, Modern Languages, Mathematics, Natural Philosophy, Chemistry and Moral Philosophy, the degree of *Master of Arts,* was conferred upon them by the Faculty.
Thomas O. Dabney, King William.
Wm. B. Stanard, Richmond.

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The session of this Institution was brought to a close on Wednesday last, by an exhibition in the rotunda, when the names of students who were distinguished at the intermediate and final examinations were announced by the Chairman of the Faculty, and diplomas awarded to those who had obtained degrees in the different schools of the University. The degree of Master of Arts was conferred upon Mr. T. O. Dabney of King William, and Mr. Wm. B. Stanard of Richmond. There were no orations delivered or Essays read —the exercises were consequently less interesting, and fewer citizens and strangers were in attendance, than is usual on such occasions. The greater portion of the students had also left college before the exhibition took place.

The Visitors formed a Board on Tuesday, and were in attendance on Wednesday. We have not heard of any changes of importance effected by them in the regulations or by-laws of the institution, except the establishment of an infirmary, in connexion with the medical department.—*Charlottesville Advocate.*

From the N. E. Farmer.

ASHES.

[We have the pleasure to present to the agricultural public the subjoined highly valuable communication; and acknowledge ourselves much indebted to the kindness of this intelligent and skilful cultivator for having at our request presented it. Our attention in passing on the road from Pawtucket to Providence had been always particularly attracted to the improvements going on on this farm, and the order and neatness which marked the premises. The last spring, on a visit to some relatives, we had the pleasure of examining the excellent management pursued at the establishment. The cultivator, it will be seen from the style of address, is a Friend. This most exemplary Christian sect are always remarkable for their neatness and order, qualities which are so valuable, and produce so much comfort in life. "Thou shalt be neat and clean, and systematic and orderly in thy person and in all thy dealings," is a commandment, which, if they have not actually added it to the decalogue, seems to have with them almost as high an authority. A slovenly Quaker is a "rare bird;" an anomaly seldom occurring. We cannot too much commend them for this. "Order is Heaven's first law." Neatness, as a friend was accustomed to remark, is next to godliness; it is essential to good manners, and almost equally so to good morals; its opposite is certainly a violation of what are called the minor morals of society. H. C.

North Providence, 6*mo.* 4, 1838.

RESPECTED FRIEND, HENRY COLMAN:--

I have never known more profitable results from the application of any manure to light and steril soils, whether loamy, sandy, or gravelly, than from leeched or unleeched ashes. They have long been used in Rhode Island with great success, especially in the growing of barley and clover, to which they seem peculiarly adapted.—As evidence of the estimation in which they are held by the farmers of the Island, ten cents per bushel have been paid for them in Newport for the last twenty years and upwards, and though considerable quantities have been furnished from different places on the sea-board, the demand for them has always exceeded the supply. They are generally used at the time of seeding, spread on an even surface and harrowed in lightly with the grain and grass seed. The quantity varying from 50 to 100 bushels per acre.

In 1833, a lot of land falling under my management which had then recently been purchased at $30 per acre, seven acres of it and perhaps the least valuable part, which in my opinion never possessed fertility, though it is usually called worn out land, being a sandy plain, gravelly subsoil, were ploughed and rolled in order to secure for the benefit of the crop what little vegetable matter had been turned under; about 1600 bushels leeched ashes were then spread on the lot, and it was sowed with 10 quarts millet and 16 lbs. southern or small clover seed to the acre. The season proved dry and the seed took badly, the crop of millet was 10 tons by estimation, and was sold for $180. 19 tons clover were supposed to have been obtained the two succeeding years at four cuttings; this too was sold for $316. The clover having nearly all perished in the winter of 1835-6 it was pastured the season following, and last year 1136 bushels ashes having been applied to it, it was again sowed with millet, and stocked as before with southern clover, 20 lbs. to the acre.—The product was 13 tons millet, for which I credited the owner $221, retaining it for my own use. Like results have been obtained from similar treatment of the same description of soil in various instances, this not having been selected because the most striking, but because the amount for which the crops sold fixes their value, without knowing exactly the quantity produced, which in each case has been supposed. The labor bestowed on the lot was more or less blended with other business of the farm; it is therefore difficult at this period of time to ascertain the amount charged. I believe however it did not exceed the charge in the subjoined account.

Cost of land,	$210 00
" Ashes for both dressings,	215 54
Seed for do.	41 25
Ploughing 10 1-2 days,	21 00
Rolling 3 1-2 do.	7 00
Harrowing 3 1-2 do.	7 00
Carting outside furrows,	7 50
Sowing 3 days,	3 00
Carting and spreading ashes,	54 00
Cutting, curing, and housing 41 tons millet and clover,	123 00
5 years' taxes,	2 10
Interest accruing on transaction,	46 00
	$737,39
Cr.	
By Produce sold, amounting to	$717 00
Value of pasturage,	15 00
Value of lot in its present condition,	385 00
	$1117 00
	737 39
	$379 61

There is reason to suppose from present appearances that the lot in question will cut two tons clover this season per acre; it will therefore be seen that my valuation is not a high one. A repetition of the treatment it has received, would no doubt improve still more the texture of the soil, but I am inclined to think there might be a falling off instead of an advancement in the amount of its productions, by subsequent ashings. Should this be the case it would indicate a suitable condition for more permanent improvement by manuring.

There is but one instance in which I can make out the exact quantity of milk sold in a year. It amounts to 11,131 1-2 gallons, this is exclusive of a supply for the family, and was produced by I suppose an average of 20 cows. There have been seasons when I think a larger quantity has been produced in proportion to the number of cows kept, but the manner in which my books have been kept, hardly ever specifying more than the amount received for the article sold, does not enable me to determine with accuracy the quantity sold in any other year. In the instance given the milk was disposed of to one person at a certain rate, which with the amount of sales being known determines the quantity. How much was used by the family is not known, probably not more than 300 gallons.

In regard to the bog there is yet but little to be said, a greater part of it being yet on the tide of experiment, whether successful or not, time will determine. The burnt part has hitherto been most productive. In 1835, 1-2 acre was pared, the turf burnt, and the ashes spread over the surface. The year following it was planted wih potatoes, the crop paying for the land at $30 per acre and all expense accruing from its improvement. Last year nothing was taken from it, it was seeded the latter part of summer, and now promises a large crop of hay.

Respectfully, thy friend,
ADAM ANTHONY.

Communicated to the Farmers' Register.

ON THE USE OF MARINE VEGETABLE MANURE.

To Joseph Ball, esq., Ditchley, Northumberland County.

Linden, Westmoreland County, July 6, 1838.

Dear Sir,

I duly received your favor of the last month, requesting me to furnish you with such information in regard to the improvement of land, by the application of "marine vegetation," as my experience in the use of it, will enable me to afford. This call for information, on a subject which I deem of vital importance to the agricultural improvement of our beautiful tide-water country, affords me peculiar gratification; and it gives me very great pleasure to have it in my power to answer it in a satisfactory manner.

My opinion in regard to the value of *kelp* or *sea-weed*, as manure, was given somewhat at large, in an essay on "*marine manures*," published in the Farmers' Register four or five years ago.* I beg leave to refer you to that essay as containing the result of my experience, up to that time. I have since applied it, with *creek-grass*, and other marine manures, upon a very extensive scale; and I may say, with the most gratifying success. In the course of about six years, I have restored to fertility the greater part of a large farm on the Potomac, that had been reduced to the lowest state of sterility, by a long course of exhausting cultivation. Upon this farm, in the course of the last year, at an expense in labor, not exceeding $300, I carried out about eight thousand loads of manure with single ox carts; and have now growing upon it, the finest corn that I have ever seen upon land of any thing like the same original quality.

The "grass" which you say has become abundant along your shores, has, of late, taken almost entire possession of the small creeks indenting our farms on the Potomac, and furnishes an inexhaustible supply of the richest manure. It is more powerful, in its effects, than the *sea-weed*, which is driven upon the river shores; and though the assertion may seem extravagant, is to be preferred to the best stable manure.

Parts of my fields are manured with each, and the most careless observer may distinguish the superiority of the corn where the "grass" has been applied. It seems to possess a peculiar quickness and power, forcing the young plants forward so rapidly, that they escape the depredations of insects, and seem to be little, if at all, affected by the coldness of the seasons, which for several years past, has retarded so much the growth of the corn. In common with the *sea-weed*, it possesses the power of attracting moisture from the atmosphere—keeping the corn green and vigorous in the driest seasons, and justifying much thicker planting, without endangering the crop, than could be ventured on with any other manure. Last year, on a lot, which had never yielded before more than four barrels to the acre, I planted corn, after manuring with creek-grass in the water-furrow, at an average distance of five feet and a half one way, and two feet three inches the other, leaving two stalks in a place. The stalks attained the height of thirteen feet or upwards, and one acre that was carefully measured, yielded nine barrels of sound corn. I have this year planted a considerable part of my crop equally thick, having more than double as many of stalks on the land, as most of my neighbors. Such thick planting as this, however, could not be recommended in our climate, even after the application of this most certain manure, except upon land that had already been improved to a considerable extent.

It is difficult for me to give you a correct estimate of the expense of manuring with the materials to which I have adverted. Having on my land an inexhaustible supply of manures accessible in some form at all times, I have been able to pursue the business of manuring as a regular system, and to devote a considerable force exclusively to that object. A considerable part, moreover, of the labor of collecting and scattering the manure and driving the carts, has been performed by children and small boys who would have rendered little or no service in any other employment. The expense, therefore, of my improvements may not be a fair criterion of the cost of manuring, under different circumstances. For this reason, I have applied to my neighbor, Mr. John T. Rice, who is a successful practical farmer, for an estimate of the expense of his improvements made with the creek-grass alone. He has kindly furnished me with a statement which you will find in his letter accompanying mine. From this you will perceive that an acre may be manured with creek-grass, at an expense of four dollars, by which the crop of corn will be more than doubled, and the land to a considerable extent permanently improved.

But many of our indolent and penurious farmers would be alarmed at the idea of incurring even this small expense. What! give four dollars for manuring an acre of land that cost only six!! Permit me here to make a slight digression. Have you ever read Black's Essay on the intrinsic value of land? It was published in an early volume of the American Farmer, and is a most ingenious and able argument to prove that every acre of land in the state of Delaware, is intrinsically worth five hundred dollars. His conclusion is somewhat extravagant, but there is much force in his reasoning. I have reflected a great deal on this subject, and I have come to the

*See Farmers' Register, Vol. I, p. 513.—ED.

conclusion that whilst it is impossible to underrate the value of poor land, supposing it to remain unimproved, it is extremely difficult to overrate the value of such as, by manuring, and a judicious course of management, has been brought to a high state of fertility; and that consequently, money and labor cannot be more judiciously expended, than in procuring and applying manures. What do you suppose is the intrinsic value of land, that in a rotation of three years will produce to the acre nine barrels of corn, twelve bushels of wheat, and a reasonably good crop of clover? And to this extent, it is not extravagant to believe that nearly every acre of land on tide-water may be improved. You will answer that an acre of such land is worth twenty, thirty, or perhaps fifty dollars. I will demonstrate that, supposing corn to sell for \$4 a barrel and wheat for \$1 50 per bushel, such land is intrinsically worth more than \$200 an acre. Col. Taylor, in his 'Arator,' estimates that each efficient laborer can cultivate fourteen acres well, on the three field system. That is, fourteen acres in corn, fourteen in wheat, and fourteen in the third shift, being in clover. The expense of cultivating an acre may be set down then at one-fourteenth of the annual cost of a laborer, including food and clothing, added to a reasonable charge for the team-work, wear and tear of implements, &c. Rating the cost of the laborer at \$112 a year, (a full estimate here) one-fourteenth of which sum. is \$8 00

And the team-work and wear and tear of implements, at	3 50
We have the cost of cultivating an acre,	\$11 50
Now what is the product?	
Nine bbls. of corn, at \$4,	\$45 00
Twelve bushs. wheat (deducting seed) at \$1 50	16 50
	61 50
Deduct expense of cultivation	11 50
Clear profit on the acre in three years,	\$50 00

Now what sum, at simple interest, will yield \$50 in three years? Answer, a sum exceeding \$270. Here then, according to the supposition, is a permanent capital, yielding a certain annual increase of more than 6 per cent. on \$200. Is the acre of land then not as well worth \$200, as a share of bank stock yielding six dollars per annum is worth \$100? I have said nothing about the value of the clover, hay, pasturage, &c., these, together with the interest in the \$70, over and above the \$200, may go to pay the cost of superintendence, and to compensate for errors, if any, in the estimates.

Pursuing the same course of reasoning, what is the value of an acre of land, that will yield in a rotation of three years, two barrels of corn, seven and a half bushels of oats, and no wheat or clover? And of this quality is more than half the land in eastern Virginia, in its present exhausted and unimproved condition.

Expense of cultivation, - -	\$11 50
Product 2 bls. corn \$8, $7\frac{1}{2}$ bush. oats, \$3,	11 00
Loss in cultivating the acre - - -	50

Value of the land less than nothing, it being a tax on the proprietor to cultivate it. I am aware that these estimates may not be entirely accurate; but they approximate to the truth, sufficiently to illustrate the great principle that I wish to enforce; viz.: that poverty and ruin are the necessary consequences of continuing to cultivate exhausted fields, while independence and wealth, as certainly result from a liberal expenditure of labor and capital in the improvement of the soil.

But to return from this digression. The best mode of applying the *sea-weed* and creek-grass, as stated by Mr. Rice in his letter, is to spread it in the water-furrow, when first hauled out; and leave it uncovered until the usual time of ploughing corn land. My practice has been to leave it in loads as carted out, until the winter and spring, when it is spread in the furrows as rapidly as possible before the plough. This plan has answered remarkably well; and when the quantity carried out is very great, it is almost impossible to pursue any other course. Mr. Rice had entertained the opinion that a great portion of the strength of the manure was lost, by leaving it in loads so long; and last year scattered a considerable quantity in the summer and fall, and listed upon it immediately. His crop was very much improved by it; but this year he has tried a fair experiment, which has convinced him against his own opinion, that it is better to leave it uncovered, or even in loads as I do, than to list upon it so early. He left six rows in his field, manured in all respects like the rest of the land, except that the manure remained upon the surface four or five months before it was ploughed in. A few weeks ago I visited his field with him. The corn on all the manured land was very fine; but, to my astonishment, after a careful examination, we found the corn in these six rows a third larger than the rest, and concurred in the opinion that it would yield a third more grain.

This, by the way, is a strong confirmation of the opinion that of late has gained ground, that surface manuring is the most efficacious.

The first application of the *creek-grass* as manure in this neighborhood, and as far as I am informed, elsewhere, was made by me on a small scale, four or five years ago. The effect was so striking, that I was induced to continue its use extensively. My neighbors, who were at first incredulous, have since been convinced of its extraordinary virtues, and commenced the use of it themselves, and now estimate their lands that are so situated as to command it conveniently, at double their former value. One of them, a plain, practical man, in very limited circumstances, and whose land is distant two miles from the water, has used it for two years, and so profitable has he found it, that last year, after getting the grass from the creek himself, he paid two shillings ($33\frac{1}{3}$ cents) a cart-load for hauling it to his fields, with the perfect assurance that he should make money by the operation.

So highly do I esteem it, that I am perfectly satisfied that the poorest land on our creeks, which in its natural state will not defray the expense of cultivation, (and the selling price of which is very inconsiderable) might be purchased even as high as \$30 an acre, and by a judicious application of this manure be made to return, in a very short time, a handsome profit on the investment. I cannot doubt, that it is destined to renovate, at no distant day, a large portion of the exhausted land of eastern Virginia.

To get the grass from the creeks, I use a common scow, built for the purpose. It is rather smaller than wood scows; and cost about $25. The grass ripens about the first of August, and becomes loose from the bottom, and is easily drawn up with rakes. I continue to get it through the fall, and in mild weather in winter. Two hands will get about twenty cart-loads a day.

There are several varieties of it, all of which I have used extensively, and with equal benefit. But there is one species more succulent than the rest, which is rapidly decomposed, when suffered to remain in loads. This kind should always be scattered as soon as carried out. The effect of this manure is striking on all crops; but it is more conveniently and profitably applied to corn. Like the *sea-weed*, it is much more beneficial on light, than on stiff land.

I have now, my dear sir, answered in substance, all your interrogatories; and I need hardly assure you, that it will afford me peculiar satisfaction, to learn that, by the information imparted, I have, in the least degree, benefited either you or the public. But my pleasure would be unbounded, if at a future day, I should learn, as I confidently trust I shall, that, by the use of the means, to which I have called your attention, and others equally within our reach, extensive tracts of land now waste and unproductive, have been restored to fertility; the tide of emigration checked, a restless and dissatisfied population rendered contented and happy; and prosperity, abundance, and wealth extensively diffused over our beautiful, but hitherto neglected country.

Whilst I regret to learn that you are prevented by age and infirmity from the active superintendence of your farm, permit me to congratulate you that your zeal in so noble a cause is not extinguished; and to remind you that "there are pleasures in rural affairs, (for which we have the high authority of Tully,) perfectly consistent with every degree of advanced years, as they approach the nearest of all others to the purely philosophical kind. They are derived from observing the nature and properties of this, our earth, which yields a ready obedience to the cultivator's industry, and returns with interest, whatever he deposited in her charge; if not always indeed with equal increase, yet, always with some." Nor can I refrain from expressing my satisfaction that you are instructing your son, for whose benefit the foregoing information has been sought, in the art and science of husbandry. Such examples are calculated to produce the happiest effects. Virginia can never be what she ought to be until the minds of our educated young men take a proper direction. The rage for speculation, politics, and the miscalled liberal professions must abate, and agriculture assume the position to which it is entitled among the noblest pursuits of educated and enlightened men, before the physical resources of our state can be properly developed, or the moral and intellectual faculties of our people, cultivated to their full extent. In ancient Rome, there were many signal examples of the high estimation in which agriculture was held by the most illustrious characters. Curius Dentatus, after having conquered the Samnites, the Sabines, and even Pyrrhus himself, passed the honorable remainder of his declining years in cultivating his farm. Cincinnatus was following his plough, when notice was brought to him that he was appointed dictator. And all the venerable senators of that age, as we are informed by Cicero, constantly resided at their villas, and were employed in rural affairs. The writings of Cato, Varro, Virgil, Pliny, Columella, and others, may satisfy us, that the cultivation of the earth and of elegant letters, were in ancient times deemed by no means incompatible. And the noble example of our illustrious Washington, who amidst the cares of state and the ceremonies of office, retained in an eminent degree his taste for rural pleasures, and his desire to benefit his countrymen, by the dissemination of useful knowlege on every branch of agriculture, inculcates the useful lesson that the practice of husbandry, whilst it calls into exercise the finest feelings and faculties of our nature, is not beneath the dignity of the most exalted in station, or gifted in intellect. Agriculture can no longer be considered a mere mechanical employment. The physical sciences, the wonderful creations of modern times, are so intimately connected with it, that it cannot be pursued with pleasure or its greatest profit, without some knowledge of their principles, derived either from the study of books, or from the practice of others. It is, now, therefore, peculiarly proper, that the rising generation should be educated with the view to the pursuit of agriculture as a profession. And if the happy period shall ever arrive, when a class of well instructed farmers shall supply the places of the speculators, demagogues, quacks, and pettifoggers that now swarm over the land, we may expect to see the natural resources of our beautiful state fully developed, and her moral, political and intellectual character elevated to the highest standard of excellence, that has ever been attained by the most distinguished nations of ancient or modern times.

But I have wandered from my subject, and shall weary you with these speculations. Permit me in conclusion, to express the hope that amidst the peaceful scenes by which you are surrounded, you may enjoy long life, and a useful and happy old age, and to subscribe myself, with sentiments of sincere respect and esteem, yours,

WILLOUGHBY NEWTON.

To Willoughby Newton, esq.
Westmoreland Co. Va.

Laurel Spring, June 20, 1838.

Dear Sir—According to your request, I furnish you with what I believe to be a correct estimate of the cost per acre to manure my land with creek-grass. On land convenient to the creek, with five men and a cart, I got up, hauled, and scattered fifteen large cart-loads per day; which manured a half acre. The cost of the laborers, including food, clothing, &c. at the average price of farm labor, was about as follows:

Five hands at 32 cents per day, -	$1 60
One cart and two yoke oxen,	40
	2 00
Which is per acre,	$4 00

This may, at the first view, appear to be a costly way of manuring, in proportion to the price of poor land, but if we consider the great increase in product, it is evident that it is the most profitable way that the labor can be applied at that season of the year, (from the middle of July to the last of

September.) I am confident, from the result of an experiment that I made last year, and the appearance of the present crop, that a manuring with the creek-grass will double the crop of corn the first year.

From experiments that I have made, I find that the best way to apply the creek-grass is to scatter it in the furrow between the old corn-beds, without ploughing it in until the following spring, at the usual time of listing for corn.

The scow that I make use of to get the grass out of the creek, is twenty-five feet long, from eight to nine feet wide, and fourteen inches deep, with a deck. The scow cost, including every thing about thirty dollars. I make use of rakes and pitch-forks to get up and handle the grass with.

I remain yours, respectfully,

JOHN T. RICE.

For the Farmers' Register.

COVERING COTTON SEED WITH THE COULTER. BENEFIT OF PLOUGHING CLAY-SOILS AFTER RAIN.

Rockbridge, Va. June 23, 1838.

About the 20th of last month, (May,) I planted our *cotton patch*. A part of the seed, (all of which had been soaked in warm water for a few hours, and then rolled in plaster,) was covered with a hoe, say two or three inches deep; the other and larger part, by running a coulter a single time along the drill and through the seed, plentifully scattered in the row. This operation covered most of the seed, and probably at various depths, from one-fourth of an inch to three or four inches. In a few warm days, the cotton *coultered in* was regularly and beautifully up; but not a grain of that covered with the hoe; nor did the latter come up for a week after, nor until the surface of the ground, which in the mean time had become cohesive from a heavy rain, was broken with a rake. It then began to come up very leisurely, and as yellow as saffron; and is now at least ten days in growth behind that covered with the coulter.

Again, having ploughed over a field of corn, from the 1st to the 10th instant, I began, a day or two afterwards, to reverse that operation, by running a two-horse harrow over each row of corn. This was continued for a day. We then had a heavy shower of rain, which stopped the harrow for a day or two, when it was again started, and the field finished. I had, lately, several times heard my overseer say that there was a great difference in the corn that had been harrowed before and after the rain. I supposed it imaginary; but being in that part of the field yesterday, where the hands were ploughing, I was surprised at the difference in the corn, *to a row*. That which had been harrowed before the heavy rain above-mentioned, was hardly knee-high, the blades generally yellow and somewhat striped, while the rows adjoining, and throughout that part of the field harrowed after the rain, on land of the same quality as that harrowed before it, was waist-high, and of a rich green color. Not remembering at the time what the overseer had said about the difference in the corn harrowed before and after the rain, I accused him of negligence in the application of plaster, when planting the corn. He affirmed and insisted that all had been plastered alike. The boy who had been charged with dropping plaster on the corn just before it was covered, and the hands that covered it, all supported the affirmation of the overseer. Well, then, if by the testimony of two or three witnesses, every word is established, there is a benefit in working our clay-lands after heavy rains, of which I had often heard, and sometimes seen instances, but never one so striking as in the case just mentioned.

R. GRIGSBY.

[We know how to appreciate the good effects of the mode of covering cotton seed above described, by the experience of five years, during which (much to the detriment of our farming and farm-improvement) we were engaged largely in cotton-culture. The plan of covering then pursued, though in principle the same with Mr. Grigsby's, was far more expeditious and economical. After the seed (without any preparation of wetting or otherwise) had been strewed along the shallow furrows made to receive them, large two-horse harrows, (or drags,) or two smaller harrows coupled together, with straight and pointed teeth, were passed over the whole surface, just as if to cover wheat. The direction of the course was generally the same as that of the cotton-rows; but this was not important, as in crossing, at the ends of the lands, there were very few seeds drawn out of the rows. The seeds were well separated, and mixed with soil, by this operation, and placed at all depths, from the surface to two or three inches below. The coming up well of either the upper or lower seeds was almost certain. Though we have abandoned cotton-culture, the same mode of covering seed we still practise on all old corn-land; and continue to approve of it as a great saving of labor, and at the same time, as helping much the tilth and good condition of the field, by the thorough and deep harrowing.—ED. FAR. REG.]

From the Genesee Farmer.

AGRICULTURAL CHARLATANISM.

We perceive in our agricultural papers notices of the method of making manure discovered by M. Jauffret, and some of our contemporaries seem to consider it as almost miraculous. We may as well say here, as we think we have not noticed the matter before, that M. Jauffret professed to be able to change by means of a lie, used by sprinkling straw, leaves, plants, even woody stalks of a finger's thickness into first rate manure in an incredibly short space of time. The preparation was kept a secret, and the announcement caused a great sensation in France and England. A committee of the French Academy of Agriculture gave their testimony in its favor, and demands for the right of using, or the sale of the liquid, flowed in upon M. Jauffret from all quarters, while the cash that accompanied the orders, rapidly accumulated in his pockets. A proposition last year to invite M. Jauffret to England, from some circumstance failed; but some English gentlemen visited Paris at the expense, we believe, of the London Farmer's Magazine, for the purpose of determining the value of the invention. Their report was decidedly adverse to the process, and the examination showed that the greatest frauds had been practised on the community. M. Jauffret is dead, and a chemical examination proved it to be only an alkaline solution, good in its effects on the soil, of course, but utterly incapable of performing the effects claimed by the inventor. There is no magic, we had almost said no mystery, in the preparation of manure. It is the result of animal or vegetable decomposition; and what has once been the constituent part of plants, is more readily adapted to their use, than matter which was never under the process of vegetable or animal organization. In the application of science to agriculture we are entitled to expect great improvements, but not miracles, and any process that claims a result approaching to this may well be looked upon with suspicion.

Since writing the foregoing, the last number of the London Magazine has reached us, and from it we make the following extract.

"*The New Manure of Jauffret.*---A friend of ours has obligingly written to a large landed proprietor in France, who is a member of the chamber of deputies, making inquiries respecting this man, and his *invaluable* manure, when it turns out that he is one of that class of charlatans, of which there are so many at this time practising deception on the agricultural community. It appears that the old peasant has lived in clover these last two years, and duped dozens of Mayors, Prefects, and other functionaries, and taken the cash of hundreds of subscribers. "Our friend's informant, who was himself one of the dupes, states that the new manure costs double the price of ordinary manure. The author of this *valuable* discovery it seems is dead. Had there been a National Agricultural Institution in existence in this country, having individuals connected with it ready and competent to examine into such pretended discoveries, this *swindler's* tricks, as well as those of many others, would long since have been exposed."

For the Farmers' Register.

AGRICULTURAL NOTES OF A TOUR IN THE WEST.

Nelson County, Va., July 12th, 1838.

Dear Sir—I left Baltimore, on the 31st of March, for the west, by the railroad to Fredericktown in Maryland; and passing over a poor stony and hilly country for the first forty miles, reached that place a little after noon. The country, as you approach Frederick, opens into a beautiful valley, well cultivated, and at this time presented numerous fields of wheat, very luxuriant in appearance. Contrasted with the wretched region in the neighborhood of Baltimore, it appears to great advantage. Valley succeeds valley, with little difference, apparently, in soil or culture, until the traveller approaches the Alleghany range of mountains. The passage across them, however fertile in scenes interesting to the "eye of taste," affords little to engage the attention of an agriculturist, except the fine national road, over which the eastern and western commerce and travel are here conducted. To us in the south, who have been struggling since the first settlement of the country with the worst modes of conveyance for our agricultural products, it is edifying to see what an immense amount of labor may be saved in the transportation of crops to market by the construction of good routes; and, consequently, that a great enhancement in their value, results from the diminution in the charge of transportation.

Fifty-six hours of constant travelling carried us from Baltimore to Wheeling; yet, so good was the road, although across lofty mountains, and so easy to sleep in the coach, that the journey was attended with very little fatigue.

The vegetation on the Ohio seemed at the first glance to be of a much richer and deeper green, than any in the east, although the uncommon coldness of the spring had retarded both so much that very little more than the first traces were visible on either side of the mountains. A steamboat ready to depart, afforded an immediate opportunity of descending the Ohio, and, in about thirty-six hours after leaving Wheeling, I was landed at Portsmouth, at the termination of the Ohio and Erie Canal. The navigation of the canal was just resumed, after the winter's suspension, and taking a passage in an excessively crowded canal boat, I arrived at Chilicothe on the following day. During this rapid journey, I had an opportunity of seeing the wheat-crop was exceedingly promising every where, but more particularly so along the course of the Ohio and up the Scioto. Reposing here some time, I received information, in several respects, of the trade and agricultural productions of this very rich valley, which may possibly not be uninteresting to some of the readers of your useful journal, although it is far less extensive than I wished.

The Scioto river is bounded by exceedingly rich and extensive flats, the dark alluvial soil of which varies from one to eighteen feet in depth, and possesses a proportionate fertility. From sixty to eighty bushels of corn to the acre are produced from lands long and successively cultivated in that crop; and there are well authenticated cases of from 120 to 160 being obtained from fresh lands, by good and careful culture. There are instances where the same field has been cultivated for forty years in succession in corn, with very little diminution, to the eye, in its product, at least for the last thirty years. These grounds yielding so abundantly in corn, are too rich to be safe for wheat, although good crops are sometimes obtained. But the neighboring highlands produce small grain of all kinds most bountifully, and all the most valuable grasses in great abundance. It may be imagined that a country endowed with such capacities for rearing live stock would have a portion, at least, of its capital applied in that manner. And that was the case to a great extent before the construction of the Ohio and Erie Canal opened the markets of New York and New Orleans to the productions of the soil. Even now that trade affords employment to the resources of many of the most wealthy landholders. Large numbers of cattle purchased westward of the Scioto valley, in addition to those bred in it are either fattened there for market, or being kept for some time, are sold to persons living in the eastern states, to be by them prepared for the consumption of eastern purchasers. Hogs too, to a very large amount, are fattened, and either driven eastward, or are slaughtered and salted for exportation. Mr. George Renick, who resides near Chilicothe, is a large landholder, and has long been an extensive and successful dealer in cattle, did me the favor to answer some queries in relation to the cattle trade, which I will subjoin in the language in which they were propounded and answered, thinking it better to give his own words, than any version of mine. My questions were the following:

1. What is the probable number of cattle annually sold from the Scioto valley ?

2. What proportion are bred in it, and how many purchased elsewhere?

3. In what parts of the country are those procured that are purchased, and how far from the Scioto are the remotest points?

4th. How long are they kept after purchase, how treated when sold, and at what advance upon the purchase money?

5th. Are they driven directly from the Scioto valley to the places of consumption, or do they stop for any length of time at intermediate points, for further preparation for market?

6th. What are the chief markets for the cattle when finally disposed of ?

7th. What will be the probable advantages of the introduction of the English cattle into this region, and which of the English breeds are most esteemed?

Any information deemed pertinent, and not comprised within the scope of the foregoing queries, will be thankfully received in addition to their answers.

The following answers were given :

To question 1st. About thirty-five thousand head, one-third of which are corn-fed.

2d. One-third bred in the valley.

3d. They are procured from Missouri, Arkansas, Indiana, Illinois and Kentucky. The most distant point, one thousand miles.

4th. They are kept from six to eighteen months, some fattened and wintered, others corn-fed, then an allowance of half a bushel of corn per day, for five months. The fat cattle are sold in the spring, and the stock cattle in the fall. The advance on the purchase-money, say five dollars per head, for stock, and fifteen for fat cattle.

5th. The stock cattle are driven east of the mountains, and are kept one season. The fat cattle are driven immediately to the place of consumption.

6th. The markets are Philadelphia, New York, Baltimore, and Boston. Some are sold at Pittsburg and Detroit.

7th. The advantages of the English breeds are, being easier kept, of larger size, fattening at an earlier age, their beef being of a superior quality, and being better milkers. The Devonshire short-horns, or Durham, are supposed the best breeds.

The quantity of hogs supplied by the Scioto valley annually for distant markets is also very considerable. Messrs. John and G. Wood, large and successful dealers in pork at Chilicothe, were good enough to furnish me with a statement of the quantity supplied by the valley, and country contiguous to it, as will appear from their estimate subjoined.

Pike County,	3,000	barrels of	pork.
Ross	16,000	"	"
Pickaway,	10,000	"	"
Franklin,	12,000	"	"
Fairfield and Licking,	15,000	"	"

Total, 56,000 bbls. of pork at $15 =	$840,000
Bacon and lard equal in value to the above,	840,000
40,000 hogs are driven to the eastern and western markets at $5 per head,	200,000
	$1,880,000
About 100,000 barrels of flour are annually furnished by these counties, which, averaged at $5 per barrel, is,	500,000
Add $700,000 for the returns from the cattle trade which I have computed to be the probable amount from Mr. Renick's statement,	700,000
	$3,080,000

It will appear that the income of six counties contiguous to the Scioto, from three articles, cattle, pork, and flour, is three millions and eighty thousand dollars annually.

The commerce of the country, however, includes many other things, as will be seen from the subjoined table of articles cleared at the Collector's Office at Chilicothe, from December 1st, 1835, to December 1st, 1836.

1,219,711	lbs.	Bacon,
739,141		Lard,
77,780		Coarse grease,
205,592		Iron,
154,840		Merchandise,
70,947		Leather,
37,946		Butter,
21,664		Castings,
14,063		Wool,
8,754		Broom-corn,
6,164		Feathers,
2,277		Candles,
373,369	feet	Lumber,
121,385	bsh.	Corn,
26,898	"	Wheat,
10,235	"	Oats,
4,053	"	Flax seed,
110	"	Potatoes,
25,221	bbls.	Flour,
15,945	"	Pork,
58,000	"	Pork in bulk,
1,675	"	Barrels Whiskey,
240	"	Bbls. and 600 bushels apples,
178	"	Barrels of beans,
43	"	Pair Racoon buhr millstones,
31,000	"	Bricks,

The Messrs. Woods state they think one half of the pork trade goes to the northern, the other half to the southern markets.

	Dolls.	*Cts.*
Amount of tolls received at this office from December 1st, 1835, to December 1st, 1836,	19,027	31
Tolls received from December 1st, 1834, to December 1st, 1835,	11,857	93
Increase.	7,169	38

Amount of tolls received from December 1st, 1836, to December 1st, 1837,	31,125 00
Increase over 1836,	12,097 69

WM. H. SKERRETT, *Collector.*

It is an interesting fact in the statement from the collector's office, that the tolls received should have undergone an annual increase, and that during the year 1837, notwithstanding the manifold inconveniences sustained from the disorder of the currency, and consequent embarrassments of the commerce, the increase over the preceding year should have been at that place alone $12,097 69.

In fact roads and canals, like just and equitable government, produce in their operation so many unforeseen advantages, it is impossible properly to appreciate them, until their benefits are experienced. And there is scarcely any country, where persons and property enjoy tolerable security, in which it would be unwise to construct them at any expense within the power of the inhabitants or government to pay. The Ohio and Erie Canal, which passes through the valley of the Scioto, has more than doubled the value of all the arable lands within ten miles of it throughout its whole route, and its beneficial influence is felt over a much wider surface. The income derived from land in many instances has been increased from four to five hundred per cent.

In addition to a highly fertile soil and salubrious climate, recent geological discoveries have shown that Ohio possesses mineral treasures to an incalculable amount, and chiefly in that part of her territory, that seemed least gifted with the means of yielding other productions. Professor W. W. Mather, (principal geologist,) in his report to Joseph Vance, esq. governor of Ohio, says—"From the reconnoissance of the past season, it is estimated that about twelve thousand square miles of the state are undoubtedly underlain by coal, and five thousand by workable beds of this valuable mineral. In many places several successive beds of the coal are superposed one over the other, with sand-stone, iron-ore, shale, or limestone intervening. The coal-beds are favorably situated for working, as they are found in the hills and ravines, where they can be drained with little expense, and without deep shafts and expensive machinery, like those of Europe, or some parts of our own country. Probably a mean thickness of six feet of coal, capable of exploration, over five thousand square miles, is a moderate estimate of our resources in this combustible." (p. 1.)

Dr. S. P. Hildreth, in his report to Professor Mather, (p. 2,) says: "That portion of the coal measures of the valley which lies within this state, occupies a space of about 180 miles in length, by 80 in breadth, extending in a south-westerly and north-westerly direction along the borders of the Ohio, from Trumbull county to the mouth of the Scioto. These immense fields will furnish fuel for a larger population than the soil of Ohio can support for ages; and when the surface beds are exhausted much thicker ones will be found, by sinking shafts to the depth of a few hundred feet, as all coal-beds are thinner in their out-crop, or near their margins, than in the centre of the basin. Of this fact we have proof, not only from foreign fields, but from the disclosures made in boring salt-wells in our own state."

"At a very low calculation (says another member of the geological corps, C. Briggs, jr.) of the amount of good iron-ore, in the region which has this season been explored, it is equal to a solid unbroken stratum, sixty miles in length, six miles in width, and three feet in thickness. A square mile of this layer being equivalent in round numbers to 3,000,000 cubic yards—when smelted will yield as many tons of pig iron. This number multiplied by the number of square miles contained in the stratum, will give 1,080,000,000 tons, which from these counties alone, (Lawrence and Scioto) will yield annually for 2,700 years, 400,000 tons of iron; more than equal to the greatest amount made in England, previous to the year 1829."*

"In reflecting upon the prospective importance of the iron business to Ohio, a question naturally suggests itself, as to the necessary supply of fuel. Perhaps no fears need be entertained on this head, as the introduction of the hot blast, and the probability that some beds of bituminous coal will be soon brought into use for the smelting of iron-ores, render it nearly certain, that this branch of industry will never receive a check from an insufficient supply of fuel."†

Another valuable mineral (the buhr stone) is most abundant in the same region. It came into use for millstones about the year 1807. "The early manufactured millstones were made of a single piece, but these often proving to be of unequal density, and not making good flour, were abandoned, and stones constructed of separate blocks, cemented with plaster, and coupled together with iron bands. Where these blocks are selected with care by an experienced workman, the flour is said to be equal in quality to that made by the French stones. From the year 1814 to 1820, the price of a pair of 4½ feet stones was $350, and a pair of 7 feet sold for $500, while the foreign article sold for a still higher sum. The 4 feet stones now sell for $150. The manufacture of mill stones is not confined to the waters of Racoon; but is also carried to a considerable extent in Hopewell township, Muskingum county. The quantity is apparently inexhaustible.—(*Geological Survey*, p. 33.)

Limestone exists in great abundance, of various qualities. "The limestones of this series are interesting, (says Mr. Briggs,) not only as affording a flux for the iron-ores of this region, and lime for the various uses to which it is usually applied, but are also of great value for agricultural purposes. * * * Three layers of limestone have been observed. The second stratum of limestone is from 18 inches to 8 feet thick where it has been observed. It is uniformly of a dark color, nearly black, and contains the remains of radiated and molluscous animals of marine origin. This limestone breaks out into oblong blocks, of suitable size for building purposes. The organic remains will add greatly to its beauty when polished." "Since writing the above," (Mr. Briggs adds in a note,) "a piece of this dark fossiliferous limestone has been polished. It is nearly or quite equal in beauty to the best Egyptian marble. If it can

* Geological Survey of the State of Ohio, p. 93–6.
† Do. pp. 93 and 94.

be obtained in sufficient quantities, and in blocks sufficiently large, as I think it may, it will be of immense value for ornamental architecture."—(*Geological Survey*, p. 82.)

When we take into consideration the wonderful fertility of the soil of Ohio, its vast and various mineral wealth, its central position in regard to the Union, its easy communication with the great mercantile cities, by prompt and easy steamboat navigation, or by canal and railroad carriage, as New York, Philadelphia and New Orleans—that the routes of the most important character, yet in contemplation, as those of Virginia, and South Carolina, with her associates, will, when finished, terminate there—it seems an obvious conclusion, more particularly when the sagacious, enterprising and persevering character of the people of Ohio is considered, that that country is destined speedily to attain the condition of one of the most adorned of the United States.

Leaving Chilicothe about the 25th of April, I returned by the canal to Portsmouth, and took a steamboat there for Cincinnati. Although long familiar with the valley of the Ohio, I was never so forcibly impressed with its beauty before. The majesty of the river, the fertility of the lands that bind it, the rich verdure of the forest just expanding into leaf and crowning the gently sloping highlands, that in some cases come near the water's edge, and afford the most beautiful situations for dwellings on their summits. The neat farms, and country houses, and thriving villages, presented an assemblage I have never seen surpassed, perhaps not equalled. This scene seems to have warmed the imagination of the coolest and most judicious of those foreigners who have recently visited our country. "The river (says M. de Tocqueville) which the Indians named by way of distinction the Ohio, or the 'Fair River,' bathes with its waters one of the most magnificent valleys, that man has ever made his residence."* The regrets of that gentleman for the loss of this fine country to France are feelingly expressed, (p. 299,) as are those of another lively and agreeable traveller, M. Michel Chevalier, who has been recently its visitor.†

The abuse of English travellers, and the regrets of the French, both springing from sorrow felt for the losses sustained by their respective nations, of territory within our boundaries, destined to become the seat of a mighty empire, however differently expressed, enable an American to calculate the value of his country in the eyes of foreigners. Indeed, the pertinacity with which the British cling to a little slip of territory on the northern boundary of Maine, to which they have no manner of right, is irrefregable evidence of their estimate of American soil. Nothing but a breach of the union can prevent our attaining a power, both by land and sea, in comparison with which the western nations of Europe must appear perfectly insignificant. We have no reason now to fear or envy any of them, and as their intercourse with us is reciprocally beneficial, I hope it may continue to be our policy to cultivate amicable relations with them.

From Cincinnati, I ascended the Ohio to Pittsburg, and was exposed as far as Wheeling to the danger of bursting boilers, in consequence of a race between the boat on which I took passage, and one which left Cincinnati an hour or two after us. Pittsburg, with its dark and lurid coal-smoke atmosphere, offers little to check a traveller's impatience to continue his journey. I left it the evening after my arrival in a packet canal-boat for the east. The boat departed about nine o'clock at night, and I was consequently deprived of seeing the country in the vicinity of the town, and along the Alleghany river.

The next morning found us near the junction of the Alleghany with the Kiskeminetas, and along the valley of the latter the canal passes on the route to Johnstown, at the western base of the Alleghany. This valley is generally narrow and rugged, abounds in sandstone, and the forest growth is chiefly oak. Vegetation on the 27th of April was just discernible on a few trees, near the margin of the river. A few patches of wheat looked well, but the whole aspect was dreary and barren, contrasted with the rich verdure of the Ohio valley. We arrived at Johnstown in the night succeeding that we left Pittsburg—the distance about one hundred and twenty-six miles—and the next morning about sunrise were transferred to the railroad, which crosses the Alleghany mountains, and communicates with the eastern portion of the canal, at Hollidaysburg. The distance from Johnstown to Hollidaysburg is between forty-two and forty-three miles, and there are ten inclined planes, five for the ascent, and five for the descent of the mountain. The cars are raised and lowered by means of a powerful rope attached to them, and worked by a stationary engine at the summit of the plane. The passengers' cars are detached at those planes from those that carry produce, and are raised and let down first, then the produce cars undergo the same process, and are reunited, at the foot, or summit of the plane. This I understood was intended to secure the passengers from accidents that might arise from overstraining the rope. And it seemed a wise precaution, for, with all their care, one cannot help feeling that their lives depend as much on the strength and secure fastening of the rope, as if they were suspended by it a mile in the air. Accidents do sometimes happen, with every precaution, an instance of which occurred about a fortnight previous to the time I was there. Two cars, loaded with flour, became detached from the train, and rushing with fearful velocity down the plane, were crushed to atoms with their loads. The sense of insecurity, from travelling across this mountain, is so extensively felt, that I was advised by several friends in the west to avoid this route on that account; and those who know the western people, and their general reckless disregard of danger, know that their cautions, on such subjects, are rarely lightly given. But my curiosity overcame my prudence, and on arriving at Hollidaysburg, about two o'clock, I felt pleased that I had paid no dearer for its gratification. "There are in the Alleghanies, (says the pleasant traveller I have before quoted, M. Chevalier, speaking of railroads,) those which present inclin-

* Le fleuve que les Indiens avaient nommé par excellence l'Ohio, ou la Belle Rivière, arrose de ses eaux l'une des plus magnifiques vallées dont l'homme ait jamais fait son séjour." Democratie en Amérique. Tome 3me p. 173.

† See his letter at Pittsburg Nov. 24th, 1834.—*Lettres sur l'Amérique du Nord.*

ed planes with frightful declivities; these were only intended for the transportation of merchandise; but it is now announced that travelling coaches *(des diligences)* are established, at the risk of breaking the necks of the travellers."*

Descending the valley of the Juniata, through the counties of Huntingdon, Juniata, Perry, &c. to the junction of the Juniata with the Susquehanna, and following the course of the latter river, we reached Harrisburg, the seat of Pennsylvania government, about midnight, and in about thirty-six hours after leaving Hollidaysburg. The valley of the Juniata is wider, and far better cultivated than that of the Kiskeminetas. The houses of the farmers are mostly of brick or stone, and good comfortable dwellings. The farms were in neat order, and the wheat fields looked very luxuriant. Farming land in this valley, I was informed, sold at about forty dollars an acre, containing an average portion of highland and low ground. The highlands seem generally to be but of moderate quality, and the mountains, which bind the valley throughout, are poor, steep, and rocky, and bear only a few scrub pines—resembling very much the mountain range between Fincastle in Virginia and the Sweet Springs. Indeed I felt quite surprised to find so large a part of Pennsylvania poor and mountainous. The traveller does not escape from the mountain region until he approaches the neighborhood of Harrisburg, and in passing from Pittsburg to Philadelphia, he sees nothing but narrow valleys and poor mountains, for three-fourths of the distance.

Since the valley of the Juniata has been canalled, the farmers sell every thing they have to spare, in the form of provisions, at good prices. Butter at twenty cents, beef at ten cents per pound, &c. The captain of the canal-boat informed me these prices were readily given, every thing being nearly equally dear, and it was difficult to procure an adequate supply even at these rates. No money but of the best kind would be taken in payment.

At Harrisburg, a railroad commences, belonging to a private company, to which travellers of the packet line are transferred, and which communicates with the state railroad, from Columbia to Philadelphia. A rapid transit of one day over this space, afforded little opportunity for agricultural observation. I noticed, however, in the neighborhood of Harrisburg, some galled and gullied fields, (a sight too familiar to the eye of a Virginian.) I did not expect this from the reported excellence of Pennsylvania farming. In the counties of Lancaster and Chester, the farms appeared small, (judging from the great number of good dwelling-houses in the vicinity of each other,) and the cultivation good. But the soil did not seem to possess the fertility usually ascribed to it. Many farmers were actively engaged in liming their fields, I presume for corn. The wheat crop looked worse than I had seen it any where, throughout my whole journey.

It must occur to a most superficial observer, that the country traversed by railroads and canals from Philadelphia to Pittsburg, is greatly inferior, in natural advantages, to that through Virginia, contemplated for the James River and Kanawha improvement. The open country of Virginia, is at least as good as that of Pennsylvania, and her mountain region is incalculably superior. That of Pennsylvania being steep and steril, with the exception of a few narrow valleys, while the mountainous portion of Virginia is very fertile, the valleys being rich and extensive, and the ridges arable to a great extent, and where not so, in most cases capable of affording good pasturage. It is plain, in a mere pecuniary point of view, Pennsylvania can only receive compensation for her great and spirited works, from the western trade. Virginia, exclusive of the western trade, for the enjoyment of which she will have many advantages, will be repaid by the improvement and traffic of her own territory, which has now scarcely any outlet to market, and is in a situation similar to that of the western part of the state of New York before the construction of the Hudson and Erie canal.

Very large quantities of produce and merchandise are transported on the Pennsylvania canal and railroad. The tolls received on that line, from the opening of navigation in the spring to June 2, of the present year, amounted to $561.635. 74. The price of transportation, too, is quite moderate; the carriage of a barrel of flour from Pittsburg to Philadelphia amounting only to one dollar and twelve and a half cents, over a distance of four hundred and seventy-three miles, it being actually less than it often costs to send one from this neighborhood to Richmond, very little more than a fourth of the distance.*

When will the people of the south learn to avail themselves of the blessings Providence has showered around them? Never, I fear, until the wealth and strength of the nation is irreparably concentrated in the north. I am by no means envious of our northern brethren. I heartily wish them success in every legitimate enterprise; but I really feel mortified, that they should so far exceed us in all the enterprises of public utility. It is said of Dean Swift, that riding out in his latter years, in the neighborhood of Dublin, he saw a new building going up, and asking what it was, was told it was a magazine. He expressed himself in the following impromptu, which I am obliged to quote from memory:

"Here's a proof of Irish sense,;
Here Irish wit is seen:
When nothing's left that's worth defence,
We build a magazine."

And when nothing is left worth struggling for, we will prosecute works of internal improvement.

My journey afforded nothing worth communicating from Philadelphia to Virginia.

Thos. Massie.

*Lettres sur l'Amérique, du Nord, Tome Jer, p. 133.

* I have seen it recently stated in the National Intelligencer, that tobacco this season has been brought up the Mississippi to Pittsburg, and transported thence by way of the Pennsylvania canal and railroad to the Baltimore market.

MOWING.

This is one of the most important operations in farming; a great deal of this work is to be done in a short time, and in a warm season, and it is of the greatest importance to lighten the labor as far as possible. We have seen some very stout hardy men toil and sweat all day, and do but a small day's work, while other men of much less strength would cut more grass, and yet not exert themselves to fatigue. From this it is evident, that some mowers exert twice the strength that others do in performing the same work, and those who use the least strength usually do their work the best, though they may not render the field so smooth, by cutting off the tops of knolls, stumps, stones, and other impediments that intrude themselves among the thick grass.

There are several reasons why there is so great a difference in expense of labor; there is a difference in sneads and scythes as to their hanging well, and there is so great a difference in scythes as to their cutting with ease and holding their edge, that some are better worth five dollars than others are worth one cent. Some men keep their scythes in prime order, and in mowing they lay their strength out to the best advantage; they use a gentle motion that will not fatigue; they are less liable to strike stones, &c. than those who make greater exertions, and when they do strike them, less injury is done.

The best scythes should be chosen, as the difference in price between a very good one and one that is good for nothing, is a mere trifle; indeed the expense of a good scythe is less than its value above a poor one for only one day's use. A scythe should hang light and easy, so that in mowing no exertions will be necessary excepting to swing the scythe and hold it steady. We have seen some scythes and sneads, or things that had these names, so rigged that the strength of one man was necessary to hold them in a proper position, while that of another was needed to swing them; of course, by having a good scythe, well hung, one-half of the labor will be saved.

With good rigging and a good scythe kept sharp, a gentle swing of the scythe will be sufficient to do as much as is performed by those who get along by main strength instead of wise management. The motion of the scythe on even ground should be horizontal, by *pointing in and pointing out*, as the saying is, cutting the grass square at each side of the swath. Some mowers who labor hard, waste half of their strength, and do bad work, strike it over the tops of the grass, cutting it off lower and lower as the scythe approaches the middle of the swath, then rising as it goes to the other side; so that the middle of the swath for only about one-third of the width is cut sufficiently low. This is called the *square lop*, and it often brings the scythe in collision with obstructions in the middle of the swath, while one fourth or more of the grass is left on each side. At a mowing match, an old gentleman was showing his sleight at taking the *square lop*, when his scythe, by some unaccommodating substance in the grass, was made into the shape of a rainbow.

Those men who labor to great disadvantage in mowing should get some that are well skilled in the business to select and hang their scythe, and give them lessons in their work. We think this would be good economy.—

With a little trouble they could improve so as to perform more labor and save ten or twelve dollars' worth of strength in one season; this item saved annually will be very important to one who wishes "to make a stout old man."—*Yankee Farmer.*

From Loudon's Gardeners' Magazine (for June.)

JAUFFRET'S NEW MANURE.

Since our remarks on this subject were published, we have received an opinion of it from one of the most scientific agriculturists in France; been made accquainted with all the particulars of the secret; conversed with M. Lozivy, the agent for granting licenses for La Manche; and seen a quantity of the manure prepared by him on Lord Spencer' sestate,at Durnsford Lodge, near Wandsworth; in short, we have satisfied ourselves as to what the invention is, and what it is worth in this country. The following is from our Paris correspondent:—

"I have not yet decided upon the question of the *engrais Jauffret*, although I have long been a subscriber. The following is, however, the opinion I have formed of it:—This compost is not equal to farm-yard manure, particularly as to duration; so that in the neighborhood of large cities, or in countries where an advanced state of cultivation furnishes the land with all the manure necessary, this practice would not be useful, or, at least, only in a slight degree. But in districts where agriculture is backward, where, for want of dung, only a half, a third, or even a fifth part of the manure is applied that the land requires, and where there are immense tracts of heath and sandy plains, that is to say, land covered with materials for the compost; in such districts, the practice of Jauffret is calculated, I think, to be of very great service. The characteristic feature and principal merit of this invention is, to convert in a few weeks, by means of a fermenting liquid, masses of these vegetable substances into real manure, or, more properly speaking, into perfect vegetable mould, which may be used immediately. It will come dear, I think, dearer than animal manure, near large cities; but probably less dear than the old composts, which required to be turned three or four times, and to lie six months, a year, or more; while in this case the object is effected in nineteen or twenty days. In France, where we have still almost entire provinces covered with heath and rushes, the Jauffret compost must be very useful. It will be useful also, I think, in the cantons, where the vine is cultivated. In England, where agriculture is much more advanced than in France, and the production of manure incomparably greater, it would certainly be of much less importance, except, perhaps, for some particular localities. Being a subscriber, I have the pamphlet which describes the composition of the compost. The receipt is so complicated as to be almost ridiculous, although it has been much simplified in a second edition, and it will, no doubt, be much more so in time.—*V. Paris, April* 6, 1838.

Jauffret's manure in England.—A gentleman of property, and a great mechanical inventor and promoter of agricultural improvement, has been at the expense of taking out a patent for Jauffret's manure in England. The specification is in the *Repertory of Arts*, No. 51, for March, 1838; and it is taken out in the name of A. B. F. Rosser, of New Boswell Court, London. M. Lozivy informs us that the specification is a correct translation of that of the French patent, of which we have no doubt, having compared it with the pamphlet alluded to by our correspondent.

The object of the inventor is stated to be, to reduce, not only "broom, heather, furze, rushes, and other vegetables, not hitherto used for making manure, as being deemed too difficult of decomposition, but also vegetables and weeds, such, for instance, as couch-grass, which it has hitherto been considered dangerous to introduce into manure, and the vegetating powers of which are by the invention totally destroyed. The principal object effected by the invention is the production of a rapid fermentation, the degree of which may be regulated nearly at pleasure; whereby the substances to be converted into manure are speedily and uniformly decomposed." The inventor next describes a liquid, which is to be prepared beforehand, of water, unslacked lime, a little sal-ammoniac, and kitchen-water, or any sweepings, dead animals, spoiled provisions, and filth form the dwelling-house. This water is to be allowed to ferment in a tank or pit. This is the first process. The next is to procure fæcal substances and urine; particularly human ordure, chimney soot, powdered gypsum, unslacked lime, wood-ashes, sea-salt, and what the inventor calls leaven of manure, being the last drainings from a dunghill already formed by the inventor's method. These articles being procured, and mixed together in certain proportions, (which we do not give, because we do not suppose there is one of our readers who would adopt them,) a quantity of the prepared liquid is to be poured over them, and the whole allowed to ferment for some weeks in a pit or cask. A piece of ground is now to be prepared by levelling and beating, so as to render it impervious to water; and on this raised floor the heap of straw, heath, or other rubbish which is to under go fermentation. is to be placed. The materials may be placed in layers, and thoroughly moistened and slimed with the liquid and its sediment. The heap may be raised to the height of seven feet, and then thoroughly moistened and covered over with the muddy sediment of the liquid. While the heap is making, it should be beaten or trodden down, so as to make the substances of which it is composed lie close and compact; and, when it is finished, it should be beaten all round with the same view. The heap is now to be covered all over with straw, branches, or herbage, so as to retain the heat and exclude the rain, or the drought. At the end of forty-eight hours from the completion of the heap, a fermentation of from 15° to 20° of heat by Réaumur's scale (66° to 77° Fahr.) has been found to have taken place; and the following day it has generally attained from 30° to 40° of Réaumur (99° to 122° Fahr.) On the third day, the top of the heap is to be opened to six inches deep with a fork, and the sediment thrown on the top is to be turned over, and another good drenching with the liquid is to be applied to the heap, which is again to be immediately covered up. About the seventh day, holes about six inches distance from each other are to be made with a fork, to the depth of three feet, and another drenching is to be applied, the heap being afterwards covered up again. About the ninth day, another drenching is to be applied, through new and somewhat deeper holes, and the heap is to be again covered up. After the lapse of from twelve to fifteen days from the making of the heap, the manure will be fit to spread. The fermentation is stopped by an excessive drenching, or by opening out the heap. If the materials of the heap are straw only, the fermentation may be stopped at 55° of heat; (156° Fahr.) otherwise it may be allowed to proceed to 75° Réaumur, (200° Fahr.)—*Repertory of Arts, March*, 1838, p. 172.

In order to give this process a fair chance of being introduced into England, M. Lozivy, one of the agents for the patentees in France, was invited to London, in order to prepare a heap of materials in the Jauffret manner. as an exemplification of Rosser's patent. He came in March, 1838, and prepared a heap of the new manure on the Earl of Spencer's estate, at Durnsford Lodge, near Wandsworth, in Surry, the residence of Mr. Patterson, the agent to Lord Spencer. When the heap was duly fermented, and fit to spread, M. Lozivy invited a number of persons to inspect it, on April 16, among whom we were included. It was formed on the south-east side of a field barn, on a raised platform of clay; ten feet or twelve feet in diameter, and covered with a very thick coating of straw. The outer covering of straw was removed, and the heap turned over, in the presence of the company; when the materials, which had been chiefly straw, were found to be thoroughly rotted, black, and moist; and, taken altogether, in a very fit state for using as manure. On examining them closely, many small branches of heath and furze were found, the leaves and the herbaceous parts of which were decomposed, and the bark of the woody part partially so. On the whole, it appeared to us that every thing that was proposed to be done was accomplished. It had required a much longer time than usual; because, owing to the extreme coldness of the weather, the heap could not for several weeks, be brought to a sufficient temperature to induce fermentation.

The impression on our mind was, that nothing more was done by this process than what may be done in any farm-yard with similar materials, moistened with the drainings of the yard, and similarly heaped up and covered. All the numerous ingredients in Jauffret's composition would, we believe, have no more effect than clear water, without the assistance of animal matter; and, therefore, if we were going to ferment straw, or other vegetable matters, without the aid of a farmyard, we should collect the dung and urine of all sorts of animals, and, simply throwing them into a tank or cask of water, allow them to ferment there; and, as soon as the fermentation took place, we would water the heap of materials, and cover it up. Of course, it would be of no use to attempt this except in mild weather; for even urine will not ferment in winter. We consider the lime, the gypsum, the sal-ammoniac, the soot, the wood-ashes, the sea-salt, and the refined saltpetre, as likely to have no effect whatever, in aiding the fermentation, though they would add to the value of the heap as manure.

All the good, therefore, which we consider may be drawn from a knowledge of Jauffret's process in England, by gardeners or farmers, is the confirmation of what they already know, though sometimes, perhaps, neglect to put in practice; viz.: that the fermentation of litter may be greatly promoted by watering it with the liquid which drains away from it, and by covering it closely with thatch, straw, mats, turfs, fagots, branches, or some other material, which will exclude rain and drought. Farther, that the urine of horses, and the urine and fæcal matters of the human species, promote fermentation in vegetable matters much more powerfully than those of cows, sheep, swine, or poultry; and, consequently, that the mixing together of the manures made by different animals will generally be found to increase fermentation.

Finally, if, in any part of Great Britain, there should be a quantity of such materials as, in France, would be made into manure by Jauffret's process, the shortest and most economical way would be to mix them with horse-dung, as practised in forming meadow-bank middens. In this way, one load of horse-dung might be made to ferment hundreds of loads of other fermentable matter.

Remarks.

We are enabled to give above, the earliest account of the process by which Jauffret's new preparation of manure is made. Since our first account of this discovery (p. 65, vol. vi. Far. Reg.) it has been cried up, by some, as a most wonderful and valuable improvement, and the discoverer denounced, by others, as a charlatan and a cheat. Now we differ from both these opinions; and we have not now, when the secret is fully revealed, to recall or retract any thing of our views stated in anticipation. (See page 125 of this volume.) Jauffret's process consists in applying highly putrescent liquids, as a leaven, to masses of vegetable matter, so as to produce speedy fermentation, and to bring the hard and insoluble materials to a state fit to feed plants. There is no new principle discovered or established by the explanation of the process; no value found that was not before known to exist. The dead vegetable matter, which natural causes, in time, would have brought to the same state, is merely converted to food fit for sustaining living vegetables in a shorter time. It is altogether a question of economy, as to the comparison of the cost of labor in the one case compared to the loss of time in the other—and of the waste of materials in both. Where it is important to reduce hard and coarse vegetable matters in very short time to *rotten* manure, this process will be effectual, and perhaps profitable. But where labor is worth more than the loss by delay, as generally in this country, it will be cheaper to let time, and the natural causes of fermentation, operate to produce the same results. Thus, we doubt not but that, by Jauffret's process, a farmer here might convert all the leaves of his wood-land to a manure fit for immediate action, and as rich too as the quality of the materials will furnish, and the rapid fermentation will suffer to be saved. But, if the same leaves had been scattered a year earlier, as top-dressing, on land properly constituted to receive and retain putrescent manure, and under a crop of young clover or other grass, perhaps a larger proportion of the fertilizing products of decomposition would have been put to use, and certainly with much less labor than is necessary for Jauffret's process.

On the other hand, we see no ground to denounce the process as a cheat. That it falls very far short of the value expected by credulous and sanguine advocates, and in that sense is, what we before guessed it would prove, one of the many agricultural "humbugs," is very certain. But no man of common sense and judgment could have believed that the manure could possibly contain more of prepared aliment for plants, than the materials used did of unprepared alimentary matter; and no one, acquainted with the phenomena of fermentation, would have believed but that the original quantity of alimentary matter must be considerably lessened by the fermentative process. Therefore, if Jauffret's manure is sufficiently prepared for immediate use, and contains all the strength of the materials used, *minus* the usual loss caused by rapid fermentation, it would seem that it is all that it promised to be, to judicious and reflecting minds.—Ed. Far. Reg.

GREAT SALE OF DURHAM CATTLE.

To the Editor of the Spirit of the Times.

Cincinnati (Ohio), June 29, 1838.

Sir—Believing that every thing connected with the improvement and sale of blood cattle must be interesting to the majority of your readers, allow me to furnish you with a transcript of the prices obtained at the sale of Maj. Chas. S. Clarkson's stock of Durham cattle, held on the 27th and 28th inst. at his (Clifton) farm, three miles from Cincinnati.

This sale was well attended by agriculturists and stock-breeders from the Miami and Scioto valleys of the Ohio, as well as from Kentucky, Indiana, Illinois, &c., and went off with much competition and spirit. The stock, as will be seen, was very superior, and showed fine keeping, and the prices which were obtained have fully justified the enterprising proprietor that in his attempt to introduce this valuable breed of cattle into the western country he has not labored in vain.

The gross sales amounted to $26,867 50, and a number of the animals have been since resold at a handsome advance of prices. I have herewith sent you a catalogue, of which you may make what use you please; and as this is the second or third sale (only) of similar stock ever held in this section of country, we ask you to furnish us with answers to the following queries, viz.:—

1st. Where (in the U. S.) has a larger number of fine stock ever been offered (at any one sale) at auction?

2d. Where have higher prices been obtained?

Waiting your reply, I am, sir, yours, &c.

Buckeye.

Note.—Imported *Minna*, and calf *Colossus*, sold for $1700, were repurchased by Maj. C. S. Clarkson at an advance; also *Lilly-of-the-Valley*, Maj. C. having made no reservation of bids at sale.

Seven young heifers not included in the catalogue brought from $75 to $150 each. J. J. W.

No. 1.	Minna the 2d, 6 years	$975
2.	Octavia, 4 years	725
3.	Pennsylvania, 7 years	725
4.	Lady Roan, 8 years	775
5.	Snow Drop, 4 years	800
6.	Florida and calf, 2 years	1075
7.	Belina, 2 years	875
8.	Kitty Clover, 7 years	700
9.	Prudence, 7 years	570
10.	Emma (and calf,) 3 years	850
11.	Hyacinth, 12, (private sale)	1000
12.	Pink, 1	700
13.	Rose-Bud, 1	850
14.	White-Rose, 1	800
15.	Dahlia, 1	475
16.	Lilly-of-the-Valley, 1	400
17.	Susan, 15 months	550
18.	Kate Kearney, 3 months (not sold.)	
19.	Stella, 7 months	410
20.	Daisy and calf	460
21.	Speckled Daisy, 4 years	400
22.	Beauty, 3	200
23.	Primrose, 2	220
24.	Althea, 2,	(not sold.)
25.	Blue Bell, 2 months [See 22.]	
26.	Speckled Durham, 8 years	300
27.	Duchess, 6	300
28.	Blossom (and calf,) 3 years	750
29.	Myrtle, 1	320
30.	Alice, calf	(not sold.)
31.	Juliet, 2 years	100
32.	Laura, calf	230
33.	Venus, 9 years	150
34.	Young Venus, 4 years	185
35.	Clio, 3 years	[not sold.]
36.	Matilda, 2 years	200
37.	Flora, 7 years	225
38.	Cornelia, 2 years	175
39.	White Lilly, 1 year	330
40.	Nora (and calf,) 7 years	120
41.	Caroline, 2 years	165
42.	Ruby, 1 year	225
43.	Cherry, 7 years	135
44 and 45.	Mulberry and calf	240
46.	Old Crump, 10 years	[not sold.]
47 and 48.	Speckled Legs and calf	150
49 and 50.	Old Kentuck and calf	135
51.	Virginia, 10 months	[not sold.]
52.	Clara, 3 years	160
53.	Cora, 1 year	95
54.	Lucy, 2 years	170
55.	Nancy, 1 year	70
56 and 57.	Harriet, 4 years, and calf	185
58.	Maria	110
59.	Rose, 6 years	90
60.	Line-Back, 4 years	60
61.	Spot, 4 years	200
62.	Black-Face, 4 years	[not sold]
63.	Clorinda and calf	205
64.	May-Flower, 1 year	465
65.	Tulip, 4 years	65
66.	Betsey Taylor, 3 years	[not sold.]
67 and 68.	Miss Cleveland, calf,	do.
69 and 70.	Red-Bud, calf	65
71.	Miss Patton, 3 years	[not sold.]
72.	Pet	50
73.	Hortense	[not sold.]

BULLS.

74.	Ohio, 3 years	1450
75.	Proclamation, 6 years	600
76.	Texas, 2 years last Sept.	710
77.	Colossus, 8 months	725
78.	Frederick, 9 months, $500 offered,	[not sold.]
79.	Daniel Webster, 1 year last Aug.	[not sold.]
80.	Colonel Crocket, 2 years, [Re-sold for $1000.]	575
81.	Lothario, foaled 1st May, sold with No. 10.	
82.	Don Juan, 1 year last Sept.	130
83.	Cortez, 3 years	80
84.	President, 1 year	190
85.	Cato, 1 year	300
86.	Logan, 1 year	160
87.	Alfred, 1 year May last	75
88.	Nimrod, calved Dec. last	80
89.	Adonis, calved 23d April last, sold with No. 52.	
90.	Duke Aranza, 1 year	120

From the Western Carolinian.

COTTON MANUFACTORIES IN N. CAROLINA.

Since we became proprietors of the Carolinian, we have taken some pains to obtain all the information within our reach, concerning the cotton manufactories in North Carolina, knowing that it it would prove interesting to our readers. Our list is not yet complete, but even as far as it goes, many of our own citizens will be surprised to see the progress North Carolina has made in the establishment of manufactories:—it should be recollected that all these establishments, with the exception of two or three, have sprung up within the past three or four years. The following is, as far as we can ascertain,

A List of the Cotton Factories in actual operation in North Carolina.

1. Factory at the Falls of Tar river, in Edgecomb county. This is the oldest in the state; owned by a company.
2. Factory near Lincolnton, Lincoln county, built by a company,—but is now owned by Mr. John Hoke.
3. One at Fayetteville, owned by Mr. Mallet.
4. Another at Fayetteville, owned by Mr. Blackwell, and others.
5. One in Greensborough—steam power, owned by Mr. Humphreys.
6. One at Milton, owned by an incorporated company.
7. One at Mocksville, Davie county, owned by Mr. Thomas McNeely.
8. One or perhaps two, in Orange county owned by companies.
9. One at Salem, steam power, recently started, owned by a company.
10. One in Randolph county, owned by a company.
11. One at Lexington, Davidson county—steam power, if not already started, will be, within a few days, owned by a company.

Besides these, there are others now in the progress of building, and will soon be in operation.

List of Factories now being built.

1. One at Rockfish, near Fayetteville, a fine water power, owned by a company.

2. One near Rockingham, in Richmond county, water power—owned by a company.

3. One on Deep river, near Ashborough, owned by a company.

4. One near Leaksville, on Dan river, building of stone, owned by John M. Morehead, esq.

5. One in Surry county, on Hunting creek, owned by Mr. Douthet.

6. One on the Yadkin a few miles below Stokes' ferry, in Montgomery county, owned by Mr. Edward Burrage, and Co.

7. One on the South Yadkin river, 10 miles N. W. of Salisbury; owned by Messrs. Fisher and Lemly.

We understand that several wealthy individuals have purchased the buckhorn shoals below Haywood, in Chatham county, with a view of erecting a cotton factory—but have not learned whether they have not yet commenced operations.

It is also understood that an English gentleman has purchased Fullenwider's iron works—intending not only to enlarge the iron establishment, but to erect a woollen manufactory.

We also learn that there is a large cotton manufactory either in actual operation, or will be soon in North Hampton county.

Besides these, it is very probable that there may be one or two others in the state, either in actual operation, or in the progress of erecting.

From these facts it will be seen that North Carolina is making rapid progress in cotton manufacturing; and we think the work has just commenced. Her facilities are so great that the business once started, must go on. We have water power abundant, and cheap. We have the raw material at hand, and, what is remarkable, labor in the western counties of North Carolina, is cheaper than in New England.

The effects of the establishments already in operation begin to be felt throughout the state: three years ago immense quantities of cotton yarns were brought into the state by our merchants from the north, and sold to our citizens: now, not a hank is brought; our own establishments not only supply our wants for home consumption, but are beginning to export the article. Parcels of North Carolina yarns have already been sent to market in the city of New York, and find a ready sale at fair profits. Even now, several of our establishments are making preparations to commence the weaving of coarse cottons. We may venture the opinion that in two years, North Carolina will not only supply the demand for her own consumption with the coarser cotton fabrics, but also send them out for sale into the markets of the world. On the whole, the manufacturers of the northern states need not much longer count North Carolina as one of their markets; they may rather regard her as a competitor, and one, who, from the great advantages she possesses, will soon become very formidable.

THE MILK SICKNESS.

A disease, called *milk sickness*, has been exceedingly fatal in Kentucky, Indiana, and Ohio, for some time past. It seems to be equal in malignancy to the cholera, and has cut off hundreds of the inhabitants. The governor of Kentucky has offered a reward of one thousand dollars for the discovery of the origin of the disease, that it may be prevented.—*Boston Journal.*

From the Quarterly Journal of Agriculture, (for June.)

A DOMESTIC RABBIT-WARREN.

It will perhaps be superfluous to detail the most accredited methods of keeping rabbits in hutches, for the perusal of those persons, to whom the plan of a domestic warren may prove intelligible, because the hutch system is well understood, and is generally practised; we shall therefore merely offer a few hints and directions, impress two or three facts—the result of experience—and then proceed to the subject which forms the title to this paper. Air, dryness, good feed, cleanliness, with very little succulent food, are essential to rabbits, which are debarred, by this unnatural system, from the healthful enjoyments of exercise in their own native wildness. For our own parts, we confess, that we should almost as readily attempt to immure a tricky squirrel in a tread-mill cage, or confine the soaring lark within the wires of a prison, as we should retain in those close boxes the happy denizens of a warren: but as the animals are subservient to man—as these creatures among others, "are made to be taken and confined," it remains for us merely to advocate their helpless state, and to inculcate mercy.

It must be gratifying to all persons who are proprietors of live-stock, to conduce to their comfort and well-doing, for the mere delight of indulging in benevolent feelings; but, when it is made manifest, that, by obeying the dictates of nature as much as possible, and making their artificial mode of living approximate as nearly to that which was intended for them, as the relative states of freedom and subordination will allow, we shall be gainers in a double sense—we should evince unwonted stolidity, not to bend our attention to effect so desirable a result. It is very little known, that an artificial or domestic rabbit-warren can be constructed with ease, and at a trifling expense, which will not only allow a free range to the animals where they breed, and to enjoy themselves unmolested by man, but that they may be caught, examined, fed, and attended to, without the delay of five minutes. We have had ample experience of the feasibility and highly advantageous nature of this method of keeping rabbits, and therefore speak positively respecting its vast superiority over that stiving unhealthy system of hutching, at present considered the only alternative, with that of total wildness in the warren.

During a residence of nearly three years in that south-eastern portion of our island, the Isle of Thanet in Kent, we had practical proof of all we have asserted, and, therefore, feel no hesitation in prognosticating similar successful results to others who may be inclined to put the scheme in practice. We should premise, that those districts in which the subsoil is of chalk or other material, equally difficult of perforation, will be found most available for a domestic warren; a sandy soil, or one of rich soft loam, would afford too ready facilities for burrowing, and the animals would shortly find an exit and escape; therefore we would advise that only in chalky, stony, dry, impervious subsoils, the trial should be made.

In any part of the premises deemed most convenient, a court or a stable-yard for instance, the soil must be removed full six feet deep, and three wide; a foot from this opening another must be made of the same depth, but *four* feet wide; the latter hole is to be bricked all around as well as the floor; and at the bottom of that part which divides it from the other space, an opening must be made, large enough to admit a full-sized rabbit to pass through, thus forming a communication between the two compartments. Down the party-wall an iron plate or door is to be slided at pleasure, in two grooves, by a rope from above. Light covers of wood, or of oil-cloth, or tarred sail-cloth, are to be fitted with hinges, on a frame-work of stout wood, and made to open towards the south, in order to admit all the warmth possible from the sun. Every morning these covers should be propped up with sticks, in which deep notches must be cut, so that the opening may be wide, or narrow, according to the state of the weather, as it is not advisable to allow more moisture to find access to the rabbits that can be avoided. Indeed, we omitted to say, that, while the excavations are being made, a drain ought to be constructed in each, over which a small iron-grating should be fixed, and the floors ought to slope towards these exits; thus dryness, so essential to the health and comfort of the animals, will be insured.

The larger of these two excavations, which we have been describing (the bricked compartment,) is the trap—the smaller we will call the warren. In the trap, *and only in the trap*, the rabbits must be fed. It is self-evident, that the more nearly to a state of nature we approximate the condition of our live-stock, the greater range we may afford them in their diet. Green food must be very sparingly administered to all that are confined in hutches, but those which are allowed a roomy space, with the salutary exercise of burrowing, may with safety be indulged with green food at their own discretion—attention being paid to select those esculents which they are known to prefer when in a wild state. We incline to think that animals in a state of nature are liable to no disorders, but that we, in consequence of our ignorance of those wise laws by which they are taught instinctively to vary their diet, and thus preserve their health, inflict diseases upon the unoffending creatures, which we then exercise our folly, not our rationality, to remedy: oh, the torture to which ignorant and conceited man subjects his speechless dependents! Rabbits in hutches thrive *in spite of* cabbage-leaves, not *by means of* that rank succulent unnatural food. Fifty generations of these animals have lived and passed away, in their wild extensive warrens, without the possibility having occurred of their encountering a cabbage-leaf. The mild beautiful herbage, that evident staple of their lives, as bread is of our own, varied with the thousand flavors, and healthful adjuncts which they meet with in the surrounding weeds—as we judiciously assist digestion with different condiments—this natural food, grass, is never given to rabbits in hutches, although they can obtain little else in the vicinity of their native warrens.

We would then strenuously advise that not any of the rank succulent vegetables of the garden be offered to creatures so artificially placed, that the option of choice is no longer in their power. Twice, or even three times a-day, there should be a supply of bran and oats in troughs, let down into the trap by means of a stick fastened to each trough, about four feet in length. A few handfuls of fresh grass, with its attendant weeds, ought also to be given daily, and the refuse should be taken away every two or three days; this can be managed with ease and expedition by means of a small ladder. It will be obvious that the trap is made deep and wide, in order to admit of easy access for the facility of cleaning the place and selecting the rabbits, which is effected in the following manner. As soon as the food is let down, the creatures, from habit, will run through the trap-door into the trap, and when it is judged that they are all collected, the person (keeping out of sight, for they are naturally shy, and would run back into their warren if they were to see any one, or hear a noise) must let down the trap by means of the long rope, and he can then select at his pleasure.

We think it likely that some of our readers may be inclined to question the utility of the opening to the warren, and may suppose that the trap would be sufficient; we assure them it is essential, for not only must a space be cleared for them to begin their operation of burrowing at that depth below the surface, but occasionally it may be requisite to clear away any loose soil which they may have excavated, as well as to secure the manure, which is valuable; besides, the two openings afford a free circulation of air, and more light than could be admitted by the trap only.

In many districts of this country not a warren or a wild rabbit is to be seen for twenty, nay, fifty square miles, yet, at all the poulterers' in large towns within those districts, *wild* rabbits *so called* are always to be obtained. There exists an imaginary preference in favor of wild rabbits, and therefore the public is never let into the secret, that they never *purchase a wild one*, excepting within an available distance from a warren. *All others* are bred in hutches, and all warranted *wild!* This we know to be fact. Independently of the superior health enjoyed by creatures nearly in a state of nature, other contingencies are prevented by the domestic warren system. Rabbits are exceedingly shy, and those unnatural propensities, the destruction of their young by the fathers, and devouring them by the mothers, which many writers have endeavored to account for, *quite unsatisfactorily*, are avoided; they are, too, probably caused by the officiousness and ignorance of man; in the first place, by interfering with the mother, in the next by having debarred her from that species of diet which her own instinct would have led her to select, to suit her maternal duties.

As our present notice refers only to the subject of a domestic warren, we abstain from offering any remarks or advice on the numbers to be kept, the sorts and advantages of this prolific and valuable live-stock, because there are few small farmers who are not aware of all we could say, by experience, in the troublesome, and every way ineligible system, of hutches, when compared with that of the domestic warren. We repeat, that we have had ample experience of its perfect success, and had it no other merit than being a mercifal and rational plan, it ought to supersede all others.

From the Quarterly Journal of Agriculture, (for June.)

LUCERNE AND SAINTFOIN.

By Mr. Towers.

Lucerne is the plant of plants! yet its merits, though undeniable, are but imperfectly understood. It is a native of England, belongs to the seventeenth class, fourth order of Linnæus, *(Diadelphia decandria)* and to the natural order of *Leguminosæ.* It is a member of the genus or family *Medicago,* medick, distinguished by having ten stamens, one of them distinct from the other nine. One seed-vessel, a *legume* or pod, spirally twisted or sickle-shaped. The figure of the blossom is that termed butterfly-shaped, *(papilionaceous.)* One plant *(M. sativa)* grows to the height of two feet or more; the stems are upright and firm, the foliage ternate, of a rich lively green, the leaflets saw-cut at their edges, the flowers are produced during June or July, in spikes, and are of a full violet blue. I extract the following from Loudon's Encyclopædia of Gardening, partly to prove the great antiquity of the culture, but particularly to show the fallacy of the concluding observations, and thereby evince the worth of the plant.

"It is highly extolled by Roman writers; it is also of unknown antiquity in old Spain, Italy, and the south of France; is much grown in Persia and Peru, and mown in both countries all the year round. It is mentioned by Hartlib, Blythe, and other early writers, and was tried by Lisle, but it excited little attention till after the publication of Harte's Essays in 1757."

"But though it has been so much extolled, it has yet found no great reception in this country. If any good reason can be given for this, it is that lucerne is a less hardy plant than red clover, requires three or four years before it comes to its full growth, and is for these and other reasons ill-adapted to enter into general rotation."

I have grown lucerne during four or five years, and previously I had witnessed its great success and extensive culture in the Isle of Thanet, Kent; there it is a *sine qua non,* because it affects chalky districts, and sends down its wiry elongated roots deep into the interstices of the chalk. It succeeds perfectly in sound loams, and therein appears to me to require little manure. *Hardy it is*—and as to tardiness, though the plant may acquire strength, and improve during four years, the fact is beyond controversy, that if sown in drills about the third week of March, and the spaces between the rows (from nine to twelve inches) kept clean by the hoe for the first three or four months, the young plants, if favored by a mild spring and genial showers, will advance with so much vigor and rapidity, that a first cutting over with the scythe can be made in June or July, and three other cuttings will follow in pretty regular succession, between the latter period and the first of November.

Seasons will of course vary; soils and other auxiliaries may be more or less favorable; but that which I have stated has occurred; it is the result of my own experience and practice. I have during five seasons witnessed the abundance of green food, which is produced by a plot of young plants, the supply being ample for a cow, even within four months after the sowing of the seed. I am thus authorized to refute, upon the evidence of facts, the charges contained in the concluding paragraph of the quotation. In cutting for a cow it will always be advisable to take the plant when it is tender and juicy, and such it will be when about a foot high. I have thus cut my plot over six times after the first year, but they who leave the plants to grow two feet high will find the stems rigid, fibrous, and less juicy; and that what they gain in bulk will be lost in time and quality.

As to the trouble in managing an established crop, it is really nothing. Though I allow it is good to hoe twice during the summer, as the plot is mown, piece by piece, yet *one general fork-digging* at that period of early spring, when the plants exhibit the first symptom of growth, so as to remove every weed and loosen the surface of the soil, will be amply sufficient to secure the safety and full development of the herb. Upon the whole, lucerne is a plant of the utmost value; for if the seed be good, the ground rich and in heart, and rendered deep in the first instance by a thorough trenching, the young plants start into lively growth, attain strength in the shortest possible time, and yield a bulk of luxuriant herbage that cannot be surpassed. If the plant require four years to attain its maximum of power, it is still a giant even from its infancy, advancing from strength to strength.

Well might the writer of a recent agricultural report (of Norfolk if I mistake not) recently exclaim, "What a plant is lucerne!" I re-echo this introductory "note of admiration," and will unhesitatingly assert, that if abundance, permanent and unfailing, particularly in shallow soils upon chalk-rock, be the object of the farmer, he will attain it by the cultivation of lucerne. The rotation must be improved by it, as in point of produce it will yield double the bulk of grass from an old sedgy meadow.

The soil which is most favorable to the perfect growth of lucerne is worthy of consideration. Chalk is what it affects, and therefore we find it most generally cultivated in Kent, and those parts of the southern coast wherein the subsoil is a chalk-rock. But my fine plot grows in a rich, deep, and rather sandy loam; the subsoil is indeed chalky or marly, but at a considerable depth. It was prepared by taking off the turf, trenching to the extent of three spits, and placing the turfs, their grassy surface downward, at the bottom of each trench. Upon these reversed turfs a sprinkling of common salt was given, and the earth was returned into the trench, with the precaution to keep the heavier and inferior soil below the fine black earth of the surface. Due preparation affords a rich and permanent pasture for the wandering roots; and my piece, of hardly one-third of an acre, has been so undeviatingly productive, with little subsequent manuring, that, in a showery season, we have found in cutting over the end where we began ready for the scythe again before the mowing was completed. Lucerne is known to produce much milk, perhaps more than any other of the artificial grasses *(Leguminosæ)*; but some complain that it communicates an austere or bitter flavor. I doubt the fact; but would always recommend that it be not given quite fresh to a cow, particularly at an early period after calving. If the required quantity be cut over night, it will be fit for the stall by ten o'clock of the following morning; and again, the afternoon meal should lie exposed to the sun for two or three hours before it is used.

A well prepared field, if kept clean by the forking, will remain productive for more than ten years; but as a change of crop always promotes abundance, it would be advisable to prepare a successional plot every six years.

The grass and weeds raised by the fork, and raked up with the small quantity of earth. adhering to the roots, if salted and sprinkled with quicklime and placed in a heap, will form a most excellent manure for the lucerne. The cuttings *here* are usually over by the end of October; the herb then becomes, as it were, torpid, and whatever manure is applied should be given as a top-dressing during the winter's state of repose. The surface must not be disturbed at that season, nor till the herb begins to grow, then, as I have before said, the fork-digging will effect all that is absolutely indispensable; it will turn in the remaining manure, remove the encroaching weeds, and open the soil, burying a fresh surface into contact with the advancing rootlets. The experience of one or two seasons, under commonly favorable auspices, will verify all that I have asserted.

Somewhat resembling lucerne in character and habits is the French grass or saintfoin *(Hedysarum Onobrychis)*, a lovely flowering plant, rich in herbage, and also a native of Britain. The grand object of agriculture ought to be the renewal of soils, and the adaptation of crops; and as science advances, and its sons become more influential, these objects will be attained.*

SEEDLING TREES FROM THE SEED OF THE MORUS MULTICAULIS, OR CHINESE MULBERRY.

There has been much said in this journal, during the last four years, as to the *kind* of products from the seed of the Chinese mulberry. We were the first in the United States to announce that the seeds could not be relied on to produce plants like the parent stock; which being itself an accidental variety, would generally produce other varieties from its seed. This information was totally disregarded by the agricultural public; and one effect of this disregard was the permitting the success of extensive frauds which were perpetrated in sales of what was called Chinese mulberry seed—which seed, was in fact, *not* the product of the *morus multicaulis*, (and was so admitted, after the cheat had been discovered,) and which, if it had been, would most probably have been worth no more.

In one of our pieces on this subject, we promised an experimental proof, which will now be furnished. In the editorial remarks on page 711 of vol. iv, it was said that "though believing that the seeds of this plant are not to be relied on for reproducing their own kind, we are not inclined, in any case, to trust to reported opinions, or authority that is the least doubtful, when the facts can be tested by accurate experiment. We have the means of making such an experiment, in seeds of the *morus multicaulis* taken last summer from trees which grew within the enclosure of the high walls which surround the Penitentiary of Virginia; and near which no other kind of mulberry grew, to affect the seeds by a mixture of the fecundating farina. If *these seeds* will not produce the *morus multicaulis*, it may be thereafter safely pronounced, that seeds are not only not to be relied on to produce this kind, but that the result of reproduction of the like kind rarely, if ever, occurs."

The seed were procured, at our request, by Dr. Lewis W. Chamberlayne, of Richmond, who, as attending physician, visits the institution every day, and by whose direction the seed were saved by one of the attendants, and delivered to him as soon as they were gathered and separated from the pulp; and were placed in our hands very soon after. The trees are in the yard, surrounded and overtopped by the very high walls that enclose the buildings, and no other kind of mulberry is near. For these reasons, there was as much security as any situation and circumstances could possibly offer against the access of fecundating farina of other trees to the flowers of these trees; and there was equal security against any change or mixture of the seed, after they were gathered, by mistake, or even by design, if there could be supposed any possible object in the gatherer to produce such deception. We placed the seed in the hands of our friend and near neighbor, S. D. Morton, esq., whose taste and fondness for the higher departments of horticulture furnished security for his strict attention to so interesting an experiment. Some of the seeds he planted in the open ground of his garden; and of these very few germinated, and only after a long time. The balance were planted in his hot-bed, sprouted soon, and grew well, and were transplanted afterwards to open ground. Though, to our mind, the result was satisfactory in the first summer's growth, we have waited for the second, and for the larger size and full development of the leaves, to make report. For this purpose, the plants have been again carefully examined, on the 23d July.

There are now standing twenty-six trees—the largest about five feet high. The few which had been planted in the open ground, and not transplanted, have suffered by their close and shaded positions, and are not more than eighteen inches in height. There is much variety in the appearance of the plants, in the shape and sizes of the leaves, &c. But there is not one which is not entirely and manifestly different from the *morus multicaulis*, of which there is a row parallel to, and within a few feet of the transplanted seedlings. None of the leaves of the latter are so large, nor so smooth, nor have they the convex form which is so marked in the *morus multicaulis*. In general appearance, the young trees are more like the common native mulberry, *(morus rubra,)* than the white—and far more so than the Chinese.

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* The climate of Scotland is far from being genial to the growth of either lucerne or saintfoin.—EDITOR.

So far as negative proof is to be depended on, this experiment may be considered decisive. But though it is now proved, as we have before maintained, that no reliance should be placed in continuing the kind by seeds, still we would not deny (even in the absence of facts,) that the seed of the variety may *sometimes* produce its like kind. Gideon B. Smith, esq., of Baltimore, has raised the true multicaulis from seeds; and therefore there is no doubt of the fact, as it could not rest on better authority. But such results are so rare, and the failures would be so many, that the fact, however curious and interesting, is of no value for practical example, even if the seed could be obtained in quantity, and at a cheap rate.—Ed. Far. Reg.

From Loudon's Gardener's Magazine (for June.)

JOYCE'S NEW MODE OF HEATING.

When we noticed Mr. Joyce's stove in our January No., p. 57,* the nature of the fuel was an entire secret. It since turns out to be nothing more than charcoal prepared in a manner, which, though it deprives it of its smell, and, perhaps, diminishes, in some degree, its deleterious properties, yet leaves it of the same nature as it was before, though not so perceptibly dangerous, from its want of any noxious effluvium. Mr. Joyce's stove, therefore, has entirely failed in realising all the high expectations that were formed of it, and cannot be recommended, either for plant-houses or human habitations. The manner in which the charcoal is deprived of its smell, is said by some to be by boiling it in any alkali, such as lime-water; and this may afford a useful hint to gardeners, where they are under the necessity of using a charcoal stove in fruit-rooms or plant-houses, on extraordinary occasions.

ON "RINDING" OR RINGING FRUIT TREES, TO FORWARD THE PRODUCTION OF FRUIT.

To the Editor of the Farmers' Register.

Richmond, July 6, 1838.

About ten year since, I met with an old magazine, containing experiments on fruit trees, among them, one on "rinding." The process is simply to make an incision near the trunk of the tree, with a sharp knife, all round in two places, at about one-eighth of an inch apart, and the rind or bark peeled out down to the wood. Care should be taken not to wound the wood. This should be done just as the buds are ready to burst. The philosophy of the process is, the sap already in the branch, being checked in its return, when most of it would be consumed in forming the tree, produces fruit in its stead.

The exudation from the wound ceases very soon, and the incision only leaves a ring, which will be easily forgotten while beholding the luscious fruit occasioned by it. I communicated these facts to a friend who resides near this city, and who will take pleasure in showing the results of his experiments, detailed below.

In the spring of 1837, he "rinded" a limb of a young apple-tree, about 7 feet high. It bore twelve apples on the whole tree, on the limb rinded seven apples, on the rest of the tree five only. Two of those on the limb operated upon being equal to three of the others in weight.

The next experiment was upon a blue plum-tree, which had not borne more than a few dozens for some years. One branch only was operated on, and the limb was full of the finest fruit, while the balance of the tree, as usual, produced a very small quantity of inferior plums. This spring, 1838, he operated upon an early young pear-tree. The whole tree bloomed before the branch that was cut did, and was killed by the frost; after which the limb put out and bore a bountiful crop of fruit.

The latter, I would remark, might be the result of the peculiar season; and may not be considered a fair test; but the former, I think, establishes the fact, that unfruitful trees may be made productive.

J. W. S. Lownes.

EXTRACTS FROM PRIVATE CORRESPONDENCE.

Union District, S. C. March 25, 1838.

I have made use of some exertions to procure some new subscribers to your valuable journal; but regret to say that I have not been able to procure even one, in consequence of a foolish and inveterate prejudice against *book* farming. This prejudice is more general than I had thought, though it must yield before the light of knowledge, and I hope to be able still to add some new names to your list. My exertions shall be unabated. On the subject of hill-side drains, I want information; I have seen several communications in the Register for and against the system; but nothing in detail, or not sufficiently so, to enable me to satisfy myself as to the *quo modo*. I am satisfied of their efficacy, if accurately done; and if not accurately done, that they are manifestly injurious. If you could furnish such information, or elicit that information from some one of your correspondents conversant with the subject, you will much oblige your obedient servant, &c.

[If those southern and western planters, who scorn all book-farming, and are sure that no agricultural journal published in a remote region can yield to them profit or instruction, would listen to our reasoning, and not consider the gaining of their subscription money to be our *sole* object, we could name very many subjects on which they need such instruction, and might greatly profit by receiving it through the channel of such an agricultural journal. We will name but the one to which our correspondent refers—the graduated ditches, or beds, on hill-sides, to guard the soil against being washed away by heavy rains. Full information on this subject was given in several communications to the first volume of this work; (which our correspondent had not then seen) and we hesitate not to declare, that if the instruction there offerred on that subject alone, had been known to the planters of the hilly lands of South Carolina, Georgia, and Alabama, and duly acted upon for the last twen-

* Copied in the Farmers' Register, p. 62, vol. vi.

ty years, the value of soil, of crops, and of labor, thereby saved to the cultivators, would have been worth millions of dollars.

A very intelligent farmer of this state, who had learned and profited by this practice, settled a cotton plantation in the hilly region of Alabama. Though on new and, as yet, rich soil, he resolved to prevent its waste and destruction; and to that end, forthwith, commenced a general system of hill-side ditches. Their useful operation was soon manifest to every observer; and an older settler, (who probably despised book-farming as heartily as our correspondent's neighbors,) pronounced the practice to be the greatest improvement ever introduced, and that the introducer was a public benefactor, whose services to that country would prove to be beyond estimation. We fully concur in this opinion, But if the new settler had obtained his knowledge of this improvement from the Farmers' Register, as he might have done, and as every hill cultivator in the south and west might now easily do, would it not have been "*book-farming*"? Even if the still farther fertilizing of rich virgin soil is not required, the preservation of existing fertility surely is desirable; and especially if it is cheaper to preserve than to waste the richness of the land. And even if neither of these important objects is cared for, still it is as important to the cultivators of the lands of the most exuberant fertility, no less than to others less happily situated, to be apprised of agricultural news, and of the advances of agricultural knowledge—and thereby be enabled to learn every new value of agricultural labor and products—and every means of making labor cheaper and more effective, by better implements and stock, and better management.]

Montgomery county, Ala., March 16th, 1838.

I am a planter of but little experience, and regret much that your work, with the aid of which one may profit so much from the experience of others, is not better calculated for my latitude. Hundreds of planters here, like myself, require to be taught much that might appear common-place to the experienced; and if your work contained the desired information, I am pursuaded its circulation would be greatly extended in the south-west. The difficulty of procuring well written essays and valuable papers upon our peculiar soils, staple and mode of culture, I am aware, must be very great to a distant editor. But this is a difficulty which it would be much to your interest to overcome. Southern cotton-planters are generally educated, intelligent, reading men; and the Register would be very popular among them, if it taught them their true policy and interest, with half the skill and accuracy, which it has hitherto displayed in relation to the farming interest of the "Old Dominion." Virginia must be well-nigh ready to graduate under your instruction; turn then to the "destitute south-west" and give us the benefit of a few lectures.

[We lament that our journal has not more southern communications. But we deny that we have been remiss in endeavoring to obtain them. The fault is in all those, like our correspondent, who *can* write and instruct, and will not do so. We have throughout paid especial attention to the agriculture of the more southern states; and never fail to publish every valuable article found in other prints, as we have published every original communication sent directly from the south to this work. And without counting any of the articles exclusively useful for the south, and though we have never been south of Raleigh, nor west of Virginia, we dare to assert that the observations on the prairie soils of the south and west, taken in connexion with the doctrines on the nature of soils in general, as presented in these volumes, offer as much of useful and profitable, and practical instruction to the people of the south and west, as might have contented them in a work printed among them, and designed exclusively for their patronage. Yet we must confess, with feelings of disappointment and mortification, that these available services seem not to have been there appreciated, and indeed are scarcely known. We have not withheld our "lectures" from the "destitute south-west," and are ready to deliver them as long as they are desired. But not for the reason that they are not still very much wanted, (though but little *in demand*, in mercantile language,) at home.]

Clarke county, Va. 22*d April*, 1838.

I received with my first No. of the Register, your "Essay on the causes of the formation of Prairies, &c.," which I read with much interest, and with entire acquiescence in the soundness of its views. I do not know whether you are aware of the fact, that this part of the valley—including a large portion of Jefferson and Clarke, and a less one of Berkeley counties, was, when first settled, and until about 80 years since, a perfect prairie. It is a highly calcareous region, and its geological character generally corresponds, I believe, with that of the "great west." It is now covered with a lofty growth of trees—though the forests are more open and sparse than in the argillaceous soils —and without any undergrowth except grapevines. I believe, however, that the trees here are short-lived—having always observed that a portion of them, in the midst of their apparently vigorous and rapid growth, die annually, without any extraneous or obvious cause. These facts corroborate your theory, that soils which contain a large portion of calcareous matter are unfavorable to the growth or perpetuity of trees; and that the luxuriant crops of grass which they produce, and the abundant supply of dead wood, where wood ever did exist, afforded sufficient food to the annual fires, which swept over these plains and destroyed their feeble efforts to throw up a woody growth; and hence the formation of prairies, wherever they exist.

Mobile, June 23.

I am pleased to see the zeal and ability with which your paper is conducted, and think it the best agricultural paper we have ever had, and likely to be of infinite advantage, though the progress will be slow. The taste has to be created with that class with whom it will be most useful.

The crops of corn in this state are remarkably fine, and may be said to be made. The cotton crop was worse ten days ago than I have ever seen it at the same time. Many places for 50 acres together there were not 50 stalks in the bald or open prairies, and the light sandy lands. The crop has been replanted, and the young cotton shows very prettily, and the weather has so far been very suitable for it; and with a cool fall the young cotton may make a ¾ crop, and the old cotton more. The month of May was very cold, the thermometer on the 24th was at 40° ; and as the cause was a general one, I think it a fair inference that the crops have every where been injured. There is no calculation to be relied on as to the probable crop for the year at this time of it; as it depends so much on the season from this time on.

Since writing the foregoing I have received a letter from Arkansas. The month of May was cold and rainy, and the crops were very unpromising.

Baltimore, April 16, 1838.

* * * Your article on "hobbies and humbugs," it seems to me, is rather severe, and calculated rather to depress the spirit of enterprise than encourage it. If we are to have no *new thing*, till it has been sufficiently tried to prove that it is not a hobby nor a humbug, we might as well give up improvement for the time. * * *

I differ with you on some of the "hobbies and humbugs," I perfectly agree with you on some others. The Baden corn, for example, is an old worthless *pony*, that has been turned out to die of old age three or four times within forty years past; (I don't wish you to suppose that I have been an observer of these things myself for forty years, as I am not old enough for that—) and it seems that even old age won't kill it, or if it does, that it won't stay killed.

Lynchburg, July 11*th*, 1838.

Our harvest is not yet completed. All accounts, until very recently, have concurred in representing the wheat crop as a very superior one. Hence, on a visit to the country ten days ago, I was much disappointed; I saw very little that was prime, and much that was inferior, and some not worth cutting. Early sowing in good ground, well prepared, looks well, a good deal of it, and some, very well, but on examination, the head, a third or a half, has three grains in a mesh, then two, with four or five at top with one, and some entire skips. And I am not certain that any of the *grain* is superior. Such is the best. There is still a large quantity of thin corn-ground seeded, unprofitable as it is. This is all inferior, and a good deal worthless. The crop is all late, but some is much later than the rest, as usual. Nearly all of this, including northern exposures, is sorry. I should say, that, in quantity, the crop is vastly short of the general estimate, and that a large portion is of inferior quality. It is proper, however, to say that my observations are confined to a limited region, from this place to the Blue Ridge the north side of Bedford, 20 odd miles.

Rye, of which the quantity sown is much diminished, is better than for several years. Oats, moderate; on thin land, not good as common. Corn backward, and more missing than usual, but a favorable season may yet make a good crop. Some tobacco land has been planted in corn, for want of plants, and from that circumstance and a scarcity of planting seasons, the prospect is unpromising.

Elizabeth City Co. Va., July 20.

Our wheat crop was generally good. More wheat has been made this year in our county than was ever grown before in any two. The crop of corn though backward, promises a fair yield.

Things have much improved here since your visit to Back river, (in 1836) and land is growing daily more valuable. We are cleaning up and manuring in every direction; and without designing to flatter you, I am free to confess that much of this improvement is owing to the influence of your valuable paper.

I was much pleased with your description of Gloucester, and felt more than ordinary interest in your remarks, because they applied with peculiar force to my own neighborhood. Your theory about wide beds is certainly true. I know from *experience* that 11 feet beds suffer from wet much less than 5 feet ones. At any rate I will try it this fall, and will let you know the result.

[From the letter of a brother editor.]

Pray how do your subscribers pay? Ours are horribly remiss.

[We may answer that our subscribers are
"Like Jeremiah's figs,
The good, are *very good, indeed*—
The bad, too bad for pigs."]

THE WHEAT CROP.

The wheat harvest has been finished, and without much loss from bad weather in general, though many crops on the lower James river suffered severely from a hurricane which tore down shocks, and scattered the sheaves, wherever its power reached. In that region the crops are found to be less productive in grain than in straw; and the yield will there be less, by perhaps one-fourth, than was counted on in our last report, made during harvest. Similar disappointment has been found elsewhere, as stated in a foregoing extract. Still the general crop will be a large one. From many other parts of the country, there is yet no abatement stated of the first anticipations of great product.

MONTHLY COMMERCIAL REPORT.

The weather has been very favorable for harvest, and the crops of wheat and oats were stacked in dry order. The showers of rain were occasionally violent, but of short duration, and during the last fortnight the weather has been dry, and the heat extreme. The product of wheat, so far as ascertained, falls short of expectation; but proves fair for the quantity sown, and the quality is good.

Some few farmers who undertook to get their wheat ready for delivery in this month and made contracts in June, obtained $1 50 per bushel; but this price soon began to decline, and subsequent contracts have been successively at $1 40, $1 30, $1 25, and $1 20, for delivery in August. Prices are expected to go still lower, unless a prospect of foreign demand shall check the decline. The crop throughout the United States, is supposed to be the largest that has been made for several years.

The inspections of tobacco to 1st inst. show double the quantity to the same time last year, but this arises chiefly from a similar difference in price. A considerable portion of the crop of 1836 has been brought to market since the 1st October, 1837, and is counted in the present year's inspection.

The range of prices is from $4 for inferior and partly decayed lugs, to $11, for choice leaf. The inspections in Virginia, it is supposed, will reach about 45,000 hhds. and those of Kentucky about the same, which, with the addition of Maryland, will furnish about an average of the usual quantity for export.

The growing crop is said to be unpromising, particularly as to the quantity.

The quantity of cotton reported in the table of receipts at different ports of the United States, reaches nearly to 1.800.000 bales, being an increase of about 450,000 bales on the receipt of last year, partly arising from the same cause that the inspections of tobacco exhibit so large an increase.

Considering all circumstances, prices have been well supported. They have advanced 1½ cent per pound in the last 6 or 8 weeks, partly owing to decline in freight, and rise in exchange on England. Sales have been small in Petersburg as high as 11½ per cent., the range of prices 9 to 11½, but some reaction is now felt, and the accounts from England to 16 ult. are not so favorable as those which preceded; indeed so large a quantity as 1,-800,000 bales had not been anticipated.

It is confidently expected that the banks in the Atlantic states will generally resume specie payments next month, and that the western banks north of Tennessee will follow the example.

Specie has fallen to 2 to 3 per cent., exchange on England 8½.

July 24, 1838. X.

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SELECTIONS.

THE FARMERS' REGISTER.

VOL. VI. SEPTEMBER 1, 1838. No. 6.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ON THE FREQUENT FAILURES OF THE WHEAT CROPS.

To the Editor of the Farmers' Register.

The successive failures of the three last crops of wheat, and the partial injury to the present, have caused a general inquiry, why this crop is more uncertain than in former seasons, and what remedy can be found for this misfortune, which threatens to destroy the cultivation of wheat, at least in Virginia. Being extremely partial to the golden grain, and thoroughly convinced that it ought to be the staple crop of the Old Dominion, I venture, as its friend, to give you some thoughts on the subject. Every candid observer must admit that the last four seasons have been very unfavorable—severe winters, and excessive rains in May and June. The present crop was very promising until the rains and exceedingly hot weather, which have created a good deal of rust in parts of the state, but still left a crop which will probably make us independent of foreign supplies.

Those causes have been beyond human control, and, so far as they are concerned, we can only submit to the decrees of an all-wise Providence; but it behoves us, as rational beings, to inquire whether there do not exist other causes, which may be removed by human effort.

There certainly is something very striking in the reflection, that a country always producing sufficient bread-stuff for its inhabitants since its first settlement, and latterly exporting more of that article than any other, should, with the view of affording a better home market to its agriculture, for the benefit of its manufactures—and in less than twenty years from the adoption of this policy—find its agriculture so oppressed, that these very manufacturers have to resort to foreigners for their daily bread. Thus showing the retributive justice of Heaven, who hath said: "thou shalt not muzzle the ox that treadeth out the corn." But, thanks to the wisdom or fickleness of our legislators, this state of things is rapidly changing; and it becomes us to inquire, now that the efficient or remote cause of the disease is about to be removed, how shall the patient be restored to his pristine health and vigor? Were this the case of a lovely form, whose freshness and beauty were fast fading away, without any evidence of fixed disease, the physician would say, "Restore her native air, and place her amongst the soft breezes of the valley, or the bracing air of those mountains, the scenes of her childish gambols, and we may hope to see the rosy-lipped cherub again bounding, like the antelope, from hill to hill."

Now, following this metaphor, may it not be well to inquire wherein has agriculture degenerated under its oppression, and to endeavor to restore that vigor, which was the cause and the consequence of its former health. Many of those who now guide the operations of the husbandman, have no personal recollection of the former state of things. But you and I, Mr. Editor, can now use the familiar phrase of some twenty years since. We were both reapers of the golden harvest, which seemed almost like coining money, immediately after the late war; and though schoolboys at the time, we recollect the high price so long kept up during Bonaparte's wars.

Your residence was on the sandy lands of the tide-water, where corn was the staple crop; but Providence cast my lot upon the green belt of the Blue Ridge, in a section, even then, rapidly improving in its agriculture. And I well remember, that the most usual sights in July and August, were large fields of clover subverted by the ploughshare, and the carts and wains all busily engaged in spreading the fertilizing produce of the stable and farm-pen, over those portions of the field which were more scantily covered with clover; and even those farmers who had not advanced to clover, were still anxious to reap the benefits of manuring and fallowing. And, as hope is more exciting than enjoyment, many hurried into those operations without even securing the previous crop, thinking less of the $2,000 they could get for it, than the $4,000 expected for the next year's produce; and I have often seen the coming crop covering those fallow fields with as bright a green as the clover which had so lately clad them, whilst the weather-beaten shocks stood amongst the rank stubble of the late harvest. But when our wise rulers took it into their heads that we must make every thing we wanted at home, and our hoodwinked farmers took up the idea, that to buy nothing was the best way to get rich, without reflecting that others must follow our example, they soon found that their barns were loaded with grain, laid up for many years; and, like the man in the parable, said "soul take thy rest." They then found that fallowing was a very laborious and expensive business; that the crop was very uncertain, and apt to be destroyed by the blue grass. For now they could not think of crossing their fallow, which was thought an expedient operation when wheat brought 9s. to 12s. a bushel; the crack of the whip, and shrill whistle of the driver, no longer impelled the patient ox with his fertilizing load; the weather was too hot in July and August; and the manure either wasted in the heap, or was all expended on tobacco, corn, or top-dressing.

The domestic market, which we sacrificed so much to gain, came at last; but it was not for wheat, but corn, which of course commanded the chief care and labor of the husbandman.

Now I would say to my brother farmers, resume those good old habits. This is the proper season. Select some field, or portion of one, of good land; not some worn-out gall, too poor for corn. Plough it well before the 1st September, if practicable, and re-plough it in that month, if necessary. Scatter all the manure you can raise, on the poorest part, and seed it well in the month of October; early, if in the upper part of the state, late in the month, if below. Plough or harrow in the wheat; but, at any rate, finish with a good smooth harrowing. If any part is inclined to be too wet, water-furrow it well. If your wheat has any smut, soak it in a strong brine, and roll in quick-lime immediately before seeding; and then pray to Heaven for a good harvest. As to your corn land, sow only that which is good, and no more than you can prepare well, and in good time; put the balance in oats. No preparation is good, unless the wheat is put in regularly at a suitable depth, and the soil well pulverized. The wheat ought never to be sown without some previous work; the land may be ploughed up with two horses, and this is best on flat land which requires bedding. But on dry land, I think the best mode is to cut the stalks off with a hoe, (not a knife, which leaves them too high;) pile or remove them. Plough up the stubbles, by running a furrow with a one or two-horse plough. Harrow the land crosswise or diagonally. Sow the wheat, plough it in with small ploughs, and harrow again. This will make the land almost as fine as a plant-bed; and although it is more trouble, if the wheat turns out well, you will be paid; and if not, it would certainly have been worse with a worse preparation. As soon as the crop is seeded, begin to lay plans and make preparations for putting in your next crop in the same or a better manner; and if your crops fail, my word for it, "you may thank God that your neighbors' are no better."

RED LAND.

RETARDED ACTION OF GYPSUM.

To the Editor of the Farmers' Register.

Some time last year I communicated the fact, that the effect of plaster, applied to the young clover soon after it came up, was not perceptible. I concluded that the soil either did not need that manure, or that the plaster was not genuine. But I am gratified to state that that plaster, though apparently useless last year, has manifested its efficacy in the most striking manner this, in so much that the bed of twenty feet width through a large lot, which was left unplastered, looks, at a little distance, as if it had been mowed, while there is a tall and luxuriant growth of clover on both sides of it. I believe that experiments in plaster, and other things, often prove abortive for the want of the unremitted personal attention of farmers to the application of them, and to the not following them out by the nicest and most careful personal inspection and comparison.

A. C. MORTON.

Mecklenburg Co., July 18, 1838.

From the Southern Agriculturist.

ON PISE BUILDINGS.

To the distressed inhabitants of the city of Charleston.

Seeing from the act of the legislature, as well as from the ordinance of our city council, that in future we are restricted to the use of incombustible materials in erecting our buildings, and knowing as I do the high price of such, and the difficulty of getting them at so high a price, I would suggest the use of *pisé*, or rammed clay walls. This mode of building is of great antiquity, and brought to such perfection in the country about the beautiful city of Lyons, in France, as to appear like elegant palaces, some of which are known to have stood three hundred years. But to be concise on this subject: I have just erected the walls, and covered in a house of 48 feet long by 24 wide, containing six large rooms, and three wide passages; and though built under many difficulties, which I had to surmount as I went on, yet it will bear comparison with any brick house of the same size, and was built in nine months by two men only, (who hired out at $10 per month before employed on this work,) assisted by a black country carpenter for three weeks. From the experience I have gained in the erection of this house, I can with confidence recommend (if my directions are followed) the use of *pisé buildings;* viz.: The foundation must be stone or brick, raised twelve to eighteen inches above the ground. The mould, which is very simple, must be a piece of 3 by 4 scantling, laid across the foundation, with a mortice at each end, describing the width of your wall, allowing for the thickness of the boards that are to stand on their edges, with their sides to the studs of scantling, standing in the mortices of the transverse scantling already mentioned, and capped with a piece of the same width; these studs to be erected three or four feet apart. The flooring-boards intended for the house, and which require seasoning, will just answer for this purpose, and will not be the least injured from this use, but better seasoned. They must be reduced to one thickness, and cut with a mitre at one end to meet at the corners, clasped with tin or sheet iron clasps, secured with small screws. These may be taken off every other course, and used as before. In this mould so formed, lay six inches of clay, as dry as you can procure it, (I never found it too dry,) and commence ramming, with a rammer beveled from a square of six inches, to one inch, all on one side. The pisadore (who is the rammer) finding it will not yield more to this rammer, then commences with a square rammer, till it rebounds briskly from the wall; he then continues filling in, continuing the same process till the boards are full, and he lays another board on the edge of that just finished, and continues this process until the story is raised to receive the joists. These are laid on a piece of scantling, 3 by 4, laid along in the mould, and each end is well dove-tailed. This being effected, I would recommend that the mould be taken apart from the wall; it will be found an equal continued surface, resembling a piece cut out of a rock, of the color of the clay. If this has any blemishes (or inequalities of surface) from the clay sticking to the mould, they can be immediately remedied by a plaster made of the same clay, with a mixture of cotton or hair. This being done, lay on the whole wall a coat of linseed oil. It will immediately sink in, and form an indurator, that will convert the surface to a crust of putty, impervious to rain, or any kind of moisture. After you have given the wall a coat or two of the oil, you may paint it of any color you wish, which it will show and retain, with the greatest brilliancy. Then erect your mould on the next story, and continue as before, laying (which I forgot to mention) your door and window jambs plumb in their proper places in the mould, as you go along. This mould possesses many advantages over the one which I described in my former article in the Agriculturist. It turns out the work in one continued mass, as if chiseled from a rock, and by this the work is reduced to three-fourths of the labor, and much more planished and perpendicular. In this manner, a pisé house can be built as elegant, durable, strong and incombustible, as of any other material allowed to be used. Its expense will depend much on the locality and vicinity of the clay, to the place it is erected. Having the clay at hand, my pisadore (or rammer) and one attendant, carried up sixteen inches of a wall, sixteen inches thick, in four days, all round a house, 48 feet long, and 24 feet wide. Now, if to build such a wall sixteen inches high, requires four days, how many days will it take to build it thirty-six feet high, the full height of a three-story house? Answer 108 days; which, at one dollar per day, would be equal to $216.

A brick house of this size would require 100,000 bricks, which at $15 per M., will amount to - -	$1500 00
Lime at 25 bushels per M., is 2500 bushels, at 20 cents, - - -	500 00
Laying the bricks at $4 per M., is -	400 00
Cost of the walls of the dwelling house only, - - - - -	$2400 00
Deduct the price of building the pisé house, - - - - - -	216 00
In favor of the pisé house, - -	$2184 00

But this is not all, for in a brick house you have to build a wood one within to make it fit to be inhabited; plaster and studs, laths, lime, nails and stucco, will amount to $1200, making the round sum of $3384. In opposition to this, I will state, the pisé walls require no plaster, but only to be smoothed and painted plain, or penciled, as taste may dictate. The pisé house being painted as it comes out of the mould, is fit to be inhabited as soon as finished.

But the difficulty of procuring clay is objected to. This will cease when we are informed, that all the bluffs about our harbor and rivers, contain it in abundance, and may be wafted over in lighters, and sold at a low price. Our harbor, and the rivers and creeks around us, contain inexhaustible banks of dead shells, which, if rammed in such a mould, will produce a fine wall equal to Tabby, well known to many of us. The banks of Ashley river abound in a concretion of calcareous matter fit for such buildings. To this important hint I call your attention. The doctrine that I have been endeavoring to inculcate, admits of the clearest demonstration, *actual experiment*. Take a box of a handy size, ram it with clay as described. When so filled and rammed, turn it up on a board, and lay it in the sun to dry, so as the box or mould may be lifted off without injury to the pisé-ed work. When dry, indurate it with linseed oil, and when it is dry, paint it on either side with any color you please. This experiment will satisfy you of the strength of the walls, the effects of the oil as an indurator, and the beautiful appearance of the paint.

I remain, with best wishes, yours, &c.

BARTH W. CARROLL.

From the Tennessee Farmer.

BEAVER OF NORTH AMERICA.

The natural habits of the beaver are topics so generally, though often so imperfectly handled, that we will rather speak at present of the manners which it is found to display in a domestic state, and of one or two other particulars less generally known.

We have domesticated certain animals, and most of those only to a certain extent, and are therefore apt to fancy that those are the only animals susceptible of domestication, and that they surpass all others in sagacity and companionable affections. But there is a very long list indeed, of animals, apparently the last to be thought of for domestication, but which, nevertheless, would please, and be pleased, if they, like others, lay in our bosoms, ate out of our dish, and sat at our firesides, and that would make manifest their understanding, and more than answer our caresses. An example presents itself in the beaver, whose habits in domesticity are pictured by a North American trader.

"I have kept several beavers," says Hearne, "till they became so domesticated as to answer to their name, and to follow those to whom they are accustomed, in the same manner as a dog would do, and they were as much pleased at being fondled as any animal I ever saw. In cold weather they were the constant companions of the Indian women and children, and were so fond of their company, that when the Indians were absent for any considerable time, the beavers discovered great signs of uneasiness; and, on their return, showed equal marks of pleasure, by fondling them, crawling into their laps, lying on their backs, sitting like a squirrel, and behaving like children who see their parents but seldom. In general, during the winter, they lived on the same food as the women did, and were remarkably fond of rice and plum-pudding: they would eat partridges and fresh venison very freely, but I never tried them with fish, though I have heard that they will at times prey on them. In fact, there are few granivorous animals that may not be brought to be carnivorous."

Of the things *usually* eaten by the beaver, the same writer gives the following account:—"Their food consists of a large root, something resembling a cabbage stalk, which grows at the bottom of the lakes and rivers. They also eat the bark of trees, particularly those of the poplar, birch, and willow; but the ice preventing them from getting to the land in the winter, they have not any bark to feed on in that season, except that of such sticks as they cut down in summer, and throw into the water opposite the doors of their houses; and as they generally eat a great deal, the roots above-mentioned constitute a principal part of their food during the winter. In summer they vary their diet, by eating different kinds of herbage, and such berries as grow near their haunts."

Beavers having returned in considerable numbers to Nottoway river and its tributaries, Mr. Ruffin, of the Farmers' Register, suggests the propriety of an experiment to domesticate them, with a view to the annual procurance of their rich furs, without destroying their lives. As this inoffensive and valuable animal is rapidly disappearing before the stratagems of the trapper, and the march of civilisation, this resort may become necessary, if practicable, and might perhaps turn out to be a profitable enterprise.

ED. TENN. FARMER.

From the Columbia Telescope.

MANURES.

Mr. Johnston—In Ruffin's Farmers' Register for May, 1838, p. 111, is an extract from a letter by Larduer Vanuxem, esq., formerly my aid in the college here, giving a very brief account of the localities of what he terms *shell marl*, in South Carolina, viz.: at the Santee canal, Eutaw Springs, Dr. Jameson's, near Orangeburgh Court House, Mr. Darby's, in St. Mathew's, at Godfrey's ferry, on the Pedee river, on the Edisto, &c. To which I have to add, a locality two miles south of Darlington Court House. *Marle*, technically, is a soil composed of sand, clay, and limestone, where the latter earth is in the proportion of one-third or more. I have reason to believe that all the localities consist principally of limestone, with various proportions of sand, but very small quantity of clay, or argillaceous earth.

My son brought me, a short time ago, a specimen of the shells and soil from the great oyster bank on the Santee, which I believe extends eight or ten miles. I have also received from Judge D. Johnson, a specimen of the shell marl near Darlington Court House. I regard all these, from the character of the shells in them, to belong to the tertiary formation—in modern phraseology, antediluvian.

Of the specimen from Santee, I took 100 grains of an oyster shell, (of an extinct species.) I dissolved it in muriatic acid, and about 5 per cent. of sand remained undissolved. I threw down all the limestone with carbonate of potash, boiling the solution to drive away any excess of carbonic acid, which is apt to keep limestone in solution. The liquor being filtered, and the residuum dried and weighed, furnished the expected proportion of limestone.

I took the earth with which the inside of the shell was filled up. I dissolved it as before, procuring about 90 per cent. of limestone. The residuum was chiefly sand, with but little clay-earth.

I took 100 grains of the common gravelly soil furnished me by Judge D. Johnson, from Darlington Court House vicinity. I rejected all the larger fragments of shells, taking what appeared to be the soil. I treated it as before, with muriatic acid, which dissolved perfectly 75 per cent. of the gravelly soil, leaving (when dried perfectly and weighed) 25 per cent. of soil, almost entirely sand, undissolved.

Here, then, in various parts of our state, are deposits of shell limestone, just as valuable for manure as any other whatever, to sandy, to clayey, or to an intermixture of sandy and clayey soil. A source of wealth that is of very great extent and very great value.

Limestone in Europe is applied when burnt into lime, sometimes to the amount of 300 bushels per acre. Twenty hundred weight of limestone ought to be exposed to fire in the kiln, till it will yield but eleven hundred weight, or more accurately from 43 to 44 per cent. of carbonic acid ought to be driven off by the heat; else the lime is imperfectly burnt, and will not make good mortar. When laid and slacked upon the land, it regains from the air about 30 per cent. of carbonic acid in about 10 days, and is gradually changed into limestone again. Hence the necessity of keeping lime from the air, which is to be used as a cement; hence, too, powdered limestone may be as good as lime in most cases. I would, therefore, were I a farmer, merely grind and screen the shell marl, without burning it, and put at least 300 or 350 bushels of the screened earth per acre, on the land. This will form a good constitution of soil, and will permanently prove useful. I should deem 400 bushels per acre, on sandy soils, not too much, and the addition of clay will add to the productive power of the mixture thus made. But as I am not a practical farmer, I say this with deference to the judgment of those who are.

I am, &c.

THOMAS COOPER, M. D.

From the Farmers' Cabinet.

CAPONS.

Auburn, Frederick Co., Md. Nov. 23, 1837.

I very much fear you will begin to think me either an epicure or the son of an epicure, it being only a short time since that I served you up a mess of bacon, and now I come with a dish of fowl. It has been said, it is not good for man to be alone. Bacon, although good alone, is very much better when accompanied with a good, round, fat pullet. But it is not a pullet that I am about to serve up to you at present, but her brother, though in an altered from, as you will learn in the sequel. It is a fact known to every traveller, that there is no dish presented before him half so often as that of chicken, served up in every form of which it is capable, broiled, fried, stewed, baked, or boiled; and it is a fact equally well known, that there is no dish so often turned away untasted, in consequence of its disgusting appearance of bad culinary preparations. I allude of course to such as we too frequently meet with on our public tables and watering places, (Bedford itself not excepted.) How often are the ears of the hungry and weary traveller assailed the moment the stage draws up to the inn, by the dying shrieks of the rooster that had but the moment before been picking up a scanty subsistence from the dunghill, and in a few moments more graces the head of the table, looking more like that well known waterfowl, vulgarly called a fly-up-the-creek, which is indebted alone to the length of its legs and neck for a subsistence, than what it really is. But I have promised to give you something even better than a fat pullet, and I shall now proceed to serve it up; I mean then that favorite dish of the ancient Romans, the "gallas spads or capon," or more plainly, the cock altered by castration, and in such high repute was it, that it generally graced the board of that most excellent judge of good eating, Lucullus, and if Shakspeare is to be believed, it was a tit-bit not only with Jack Falstaff, but with the Justice who is represented—"In fair round body with good capon lined." In England, at the present day, at every respectable eating-house, the first thing that greets the eye of the traveller and heads the bill of fare, is a capon, either boiled or baked. In France they are made doubly useful, not only as an article of food, but a means of production; if I may be allowed the expression, they are used as a foster-mother for raising chickens, which they do much better than the hen, owing to the large size and thick coat of feathers. The poulterers use a considerable number of them for this purpose,—the moment the hen has hatched her brood they are given to the capon, which rears them with all the care of the mother, the hen is cooped and fed until she gains her flesh and strength, and then turned out to lay and set again; in this way the poulterer is enabled to raise a large number of chickens from half the number of hens. The capon at market sells higher than any of our domestic fowls. What is the reason then in our country, where good living is so highly prized, the capon is seldom or never seen? Should you travel from Maine to New Orleans, you will probably never have this question put to you at table, "Sir, shall I help you to a fine piece of capon." I would by no means attribute this neglect of one of the finest dishes in the world to obtuseness of palate, but rather to a want of the necessary information as to the manner of performing the operation on the cock. To obviate this, I will subjoin directions, by the observance of which a man of common adroitness can make two dozen capons in an hour. Lay the chicken before you on his left side, with his head towards your right hand. Let an assistant hold him by his head and legs extended; with a sharp knife make a transverse incision of one and a half inch or more in the side just below the ribs. Insert the fore finger, and near the middle of the body, at the distance of about three quarters of an inch from the incision, near the spine will be found the testicles, which may very easily be removed by the thumb and finger; sew up the orifice and daub a little tar over it to keep off the flies. Care should be taken in cutting through the several integuments lest the viscera be wounded. The cock should be about half grown. Not one in a hundred will die if the operation be properly performed. After a fair trial both of the bacon and capon, should you relish them, I may be induced at some future time to serve you up some other dish, which I only hope may be found as agreeable to your numerous readers as was the long and learned dissertation we had some time since upon Hollow Horns. With my best wishes,

I am respectfully your ob't. serv't.

J. W. J.

From the Genesee Farmer.

DUCKS.

It is stated in a New-York newspaper, "that several of the farmers on Long Island, who raise large numbers of ducks, have had nearly their entire flocks of young ones destroyed, by a red insect named the 'Lady bug:' a *post mortem* examination led to the discovery, as, on opening the body, the bugs still living were taken out by the handful." So far as our observation has gone, insects of all kinds, with perhaps a single exception, have flourished abundantly the present season, the high temperature of June having proved as propitious to their increase as to the rapid growth of vegetation. The exception to which we have alluded, is the common striped bug, so fatal to cucumbers and squashes, of which we have not seen a single one the present season.

CONSIDERATIONS UPON THE NATURE OF THE VEGETABLES THAT HAVE COVERED THE SURFACE OF THE EARTH, AT DIFFERENT EPOCHS OF ITS FORMATION; READ BEFORE THE ACADEMY OF SCIENCES OF PARIS, ON THE 11TH SEPTEMBER, 1839, BY MONS. ADOLPHE BRONGNIART.

Translated from the French, and communicated for the Journal of Science and Arts, by R. W. Haskins,* of Buffalo, New York.

Curiosity is one of the most distinctive faculties of the human mind; one of those that most clearly mark the distance between man and the brute creation; and for this reason it may designated one of his most noble faculties, whenever directed to any end really worthy of his being.

It is this which continually excites us to extend the field of our knowledge, and to fathom the most hidden mysteries of nature, without being able to hope, for the most part, any other reward than the good which will result to all intelligent beings, in proportion as they are able to form ideas more exact upon the nature of the phenomena which surrounded them. These phenomena appear the more difficult of investigation in proportion as, by their nature and position, they are farther removed from our direct observation; and in like manner we are struck with the results to which profound researches have conducted those men who have made these investigations the object of their studies.

The invention of the telescope, by opening to our view what is passing in the elongated regions of space; and of the microscope, by revealing to us the existence of numberless beings so minute as, but for this instrument, would for ever have escaped our observation, have made, upon the human imagination, the most vivid impression.

The sciences have made such rapid advances, within late years, that no one can reasonably expect to open new views and to disclose new truths equally exciting to human curiosity as those disclosed by the telescope and the microscope; but still, the study of the soil upon which we daily tread, has become, within the last half-century, in the hands of Werner, of Cuvier, and the crowd of learned and able men who have assiduously followed these illustrious pioneers, one of the sciences the most fruitful in results, not only of high interest to the professionally learned, but well calculated vividly to interest the imagination of all persons who love to reflect upon the great phenomena of nature.

In investigating the layers which compose the superficial strata of the earth, their order of super-position, their nature, and the animal and vegetable remains which they contain, geology traces for us the history of the earth, during the long periods of time that have preceded its pre-

*Mr. Haskins prefers an orthography in some cases peculiar, and retains also certain French idioms.—Eds.

sent condition; it makes known to us the beings which have successively inhabited its surface, the revolutions that have conduced to their destruction, and those which have given birth to the mineral layers the earth contains, and the modifications to which this surface itself has been subject by reason of these revolutions; it discloses to us, in short, that all these phenomena, which have necessarily required so many centuries for their accomplishment, were prior, in point of time, to the creation of man. It conducts us alike to appreciate events, and to re-construct beings which have preceded, many thousand years, not only the most ancient historical traditions, but also the very existence of our race.

This prolonged history of the formation of the superficial strata of the earth, is constituted, like the history of nations, of periods of repose, or of tranquillity sufficiently great, at least, for the waters and the dry land of the surface to become peopled by a variety of inhabitants; and of periods of revolution, during which resistless forces have agitated this surface, elevating mountains, submerging lands previously dry, and causing ancient beds of oceans to issue from the bosom of the deep; in short, pouring over pré-existing rocks the materials for new layers which, enveloping the ruins of living beings, destroyed by these violent convulsions, have thus preserved their remains as precious monuments which now reveal to us, after so many thousand years, the nature of the ancient inhabitants of our globe, and the order in which the several races of beings have succeeded each other.

The study of the periods of these revolutions, and of those of repose, are alike of the most vivid interest: but the first are entirely the province of the geologist; while the second, on the contrary, necessarily require the light of the zoologist or the botanist; for these alone are able, by an exact comparison of the fossil remains of former beings with the corresponding parts of such as are now existent, to determine the relations which exist between the inhabitants of the globe, at various and distant epochs. It was thus Cuvier, in his admirable researches upon fossil bones, basing his investigations upon the positive data which comparative anatomy furnishes, was enabled to reconstruct the skeletons of the greater part of the animals of which the remains had then been discovered, and also to determine, with the greatest probability, their exterior forms, and their analogy to those animals with which we are now acquainted.

Botany, nothwithstanding it has long furnished fewer documents upon the ancient state of the globe, ought, nevertheless, to be equally laid under contribution, by the geologist; and it is even able to cast more light than zoology upon the state of the terrestrial surface, during the most ancient periods of its formation. Indeed, at that epoch when life first began to be manifested upon our globe, the animals were all confined to the interior of the waters, and even these presented but diminished specimens of their kinds; while a powerful vegetation, forming vast forests, covered at that early period, all such parts of the earth as were not submerged by the sea; and each succeeding period of repose has had its own peculiar vegetation, more or less varied, and in greater or less abundance, according to the circumstances which influence the development of the beings that composed it, and perhaps, also, in proportion to the duration of these periods; but almost always entirely different from those of either the preceding or succeeding epochs.

Of the different associations of vegetables which have successively inhabited our globe, there are none which so pointedly merit our attention as those which seem to have been first developed upon its surface; which appear during a long space of time to have covered with dense forests all those parts of the earth that rose above the general level of the waters, and of which the remains of successive growths, heaped one upon another, have formed our layers of coal, so deep, extensive and numerous; and in this form the remains of these primeval forests, which have preceded, by so many centuries, the existence of man, and which now supply us with fuel, in place of our more modern forests, of which the great increase of the human family is causing a rapidly augmented destruction, have become one of the principal sources of the prosperity of nations.

None can doubt that coal owes its origin to accumulated masses of vegetables, changed and modified, as probably the layers of peat in our marshes would be, if they had been overlaid by thick coverings of mineral substances, compressed under the weight of these, and subsequently exposed to an elevated temperature. If farther confirmation of this origin were necessary, it is found in the almost ligneous structure which coal sometimes presents, and in the numerous remains of plants contained in the rocks which accompany it.*

But the study of the impressions of stems, leaves, and even fruit, which are in general contained, in so great quantities, in these rocks, proves not only the vegetable origin of this substance, but even enables us to determine the nature of the vegetables of which it has been formed, and which, consequently, at the period of such formation, occupied the surface of the earth.

Among these vegetable imprints, the most frequent are those produced by the leaves of the ferns; yet these ferns of the primitive world are not those which now grow in our climates; for Europe, at this time, does not produce more than from thirty to forty species, while the same regions then nourished more than two hundred, all much more analogous to those now found between the tropicks than to those of the temperate climates.

In addition to the leaves of ferns, the same earths contain trunks, the dimensions of which render them comparable to the most gigantic trees of our forests, while their form is wholly dissimilar; and indeed all the ancient naturalists, struck with this dissimilarity, and yet desiring to find analogous productions still existent, referred them to arborescent vegetables, then imperfectly known, as the bamboos, palms, and the great cactus, sometimes designated *torch-thistle.* But a more

* The most complete and valuable collection of plates of impressions of these coal plants which is generally accessible, in this country, will be found in this Journal, vol. xxix, No. 2. This volume contains Dr. Hildreth's valuable paper upon the coal deposits of the valley of the Ohio, which he has accompanied with some thirty pages of excellent drawings of fossil remains and impressions, mostly vegetable, found in the accompanying rocks.—*Translator.*

attentive comparison of these products of the equinoctial regions with those trunks, the growth of the ancient world, suffices to dissipate all relations, which are founded only on some resemblances in the general aspect, that have been attempted to be established between them; and a more profound examination, either of these trunks or of the leaves which accompany them, readily shows that the vegetables which formed these primitive forests are not identical with any trees still found flourishing upon the earth.

The arborescent ferns which, by the elegance and magnitude of their exterior, now form one of the principal ornaments of the equatorial regions, are the only arborescent vegetables which are recognized, even in small number, among the trees of this antique vegetation.

As to the other fossil stems, remains of these primitive forests of the ancient world, it is among the most humble vegetables of our epoch that we must seek their analogues.

For instance, the calamites, which attained from four to five mètres (a little more than 13 to 16 feet) of height, and from one to two décimètres (not quite four to eight inches) of diameter, have almost a complete resemblance, in all the points of their organization, with the equiseta (horse-tails) which grow so abundantly in the marshy situations of our climates, and of which the stems, hardly as large as the finger, rarely surpass one mètre (about 39⅓ inches) in height. The calamites, then, were arborescent equiseta, a form under which these plants have wholly disappeared from the surface of the earth.

The lepidodendrons, of which the numerous species appear to have mainly constituted the forests of this ancient epoch, and which have probably contributed more than all other vegetables to the formation of coal, differ very little from our lycopodiæ. We recognize in their trunks essentially the same structure, the same mode of ramification; and in short we see inserted upon their branches leaves and fruits analogous to those of these vegetables. But, while the lycopodiæ of the present day are small plants, most frequently creeping, and similar to the great mosses, attaining very rarely one mètre (about 39⅓ inches) in height, and covered with very diminutive leaves, the lepidodendrons, preserving the same form and aspect, elevated themselves to twenty or twenty-five mètres (a little more than 65 to 82 feet,) having, at their base, near one mètre (about 39⅓ inches) of diameter, with leaves which sometimes attained to half a mètre (over 19½ inches) in length. These were, consequently, arborescent lycopodiæ, comparable, by their stature, to the largest firs, of which they enjoyed the rank, in this primitive world; forming, as these now do, immense forests, in the shade of which were developed the ferns, so numerous at that period.

How different this powerful vegetation from that which now clothes, in ever-varying tints, the surface of the earth! Magnitude, strength, and activity of growth, constituted its essential characteristicks; the smallest plants of our epoch were then represented by gigantick forms; and yet, what simplicity of organization, and what uniformity in the midst of a vegetation so enormous!

At the present day, even in those regions where nature has suffered no change at the hand of man, the eye reposes with delight upon trees which are immediately distinguishable by the diversity of their form, and the tints of their foliage; and which often support flowers or fruits of the most dissimilar colors. This variety of aspect is still more strongly illustrated by a contemplation of the diversified shrubs and plants which fringe the borders of our forests, or adorn our meadows, and of which the flowers exhibit to us almost all the tints of the prism. Finally, there result from this diversity of structure, among these plants, many varieties suited to the nourishment of man or of animals; and indeed such as are even indispensable to their existence.

The variety in the organization and aspect of the vegetables which at present cover our globe is indicated by the number of natural groups into which they are capable of being divided. These groups or natural families amount to more than two hundred and fifty, of which about two hundred belong to the class of the dicotyledons, (which consequently present the greatest variety of structure,) and thirty to that of the monocotyledons. Now the first of these classes, that is, the two hundred families which they contain, are completely wanting in our primitive flora, and seldom can we there recognise any indications of the monocotyledons.

The class which constituted, almost alone, the vegetation of this primitive world is that of the vascular cryptogamia, which at present comprehends no more than five families; almost all of which had parallels in the ancient world; such are the ferns, equiseta and lycopodiæ. These families constitute, thus to speak, the first degree of ligneous vegetation: they present, like the arborescent dicotyledons or monocotyledons, trunks more or less developed, of a solid texture, although more simple than those of these trees, and garnished with numerous leaves; but they are deprived of those reproducing organs which constitute the flowers, and they present, in place of fruit, organs much less complicated.

These plants, so simple, so little varied in their organization, and which, by their number and dimensions, rise not above a very inferior rank, in our present vegetation, constituted, in the dawn of the creation of organized beings, almost the entire vegetable kingdom, and formed forests so immense that we find not their analogy in modern times. The rigidity of the leaves of these vegetables, the absence of fleshy fruits and farinaceous seeds, would have rendered them very unfit to have served as aliment to animals: but terrestrial animals, at the time of their growth, had not yet existence; the seas alone offered numerous inhabitants; and the vegetable kingdom, at that period, maintained undivided sway over all the undeluged portions of the earth; upon which it seems to have been called to play another part, in the economy of nature.

We cannot doubt, in truth, that the immense mass of carbon accumulated in the bosom of the earth, in a state of coal, and which is the product of the destruction of those vegetables which grew at that ancient epoch, upon the surface of the globe, has been imbibed, by those vegetables, in the carbonic acid of the atmosphere—the only form under which carbon, not derived from the destruction of preëxisting, organized beings, can be absorbed by plants.

Now, a proportion, even very feeble, of carbonic acid, in the atmosphere, is generally an obstacle to the existence of animals, and particularly of the most perfect classes of them, as mammifers, and birds; while, on the contrary, this proportion is highly favorable to the growth of vegetables: and if we admit that there existed a proportion very much greater of this gas in the primitive atmosphere of our globe than the present atmosphere is found to contain, we may consider this one of the principal causes of the powerful vegetation of these ancient epochs.

This collection of vegetables, so simple, so uniform, and which would consequently have been so little fitted to furnish suitable aliment for animals of diversified structure, such as those existing at the present day, in purifying the atmosphere of the carbonic acid which it then contained in excess, would have prepared the conditions necessary to a creation more varied: and if we still wish to indulge that sentiment of pride which has caused man to assume that all in nature has been created exclusively for him, we may suppose this primitive, vegetable creation, which preceded, by so many centuries, the appearance of man upon the earth, was, in the economy of nature, designed to prepare the atmospheric conditions necessary to his existence, and at the same time to accumulate those immense masses of combustibles which his industry was in future time to apply to his necessities.

But, independently of this difference in the nature of the atmosphere, which the formation of these vast depots of fossil carbon renders extremely probable, may not the nature of the vegetables themselves, that have produced them, furnish some data upon the other physical conditions to which the surface of the earth was subjected during this period? The operations of nature now going on in different regions of the globe, may throw some light upon this question.

The study of the geographical distribution of those plants appertaining to the same families which alone composed the vegetation of the coal period, may, indeed, indicate to us the climacterick conditions and consequently the physical causes which favored the increase of stature as well as the great frequency of these vegetables; and we may conclude from these, with much probability, that the same causes determined their preponderance at that epoch.

We see for example, that the ferns, equiseta, and lycopodiæ attain a more lofty stature in proportion as their geographical position approaches the equator. Thus it is only in the hottest regions of the globe, that we find those arborescent ferns which combine with the towering and majestick mien of the palms, the elegant foliage of the ordinary ferns, and of which we have indicated the existence in the coal formations. In these same regions the equiseta and lycopodiæ attain to a stature double or triple that which the largest of these species present in temperate climates. A second condition appears to have a still more marked influence upon their preponderance, in reference to the vegetables of other families, namely, humidity and uniformity of climate; conditions which are united in the highest perfection, in the small islands situated far distant from continents.

In such islands, indeed, the extent of the surrounding oceans fixes a temperature with but slight variations, and coupled with perpetual humidity; circumstances which appear to favor, in a remarkable manner, the development and the variety of specifick forms among the ferns and the analogous plants; while, on the contrary, under the influence of the same conditions, the phenogamous plants are little varied, and are far less numerous. From these causes it results, that while on the extensive continents of the earth the vascular cryptogamick plants, such as the ferns, lycopodiæ, equiseta, &c. often form scarcely one-fiftieth of the total number of vegetables, yet in the small islands of the equatorial regions, these same plants constitute almost half, and in some cases, even two-thirds of all the vegetables which inhabit them.

The archipelagos, situated between the tropicks, such as the islands of the great Pacifick ocean, or the Antilles, are, then, the points of the globe which at the present time present vegetation the most analogous to that which existed upon the earth when the vegetable kingdom commenced, for the first time, to develop itself thereon.

Detailed examination of the vegetables which accompany the coal cannot fail, therefore, to induce the inference that at this remote epoch the surface of the earth, in the countries where are found those vast depots of fossil carbon with which we are most familiar, namely, in Europe and North America, offered the same climacterick conditions which now exist in the archipelagos of the equinoctial regions; and probably a geographical configuration little different.

When we consider the number and thickness of the layers which constitute most of the coal formations, and examine the changes that, from first to last, have taken place in the specifick forms of those vegetables of which they have been constituted, we cannot fail to see that this stupendous primitive vegetation, during a long interval, must have covered with its dense forests all parts of the globe which were at that period elevated above the sea; for all these present themselves with the same characteristicks in Europe and America; and equinoctial Asia, as well as New Holland, seem therefore to have participated, in this general uniformity of the structure of vegetables.

Nevertheless, this primitive vegetable existence promptly disappeared, to give place to a new creation, composed of beings of an organization less extraordinary than the preceding, but almost equally different from such as flourish at the present day.

To what cause can we attribute the destruction of all the plants which characterize this remarkable vegetation.

Is it due to some violent revolution of the globe? Did it arise from the gradual change of the physical conditions necessary to their existence; a change in part arising from the presence of these vegetables themselves? These questions cannot be resolved in the present state of our knowledge upon the subject.

Certain it is, however, that the deposition of the last layers of the coal formation was followed by the destruction of all the species which constituted this primitive vegetation, and particularly of those gigantic trees of peculiar structure, as the lycopodiaceæ, the ferns and the equiseta of gigantick growth; which was an essential characteristick of this primitive creation.*

After the destruction of this primitive vegetation, the vegetable kingdom appears for a long period not to have attained the same degree of development. Indeed, in the numerous layers of secondary earths which succeed the coal formations we scarcely ever find those masses of vegetable imprints, a species of natural herbariums, which, in these ancient depots of carbon, attest to us the simultaneous existence of a prodigious number of plants. Scarcely in any part of these formations do we meet with thick layers of fossil combustibles; and never are such layers often repeated, or found of such great extent as in the coal deposits. Either the vegetable kingdom at this period occupied more circumscribed portions of the surface of the earth, or its scattered individuals covered but incompletely a soil of little fertility, and of which the revolutions of the globe had not permitted them to become tranquil possessors; or, finally, the condition of the surface of the earth was not favorable to the preservation of the vegetables which then inhabited it.

Yet that long period which separated the coal from the tertiary formations, a period that was the theatre of so many physical revolutions of the globe, and which witnessed the appearance, in the waters of the deep, of gigantic reptiles, types of the fantastical organizations in which we may suppose we often recognize those monsters born of the imaginations of the poets of antiquity; this period, I say, is remarkable in the history of the vegetable kingdom, by the preponderance of two families which are lost, so to speak, in the midst of the immense variety of vegetables with which the surface of the earth is covered, at the present day, but which then predominated over all the others, by their number and their magnitude. These are the *coniferæ*, of which the fir, pine, yew and cypress furnish well known examples; and the *cycadeæ*, vegetables wholly exotick, less numerous at the present day, than at this ancient period, and which joined to the leaves and mien of the palms, the essential structure of the coniferæ. The existence of these two families, during this period, is of high importance as signalizing an intimate relation between them, by their organization; and they form the intermediate link between the vascular cryptogamia, which composed, almost alone, the primitive vegetation of the coal period, and the phanerogamick dicotyledons, strictly speaking, which constituted a majority of the vegetable kingdom, during the tertiary period.

Thus, to the vascular cryptogamia, the first degree of ligneous vegetation, succeeded the coniferæ and the cycadeæ, which held a rank more elevated in the vegetable scale; and to these last succeeded the dicotyledonous plants, which occupy the summit of that scale.

In the vegetable kingdom, as in the animal, there has been, then, a gradual improvement in the organization of the beings which have successively existed upon our earth, from the first which appeared upon its surface even to those that inhabit it at the present day.

The tertiary period, during which were deposited those earths that now form the soil of the principal capitals of Europe, as London, Paris, and Vienna, witnessed transformations, in the organick world, greater than any of those which had taken place since the destruction of the primitive vegetation.

In the animal kingdom: the creation of mammifers,* a class which all naturalists concur in placing at the summit of the animal scale, and by which nature seems to have preluded the creation of man; in the vegetable kingdom, the creation of the dicotyledons, a grand division which, by unanimous consent, botanists have always placed at the head of this kingdom, and which, by the variety of its forms and organization, by the magnitude of its leaves and the beauty of its flowers and its fruits, must, of necessity, have imprinted upon vegetation, an aspect very different from that which it had offered through all previous periods.

This class of dicotyledons, of which we are scarcely able to cite any indications at the close of the secondary, presented itself, all at once, during the tertiary period, with preponderating influence. It then, as at the present day, held dominion over other classes of the vegetable kingdom, both in reference to the number and variety of the species, as well as the magnitude of the individuals. Thus the assemblage of vegetables which inhabited our climes during the deposition of the tertiary formation, which enveloped their ruins in its sedimentary layers, were intimately allied to the mass of our present vegetation, and more particularly to the flora of the temperate regions of Europe and America. The soil of these countries was covered then, as at present, with pines, firs, culms, poplars, birches, elms, walnuts, maples, and other trees almost identical with those which still flourish in our climates.

And yet, not only do we not recognize any indications of those singular vegetables which characterized the primitive forests of the coal period, but we rarely encounter, there, even fragments of plants analogous to those which now vegetate between the tropicks.

We do not, however, necessarily infer that the same vegetable forms have been perpetuated from this epoch, still very ancient, (since it preceded the existence of man,) to the present day. No: very sensible differences almost always distinguish these inhabitants of our globe, very recent, geologically, but exceedingly ancient, chronologically, from our cotemporaneous vegetables to which they seem most nearly allied; and the existence in these same earths, in the north of France, of palms, very different from those which still vegetate upon the borders of the Mediterranean, and of a small

* We find, it is true, in some parts of the secondary formations, a small number of arborescent ferns and of the gigantick equiseta; but yet of a stature much less considerable than those of the coal formations; nor do we discover, there, any trace of the arborescent lycopodiaceæ analogous to the lepidodendrons.—*Author's note.*

* In placing the first appearance of mammifers at the epoch of the tertiary formation, I do not include the fact, unequalled elsewhere, of the fossil mammifers of Stonesfield; a case which forms an exception to all former experience, and which cannot be detailed in so limited an essay.—*Author's note.*

For drawings and brief descriptions of these fossils, which occurred in *oolite*, see Lyell's Geology, American edition, Vol. I, pp. 151-5.—*Translator.*

number of other plants which appertain to families now limited to the more torrid regions, seem to indicate that at this epoch central Europe enjoyed a temperature more elevated than at present; which, besides, accords very well with what we may deduce from the presence, in the same formations, and the same countries, of elephants, rhinoceroses and hippopotami, animals which are now rarely found to range beyond the tropicks.

What an astonishing contrast between the aspect of nature during modern geological periods, and that which she offered when the primitive vegetation covered the surface of the globe!

Indeed, at the periods in question of the geological history of the world, the earth had already assumed, in great part, at least, the form which it presents at the present day; continents very extended, and mountains greatly elevated, fixed and determined varied climates, and thus favored diversity of beings. In this way, in countries of little extent, the vegetable kingdom offered us plants equally as diversified, one from another, as those found growing at the present day.

To the coniferæ, with their narrow durable leaves of sombre green, were joined birches, poplars, walnuts, and maples, with broad leaves of a more lively tint; and in the shade of these trees, on the borders of waters or upon their surface flourished herbaceous plants analogous to those which at present embellish our fields by the diversity of their forms and colours, and the variety of which renders them suitable to satisfy the different tastes of an infinity of animals, of all classes.

The forests of the ancient world, like those of our epoch, served, indeed, as a refuge for a vast number of animals, more or less analogous to those which still inhabit our globe. Thus elephants, rhinoceroses, wild boars, bears, lions and stags, of all forms and of all statures, have successively inhabited them; while birds, reptiles, and numerous insects, complete this map of nature, as she presented herself, upon such parts of the earth as were elevated above the level of the oceans; the whole forming a scene equally beautiful and equally varied as that which is still witnessed upon the emerged portions of our globe.

On the contrary, at the dawn of the creation of organized beings, the terrestrial surface, divided, without doubt, into an infinity of islands, low, and with a climate almost uniform, was, it is true, covered with immense vegetables; but these trees, differing little from each other in their aspect, and the tint of their foliage; deprived of flowers and those fruits with brilliant colors which so highly adorn many of our large trees, must have imprinted, upon that vegetation, a monotony not interrupted even by those small herbaceous plants that, by the elegance of their flowers, constitute the ornament of our groves.

Add to this, that neither mammifer, or bird, nor any animal, in short, was present to enliven these dense forests, and we may be able to form a very just idea of this primitive nature; sombre, cheerless and silent, but at the same time so imposing by its grandeur, and by the space which it has been called to fill in the history of the globe.

Such, gentlemen, is a rude outline of the great revolutions of terrestrial vegetation, as the researches made upon this subject, within the last thirty years, have enabled us to trace them. Each day will doubtless add new traits to these details; but recent discoveries, by confirming the results at which we had previously arrived, seem to assure us that this general delineation will not experience great changes when, thanks to the materials that are being collected on all sides for this object, we shall be enabled to transform this rough draught into a picture more finished and complete.

SIXTH ANNUAL REPORT OF THE PRESIDENT AND DIRECTORS OF THE PORTSMOUTH AND ROANOKE RAILROAD.

In submitting to the stockholders of the Portsmouth and Roanoke railroad a report of the progress, business and prospects of the company during the past year, respectfully represent:

That the subscription of $50,000, authorized by law and accepted by your last general meeting, was made and the money paid by the board of public works, in August last, which sum, it was believed, would enable this board, besides satisfying all pressing demands, to have completed the warehouse and wharf which had been commenced in Portsmouth; this would have been effected, but for the melancholy accident which happened about this period. A train carrying a number of persons residing along the line of the road, who had for recreation merely visited the towns, on their return were met by a train bringing a load of lumber, a short distance beyond Suffolk, at the only point on the road where a meeting would have been considered dangerous. As both were descending, and not perceived by either until too late to arrest their progress, a collision ensued most disastrous in its consequences. Demands for payment increased: these and the expense in replacing the coaches destroyed, absorbed all our funds, and for some time the revenue was insufficient to meet the current expenses. When business revived, and the Weldon bridge was nearly prepared for use, two additional engines were procured, which unfortunately proved too heavy for our road, a portion of which was discovered to be decaying. Another accident not less fatal in its consequences than the former, occurred a few days after we had succeeded in crossing the Roanoke, when our prospects seemed most promising. This was occasioned by the elevation of the end of an iron rail perceived too late to be prevented. By DOUBLING it threw the engine off the track, which suddenly checking the progress of the train, caused a dreadful crush of all the coaches which were next the engine. Until that fatal event, this position was believed the least liable to injury, in case of accident, as cars in the rear had several times run off, without injury to the coaches in front of them. The practice of placing the coaches in rear of the burthen cars has from that day been adopted by us, and, we are informed, other roads have made the same change after hearing of our misfortune.

This second dreadful calamity, added to the state of dilapidation in which that portion of the road between Portsmouth and Suffolk was found to be, threatened a total suspension of all the business of the road. But by increased exertion such repairs have been effected, and by improvements in the condition and management of the engines, and regularity in the running, confidence seems in a great measure restored, and the travel has so much increased as to justify the opinion heretofore expressed that few roads in our country have a better prospect of ultimate success.

Among the errors into which we have fallen, it is believed that the effort to establish and carry on an extensive manufacture of machinery has proved the most expensive, though in the infancy of our establishment the difficulty and delay met with in promptly procuring necessary articles or repairs seemed to render such an establishment indispensable. Now when the number of such factories has greatly increased, conducted by workmen for their own account, it is believed that a small part of the force, heretofore deemed necessary, will be required, consequently reducing greatly these expenditures. Considerable loss has also been sustained by being compelled, in consequence of a mail contract and the delay in finishing Weldon bridge, to purchase stages and horses, which we had contracted to have furnished up to the period when it was supposed they would be no longer required. That period having arrived, being unable to renew or extend our contract, and the bridge still unfinished, the purchase was indispensable.

Application was made to our late legislature for a loan, on a pledge of the stock and profits of the company. The terms on which it has been authorized, require the consent of the stockholders; the law is submitted for your consideration. It may be proper to remark that a reliance on that aid has enabled us to procure a credit, without which it would have been impossible to have continued the operations of the road.

By agreement with the Wilmington company we are permitted to use their road to Halifax, and when finished (which it is expected will be about the first of July next,) to continue our run to Enfield, about ten miles farther south, by which their stage route will be much shortened. Mutual interest will secure the continuance of that good feeling, which has ever prevailed between these companies.

An agreement has also been entered into with the Maryland and Virginia steamboat company, which, while it affords increased expedition and comfort to travellers, cannot fail greatly to advance the interest of both companies.

With the aid relied on from the state, the company will be relieved from existing debts, be enabled to finish the wharf and warehouse so much needed for the accommodation of the business of the road, and to procure necessary engines and coaches, and then by means of the connexions already secured, we feel fully justified in our expression of confidence in the value of this enterprise.

The reports of the treasurer and general agent are herewith submitted.

By order of the board.

ARTHUR EMMERSON, President.

Office of the Portsmouth and Roanoke Railroad Company.

To the President and Directors of the Portsmouth and Roanoke Railroad Company:

Gentlemen:—Although from personal observation you may be presumed to be acquainted with the condition of the work under your control which has been committed to my management, it may be considered my duty according to usage to review the operations upon the road since the affairs of the company were confided to me.

By reference to the 5th annual report of the president and directors, it will be seen that the road was opened to Garysburg in August, 1836. The tardy progress of the remainder of the work, comprising the superintendence from Garysburg, to the Roanoke river, the bridge across the Roanoke, and the road and fixtures at Weldon, rendering my personal attention only occasionally necessary, I voluntarily relinquished one half of my annual salary in October, 1836, still however retaining entire charge of the transportation until May, 1837, when, agreeably to some general regulations of the stockholders, the duties of general agent of transportation devolved on the president of the company, and I confined myself entirely to the completion of the road, which was effected in November, that is, on the 27th of November last, the bridge over the Roanoke was so far completed as to allow the passage of the cars, which commenced on that day running regularly to Weldon.

On the 1st January, 1838, I again resumed the charge of the transportation department by a resolution of the board appointing me the "general agent and superintendent of the affairs of the company." I found the road very much injured by the use of two heavy engines which had been most ill-advisably placed upon it. Between Portsmouth and Suffolk, where the rails had undergone some decay, the road was entirely broken down, and almost impassable. Between Suffolk and Weldon, although much of the iron was broken and many of the rails crushed, this portion of the road was not so materially injured. My attention was immediately directed to the repairs of the road, and a large force was employed, which soon put it in a condition that has, I believe, given general satisfaction to the public and to all concerned. The engines were also put in repair; and without going into details, let it suffice to say, that, since the 10th of January, the cars have been running with a regularity and speed unsurpassed by any other road in the country. And, as I observed in my report to the board in May last, nothing is now wanting but an administration of the affairs of the company upon the system which has been adopted. The simplicity of a railroad with its embankments, excavation, bridges, and iron-capped superstructure, and the great ease with which high velocities are attained, and immense burdens transported, are too apt to beguile those unacquainted with such matters into the belief that all is accomplished when the wheels are put in motion, when in fact the work is but just begun. Besides the many heavy losses which companies have sustained, the whole railway system has well nigh been brought into disrepute by so fallacious an opinion. A reference to my printed reports, but more especially my communications on file in the office of the company, will show the great anxiety I have felt, from the very commencement of your improvement, to leave the management of your road in competent hands.

In my report of 1836, nearly twelve months before the completion of the railroad, in my remarks under the head of transportation, I observe, in relation to the agent, that the various and complicated duties to be performed by such an officer after the completion of the road—including the enforcement of established regulations, the institution of such rules as may be found necessary for the well ordering and conducting of the affairs of the company, the disbursements, repairs of the road, and frequently important negotiations—indicate the necessity of filling the appointment with one whose thorough knowledge of business, enlarged and liberal views, qualify him for its duties. And again I observe the connexion of this with other improvements, with steamboats and stage lines, and the collisions and differences which cannot fail to arise, attach to your agent a responsibility of no ordinary character, and require the exercise of great firmness, with a full and comprehensive understanding of the rights and interests of the company. And in my last annual report, after adverting to the many advantages resulting from a connexion with other improvements in progess, and the great addition thereby to your income, I say that even with such brilliant prospects, the road cannot succeed without the most skilful and prudent management of its general operations, and the strictest economy in the application of its resources; and this can only be insured by able and zealous officers, and I now take the occasion to repeat that no advantages, nor can any combination of circumstances counteract the effects of bad management, and I reiterate that with prudent and skilful management, your road cannot fail to be productive.

The repairs of the road since the 1st of January, notwithstanding the many disadvantages under which they have been made in the short days of the most inclement winter months, and the advantage always taken of urgent necessity, such as existed in the crippled state of the road between Portsmouth and Suffolk, have only cost $4762 35: of this $2711 17 have been expended between Portsmouth and Suffolk, and the remainder $2051 16, between Suffolk and Weldon. There are now engaged in the repairs of the road, five overseers and thirty hands. It is necessary, however, and directions have accordingly been given to increase this force to about 60 hands for a few months, with the view of removing the earth from the rails which was beaten down against them from the horse-path by the rains of the past season, and the weeds and grass which were permitted to decay and lodge around the timbers, and which are now springing up with renewed vigor, and, if not soon removed, will totally destroy the road.

All experience has proved the advantage and the economy of keeping on hand a supply of timber. Contracts are made cheaper when it is known the demand is not pressing, and by being seasoned before used, the durability is much increased. I have accordingly contracted for about three hundred thousand feet of rails and thirty thousand sills, to be delivered in the course of the year. This amount will be sufficient for the present, and will leave a good supply on hand for the ensuing year. I have also given directions for the erection of suitable sheds for the preservation of the timber, and for buildings contiguous to them, for the accommodation of the overseers, and hands engaged in the repair of the road, who on rainy days, can be occupied in dressing and preserving the timber for use.

The road between Portsmouth and Suffolk was completed in the summer of 1834. The superstructure consists of heart pine rails 7 by 5 inches, keyed into oak, pine, chinquepin, sassafras, and cypress sills, 8 feet long and from 10 to 14 inches in diameter, flatted on one side and placed 4 feet apart. The iron on this portion of the road is $\frac{5}{8}$ by $2\frac{1}{4}$ inches. Between Suffolk and Weldon, the superstructure is on the same plan as the above. The iron is $\frac{1}{2}$ by 2 inches; the rails are 5 by 9 inches, keyed into sills of oak not less than 12 inches in diameter, and placed 5 feet apart. The timbers were laid at different periods between the summer of 1834 and the winter of 1836. The repairs on this portion of the road, during the present year, will comprise the renewal of about one-sixth of the timbers between Suffolk and Blackwater, and but very few for the remainder. Between Portsmouth and Suffolk it will be necessary to replace at least three-fourths of the timbers. The bridges will require very partial repairs. But few of them need any. Whenever it is necessary to renew any portion of the road entirely, I would advise the adoption of the superstructure recommended by me for the Roanoke, Danville and Junction Railroad, and which is now being put down on the Wilmington and Raleigh Railroad. By this plan, the rails are fastened on the tops of the sills by trenails and knees, instead of being keyed as they ordinarily are into the sills. This renders it necessary that the sills should be *square* and *entirely of heart*—and indeed the necessity of the last requisite is no less important upon any plan, for the sap not only rots in the course of a few months, but promotes the rapid decay of any timbers in contact with it, and therefore the contracts herein reported are for heart sills.

I have stated that the engines are now and have been running with great regularity. The time consumed in the daily trips over the road, (including delays) is $6\frac{1}{2}$ hours. Deducting detentions for wood and water, it gives for the travelling time $5\frac{1}{2}$ hours, being a speed at the rate of 16 miles per hour. This statement, compared with the state of things which existed just prior to my taking charge of the road, (as for example, the cars were from $2\frac{1}{2}$ to 3 hours in running between Portsmouth and Suffolk, a distance of $17\frac{1}{2}$ miles,) gives an idea at once of the improvement in the condition of the road. It is now in good repair; but to keep it so, will require the most constant attention. I would hereby remark, while on the subject, that the arrangements which have been made, contemplate the most thorough repairs in the course of the present year. The interests of the company, and their duty to the public, require that the road should be kept in the best possible order.

I have next to state the condition of the motive-power and vehicles of transportation. When I took charge of the road, the two heavy engines, before mentioned as having done so much damage to the road, were condemned by me, on account of their weight, (though in other respects very superior machines,) and under an order of the board to sell them, a contract has been made with the maker to exchange them for lighter engines. Of the remaining five engines, there was but one in running order—the other four had been improperly condemned by the late foreman of the shops, as will appear by the annexed return which exhibits the performance of the locomotives, and the cost of the repairs for the months of January, February and March, during which period as well as during the month of April, there have been three and often four engines on the route daily. There are now 70 cars and 6 coaches on the road. Two eight-wheeled coaches have been contracted for. One may be expected in a few days, and the other in the course of a few months. I have also contracted for 40 cars, to be delivered in the course of this year.

The agents of the company are all acting under the written regulations which were placed in their hands when the road was first opened for transportation, (but which had been neglected,) and not the slightest accident has occurred since the 1st January. With the view to additional security and to guard against any delay that might be caused by the machinery of the passenger train giving way, the freight is transported by a separate engine following that which conveys the passengers, and keeping just in sight. The engines are all provided with alarm bells, and the train agent is directed to take his seat on the top of the baggage car, where he can overlook the train, and keep always in his hand, a rope attached to the bell on the engine, and besides the break which he himself can apply, the trainmen are kept constantly at the breaks while the train is in motion—and indeed every precaution dictated by experience here as well as elsewhere, has been taken to guard against accident, which, should it occur, (provided the present regulations are strictly enforced,) will be beyond the power of human foresight to control or guard against. By referring to the annexed table, it will be seen that the amount of the receipts during the past year, is $49,371 11. For the months of January, February and March, the receipts, are $11,479 43, and the expenditures on account of the repairs of locomotives, cars, coaches, the repairs of the road, and the salaries of agents and superintendents is $14,856 86—every item of which, as will readily appear from what I have said, must exceed by far the average expenses of the road. By reference to the pay rolls filed in the treasurer's office, it will appear that the expenditures in the shops for the month of March, amount to very little more than one-half of the expenses for the month of January. In the latter, the amount is $1,867 41, making a saving of $916 79.

Supposing the fiscal year to end on the 30th April, the accounts of the company for the ensuing year may be stated as nearly as may be as follows:

Received.

On loan from the state,	$150,000
For gross amount of transportation,	80,000
	$230,000

Disbursed.

Paid the outstanding debts,	$115,000
Charges on transportation including repairs to the road,	50,000
Interest on $150,000 at 5 per cent.,	7,500
For timber on hand, and sheds,	20,000
For cars and coaches,	14,000
For warehouse in Portsmouth,	10,000
For contingencies,	3,500
Cash on hand,	10,000
	$230,000

It will be observed that, in the foregoing estimates, I have anticipated an increase in the receipts of the road for the ensuing year of about $30,000. When it is considered that the receipts have not fallen off during the past, by far the most eventful year in the history of our country—unparalleled in commercial distress, and the prostration of every branch of industry, paralyzing alike the most gigantic national enterprises, and the efforts of the wealthiest as well as the most humble individual. In retrospect of these distresses which have pervaded our land from one extremity to the other, and the many untoward circumstances, which have tended to embarrass the company, we have shown that the road has prospered—may we not therefore anticipate an increase in the receipts from the awakening energies of the country?

In the discharge of the arduous and responsible duties which have devolved on me during the last four months, I have been most efficiently aided by Capt. Charles Dimmock, whom I would beg leave to recommend as an able and efficient officer, every way worthy of trust and confidence.

In conclusion, gentlemen, I have to state that I now resign the office of "general agent and superintendent of the affairs of the company," so flatteringly bestowed on me by a unanimous resolution of your board of the 1st of January last.

I am, gentlemen, very respectfully, your obedient servant,

WALTER GWYNN, *Civil Engineer.*
Portsmouth, 1st *May*, 1838.

Report of the Annual Committee.

The annual committee appointed at the last general meeting in July, have, as far as practicable, performed the several duties required of them, by "examining into the condition of the road," "inquiring into the management of the same, and the manner in which the books are kept," and by recommending to the directory, as far as they were competent, such measures as in their opinion would tend to promote the permanence and value of the road."

They entered upon their duty about the middle of November, by visiting and viewing the entire line of the road. The first eighteen or twenty miles of it commencing at Portsmouth, they found to be in a decaying and disordered condition. That portion of it, especially, which passes through the Dismal Swamp, a few miles east of Suffolk, was in a state which required immediate and extensive repairs. The balance of the line, including excavations, embankments and bridges, was in good order, with the exception of the iron on the rails, the ends of which were, in many places, so loose as to spring above the level of the ways.

The inquiries and examination of your committee into the general management and success of the road, at the period above alluded to, were far from affording a gratifying or satisfactory result. The motive power was inefficient, the water stations at several important points, were deficient of water, and a want of attention at these important auxiliaries to the proposed and successful management of a railroad, was manifest; the trains were delayed on the line, and the detention from this cause was such as to produce so much irregularity in the time of their arrival, at either end of the road, that the complaints of disappointed passengers, were loud and frequent. This state of things continued with some exceptions, until January, when a more efficient system for the improvement, repair and management of the road was adopted.

Your committee made a second tour of examination on the road on the 24th and 25th of last month, April, and found the aspect of things entirely changed. The repairs of the road since their first visit, had been prosecuted with energy, and to the extent necessary to the security and success of the line. The road is now in good order. Measures have been adopted to secure, at all times, a plentiful supply of wood and water, by the improvement of old water stations and the establishment of new ones. The motive power of the road, though not equal to all the purposes of transportation, is more efficiently applied, and the passenger trains travel with speed and certainty, and arrive with punctuality.

Your committee have made a thorough investigation of the books of the treasurer. They have been kept with an accuracy which does credit to that officer. Every item of expenditure is sustained by the proper vouchers, and the arrangement of his books and accounts is such as to present, at a glance, a faithful exhibit of the fiscal affairs of the company. The books exhibit the receipts and disbursements as follows:

Receipts from railroad for transportation, - - - - - -	$50,336 64
All other sources, - - - -	80,075 35
	$130,411 99

Expended.

The payment of debts,	$36,669 35
The excavation, embankment and other purposes of road,	93,098 98
Balance in hand of treasurer,	643 66
	$130,411 99

Respectfully submitted,

SAMUEL WATTS, *Chairman.*

From the Mining Journal.

ASTONISHING FACTS RELATIVE TO A FORMER ORGANIC WORLD.

"Dr. Buckland now proceeds to the most important and popular branch of his subject—to give a description of the most interesting fossil organic remains, and to show that the extinct species of plants and animals which formerly occupied our planet, display, even in their fragments and relics, the same marks of wisdom and design which have been universally recognized in the existing species of organized beings.

"After giving some account of the supposed cases of fossil human bones, and establishing the remarkable fact of the 'total absence of any vestiges of the human species throughout the entire series of geological formations,' our author passes to the general history of fossil organic remains:—

"'It is marvellous that mankind should have gone on for so many centuries in ignorance of the fact, which is now so fully demonstrated, that no small part of the present surface of the earth is derived from the remains of animals that constituted the population of ancient seas. Many extensive plains and massive mountains, form, as it were, the great charnel-houses of preceding generations, in which the petrified exuviæ of extinct races of animals and vegetables are piled into stupendous monuments of the operations of life and death, during almost immeasurable periods of past time. "At the sight of a spectacle," says Cuvier, "so imposing, so terrible as that of the wreck of animal life, forming almost the entire soil on which we tread, it is difficult to restrain the imagination from hazarding some conjectures as to the cause by which such great effects have been produced." The deeper we descend into the strata of the earth, the higher do we ascend into the archæological history of past ages of creation. We find successive stages marked by varying forms of animal and vegetable life, and these generally differ more and more widely from existing species as we go further downwards into the receptacles of the wreck of more ancient creations. * * * *

'Besides the more obvious remains of testacea and of larger animals, minute examination discloses, occasionally, prodigious accumulations of microscopic shells that surprise us no less by their abundance than their extreme minuteness; the mode in which they are sometimes crowded together may be estimated from the fact that Soldani collected from less than an ounce and a half of stone, found in the hills of Casciana, in Tuscany, 10,454 microscopic chambered shells. * * * Of several species of these shells, four or five hundred weigh but a single grain; of one species he calculates that a thousand individuals would scarcely weigh one grain.'

"Extraordinary as these phenomena must appear, the recent discoveries of Ehrenberg, made since the publication of Dr. Buckland's work, are still more marvellous and instructive. This eminent naturalist, whose discoveries respecting the existing infusorial animals we have already noticed, has discovered fossil *animalcules*, or infusorial organic remains; and not only has he discovered their existence by the microscope, but he has found that they form extensive strata of tripoli, or poleschiefer (polishing slate,) at Franzenbad, in Bohemia—a substance supposed to have been formed from sediments of fine volcanic ashes in quiet waters. These animals belong to the genus Bacillaria, and inhabit silicious shells, the accumulation of which form the strata of polishing slate. The size of a single individual of these animalcules is about 1.288th of a line, or the 3400th part of an inch. In the the polishing slate from Bilin, in which there seems no extraneous matter, and no vacuities, a cubic line contains, in round numbers, 23,000,000 of these animals, and a cubic inch 41,000,000,000 of them. The weight of a cubic inch of the tripoli which contains them is 270 grains. Hence there are 187,000,000 of these animalcules in a single grain; or the silicious coat of one of these animals is the 18,000,000th part of a grain!

"Since this strange discovery was made, Mr. Ehrenberg has detected the same fossil animals in the semiopal, which is found along with the polishing slate in the tertiary strata of Bilin, in the chalk flints, and even in the semiopal or noble opal of the porphyritic rocks. What a singular application does this fact exhibit of the remains of the ancient world! While our habitations are sometimes built of the solid aggregate of millions of microscopic shells—while, as we have seen, our apartments are heated and lighted with the wreck of mighty forests that covered the primeval valleys—the chaplet of beauty shines with the very sepulchres in which millions of animals are entombed! Thus has death become the hand-maid and the ornament of life. Would that it were also its instructer and guide!"—*Ed. Review.*

THE SPRING-WHEAT HUMBUG.

To the Editor of the Farmers' Register.

Back river, Elizabeth-city county, July, 1838.

I have just read with much pleasure, and probably profit, your remarks in your Register of April, 1838, (just borrowed,) upon "Agricultural Hobbies and Humbugs;" and although I am not much pleased with the terms, so far as they depend upon the beauties of style, yet they force upon me that which Blair himself could not more convincingly have done, with all his beauties of composition; and, whilst I might have been pleased with his sounds, without conviction, your number has at least had the benefit of inducing me to the belief, that we will ride our hobbies, and so long as we do so, we are ever in the road to be humbugged. Man has always been, from the days of Adam up to the present time, the mere creature of fancy, and I believe always will be so, place him where you will; and hence his liability to be always taken in with any thing new, or which has the appearance of being so. I believe that we shall always be in search of the "philosopher's stone;" and although satisfied of the fruitlessness of the search, yet, but attack our fancy, and we immediately let loose the reins—our reason becomes blinded—and, before our career of fancy is fully over, we are not bad representatives of Phaeton, in his career of rashness. We are always too ready to believe, at least to credit, all such statements as may be sounded in the gazettes or papers of the day, particularly when they shall be blazoned forth by a few remarks from our worthy editors, who are all men of the people, ever on the alert, placed high on the watch-tower, to sound the alarm; and when, instead of the alarum bell, they are sounding to us news of glad-tidings, how ready are we to believe all their statements, and particularly so, if an editorial commendation backs them. This though is not very remarkable; because the farmer or agriculturist, relying much upon facts, yet is very credulous, and is apt to believe that most of the statements which reach him, whether communicated in the pamphlets or papers of the day, or in any other way, so far as they are introductory to any new variety in grain, or any thing else in his line of business, are true. For he, poor simple man, never once thinks that all these great products in corn, wheat, &c. sounded so repeatedly and invitingly to his ears, in many various ways, are for effect; and being honest himself, believes all others so, and hence his liability to imposition.

Such then being the state of the case, let us bring into review one or two instances where this too ready belief has led some of us into error; and I, for one, having fallen into it, take at least this mode of endeavoring, through you, to guard others against it. And although I by no means admit that there is error in the substitution of the twin, or prolific, or Baden corn, (having succeeded in making better crops of that than of any other of the large varieties of white corn,) for the large corn, I agree with you perfectly so far as the Italian spring-wheat is concerned; which, upon this second year's trial, I consider almost an entire abortion. I purchased, in the winter of 1837, of Mr. Hathaway, of Troy, New York, a barrel of the Italian spring-wheat, said to contain 3½ bushels, although, from some cause or other, I do not believe that there could have been in the barrel more than 3 bushels. The barrel was of the large size of flour barrels, and it wanted at least 3 pecks, if not a bushel, of being full; and with this a large proportion of the grains therein were oats—I think at least half a bushel. To one of my friends I parted with a half bushel, (oats intermixed,) and to another a gallon, in the same condition; the remainder I kept and sowed. I picked the oats out of the wheat, before seeding, clean by the hand, and obtained a peck and a half; the remaining part, being wheat, say two bushels, I sowed, at least a part of it, upon very rich land—a chocolate mould, high and light for our section of the country. The richest part was drilled in about three-feet drills or rows. This received, in the course of the spring, two workings with the cultivator or hoe. The other, upon land not manured, was sown broad-cast, in beds 5½ feet wide, and divided only by a narrow cart-road of about ten feet; the land nearly of the same description, with the exception of the difference made by manure. The growth of the drilled wheat was very fine; but the rust attacked it badly. The growth of the wheat not drilled was about as good as the fall or winter-wheat upon our fields in general. But this was perfectly clear of rust; in fact, I could perceive no injury to its growth from any cause. The wheat, both drilled and broad-cast, was seeded between the 5th and 10th of April. Its promise, with the exception of the rusted part, answered my most sanguine expectations; and this appearance held good until its change for maturity. I then discovered that climate, or some other cause, had its effect. The grain had all the appearance of wheat badly rusted, or injured from scab or blast; and I should have attributed its shrivelled state to the rust, but as much the larger portion of the grain seeded had no appearance of rust or any other disease, (I drilled only a gallon,) in its stalk, whilst growing, and as the grain in that part which had no rust, was *no better*, in any way, than the drilled, which had the rust, I could not account for it, and have not endeavoured to do so, further than the belief that climate had its effect. To cut short, I reaped it, and stacked: and in February last I got it out, and cleaned 25 bushels. This product from wheat, seeded as late, although the grain was indifferent, I thought a good one, and believed that this year I could make it turn out much better, provided it kept clear of rust, scab, &c., which I was induced to believe would be the case by earlier seeding. I parted with 8 bushels of the wheat, and seeded the balance, 17 bushels, to about ten acres of land, this year, 1838. Two bushels were sown in January, and the balance in March, from the 20th. It is reaped and in stacks, and I do not believe that I shall get over 50 or 60 bushels of wheat from the whole 17 seeded. It not only was attacked by the rust, but had also scab or blast, and the grain is so light that I am apprehensive that one-third of it will be blown away by the fan. There was a considerable difference in the growth of the January from the March wheat. The January growth was very fine, but the other *so light* and indifferent, that the scythe, as it passed through it, beat down a large proportion of it. I have selected two parcels of the best of the growth of each seeding, and herewith enclose them for your inspection. I discover that the winter frosts killed fully one-half of what I seeded, probably more. The same ten acres would have yielded me this year 150 or 200 bushels of the fall or winter-wheat, (golden straw, such as we seed.) You can readily perceive the loss. I am done with it and all other untried grains, at least so far as untried in our climate. I shall wait to see the experiment made by others in my vicinity, so that I can "see it, feel it, handle it." Should you ever come in this part of our state again, it will afford me much pleasure to see you; not only as an old acquaintance, but that you may set me to rights in some of my odd notions. With sentiments of the highest respect, I remain yours, &c.

P. S. I have made no corrections in this communication, as it is for you alone.

[The foregoing communication was signed by the name of the writer, (and a very responsible name it is); but the postscript placed us in doubt, whether to be directed by its purport, and to suppose this letter, (written, as it is, wholly on agricultural subjects of public interest, and superscribed with our address, as "Editor of the Farmers' Register,") was intended merely for our individual inspection and benefit—or, judging from every thing but the postscript, that it was designed as a communication to the Farmers' Register. With considerable hesitation, because of our unwillingness to place any correspondent in a position which he does not desire to occupy, we have decided on a middle course; that is, to publish the letter, but suppress the signature, which we never presume to use, without the writer's consent, expressed or implied.

Our correspondent (like several others) has drawn from our cautions against novelties which *may* (and usually, in the end, *do*) prove to be humbugs, an inference very different from our intention, and from the expressed words, as well as the general context, of our remarks. So far from advising to not *try* things newly recommended as great improvements or probable benefits to agriculture, we urged then, as we would now, the contrary. Every plausible suggestion of a supposed or asserted improvement, or new source of profit, should be submitted, fairly, to the test of experiment. But, at first, *merely of experiment*, and on a scale so small as not to cause much loss, in the very probable event of disappointment. And in deciding whether the recommendation of any new thing deserve this respect, we should have due regard, not only to the apparent reasonableness of the recommendation, but also to the fact, whether the person recommending is, or is not, a deeply interested salesman of the article in question.

Further—we would pronounce it not only bad policy for self-interest, but a failure in a moral obligation, for a farmer to wait always for his neighbors to incur the risk of failure in new experiments, and never to join in bearing some share of the cost, until others had borne that risk, and proved the benefit, by the *visible* and *tangible* profits resulting. If all were to adopt such a rule of conduct, (as is done, in fact, by the far greater number,) then, indeed, all future agricultural improvement would be hopeless.

Our correspondent has also mistaken us as denouncing the Maryland twin-corn as being inferior, in *all cases and situations*. Not so, by any means. It may well be, and doubtless is, (and so of any other variety,) the most prolific, under some particular circumstances. But we meant to oppose the popular error—that this, or any other supposed grain, can be most productive in *all*, or in many different soils and climates; and to deny the truth of the *principle* of procuring more productive kinds of grain, by the process of selecting for seed the plants which bear the greatest number of ears, or ears with the greatest number of grains, or of grains of certain form and largest size, &c.

As to spring-wheat, we have had but one opinion of its value since the commencement of its culture in this country; and we cannot understand how an opposite opinion could have been held by any person who had read and attended to the European accounts of this crop. This unfavorable opinion, so contrary to that which has been disseminated so extensively in this country, (for the profit of the northern tribe of Hathaways,) has been frequently exposed in the Farmers' Register; and if our correspondent had been prepared to profit by our advice, he would have avoided his heavy loss, by borrowing and reading the numbers of the Farmers' Register, some years earlier than he has done.

Of the two specimens of grain sent, that sown in January, though small, is full and well made. The grain from the March sowing is badly filled, and very inferior in quality. And here an observation should be made, which perhaps escaped our correspondent. It is, that his *partial success*, in the early-sown crop, was obtained by a wide deviation from the practice proposed, and a total surrender of the advantage expected from spring-wheat, to be found by sowing *after winter is over*, and the danger of winter-killing passed. Wheat sown in January, should, in fact, be considered not as spring, but as ordinary or winter-wheat. Much wheat, every season, (though without excuse,) is sown in December, and often does not sprout sooner than it would if sown a month later. But the difficulty, alone, of sowing a crop of wheat in the usually severe weather of January, would be a sufficient objection to any kind requiring such a time for sowing; which, however, is not the case with any kind.

Since writing the above, we have seen an extract from a Staunton paper, which states that the trials of spring-wheat, in that part of the country, have had very favorable results; and, thereupon, the more full use of that grain is strongly urged. We have here another example of the general fact of the readiness of farmers to be gulled, and the facility with which error is propagated, and fraud succeeds—and the difficulty with which truth is permitted to operate, to guard against either. Probably the experimenters near Staunton are now at that stage of the trial in which our correspondent was last year, and, therefore, are honestly of opinion that, *if due allowance is made for every supposed cause of diminution*, the crop is really promising. Or, perhaps, some who have paid three or four dollars a bushel for their seed, are desirous to make the crop sell as well, and to come in for a little of such large profits as Mr. Hathaway seems to have realized.]

From the Gardener's Magazine.

REMARKS ON THE PROPAGATION OF THE DAHLIA.

Every cultivator of the dahlia is aware of the facility with which it is propagated by cuttings of the young shoots, plunged in a little bottom heat. Indeed, from a single root, under proper treatment, several dozens of young plants may be raised in a short space of time. Consequently, this method is universally adopted by nurserymen; they annually requiring a large stock of young plants for sale; and by individuals anxious to propagate extensively a new variety. But it ought not to be practised by amateurs or others, anxious to obtain fine perfect flowers for exhibition or otherwise. I speak advisedly, and from experience, when I assert, that plants raised from cuttings do not produce equally perfect flowers, in regard to size, form, and fulness, with those produced by plants grown from division of the tubers, the old method of propagating the dahlia. It has been said that plants raised from cuttings flower more abundantly than those raised by division; but to this I am not prepared to subscribe.

Physiological botany readily accounts for the different results of the two methods. The starch or feculent matter, stored in the roots, is intended by nature for the nutrition of the annual shoots, not only until the tubers have formed, at the commencement of the vegetating season, the spongioles necessary for the absorption of the required quantity of papula; but also when that the spongioles are unable, from drought, or other causes, to absorb a sufficiency of nutrient matter, to sustain the rapidly developing and vigorous vegetation.

Plants propagated by cuttings cannot, of course, absorb the nutriment prepared and stored, during the last season, in the tubers of the mother root; and are forced to form spongioles and tubers for themselves. But the fecula contained in these latter is not, till towards the end of the year, sufficient in quantity, or sufficiently ripened by the deposition of carbon, to be in any way serviceable.

The potato might be propagated by cuttings of the young shoots, in the same way with the dahlia; but such plants would not, in the early stages of their growth, be nourished by the starch of the tubers; and, therefore, would neither be so strong and vigorous as plants raised in the usual method, nor would they yield a return equal in weight or quantity.

It is well known that tubers and bulbs, when placed in damp situations (the potato for instance in a damp cellar,) develop their leaf-buds; and that these continue to grow and elongate, without the assistance of rootlets or spongioles, so long as there is any fecula in the tuber or bulb; but that when this is exhausted the stem withers and dies. We hence perceive how important the nourishment derived from this substance is to the vigor of the plant, and why whole tubers of potatoes produce larger crops than are produced by cut sets. Hence, too, we may learn why perfectly ripe sets are so much more certain of success than unripe ones; the fecula in the former being so much the more abundant, and more perfectly elaborated. To the unripeness of the sets is attributable the failure of the potato-crops in some parts of Scotland, in the autumns of 1835 and 1836, and the consequent misery and starvation of the unfortunate peasantry.

I feel no doubt that much of the disappointment and dissatisfaction experienced by buyers of new varieties of the dahlia, arising from these so rarely answering the expectations formed of them, is the result of the system of propagating from cuttings. A good seedling is raised: the grower is naturally anxious to make the most he possibly can of it; he therefore plunges the root in heat, and strikes every cutting he can force it to throw out. The young plants are consequently weak and unhealthy, rarely throw out a good flower during the whole season, and are probably discarded, as undeserving of further notice. My first plant of Brewer's Rival King was a cutting from a root, which had been much worked, and consequently, did not show a good flower during the season. The next year, I grew it from tubers, and also from cuttings: the latter always produced imperfect flowers, but the former beautifully perfect ones. With many other varieties, I have found the same difference between plants raised from cuttings and those from tubers.

I would therefore recommend, in order to secure a good and satisfactory bloom, that the roots be laid, in March, in a damp warm place, such as a forcing-house, gentle hot-bed, or even a cellar; and that when the buds show themselves, each root be divided into as many pieces as may be required, retaining a bud to each piece; and that they be then planted separately in 48-sized pots. The after-treatment is the same as for plants raised from cuttings.

From the Horticultural Register.

FLOWERS, FRUITS, AND TREES.

By H. A. S. Dearborn.

Mr. Breck—The season having been unusually favorable for vegetation, and especially since the 15th of May, the consequent verdant and magnificent appearance of the country, with the blandness and congeniality of the weather, have induced vast numbers of persons to visit the many highly cultivated gardens in the environs of Boston, several of which have attracted universal attention, either from the great variety of ornamental plants they contain, or the beauty of some favorite kinds, that have been managed in the most skillful manner.

Mr. Walker's exhibition of tulips became the first chief point of attraction for nearly two weeks, and thousands were delighted, with the superb display, of that infinitely various and gorgeous family of flowers.

Other towns, it appears, have also enjoyed a like interesting spectacle; but a discrimination must be made between the merit due for quantity, and that resulting from the excellence of the varieties, and the perfection of their development. The enterprising gentlemen of Newburyport and Salem, are entitled to great credit, for the taste they have evinced, in the culture of elegant plants; but it is presumed they do not claim precedence, unless they had also as many kinds, which were as rare and perfect in florescence, as those which Mr. Walker presented; for the mere superiority in number, cannot be considered as giving preeminence, in any vegetable production, unless it is of some very peculiar or notoriously useful species.

To obtain bulbs of the best kinds of tulips from Holland, Belgium, France, and England, is very difficult and expensive, as every person has experienced, who has undertaken to introduce any particular plant from foreign countries. The bulbs, generally sent to this country for sale, are the rejected of the large nurseries, as all the most choice and valuable kinds are carefully reserved for the European markets, where the amateur purchasers are numerous, and willing and able to pay the highest price, for the remarkable varieties. Even in our day the extavagant passion for tulips has not entirely subsided, and from 500 to 1500 dollars have been given, within a few years, for a single bulb, while those disposed of, at our auction sales, do not average more than from five to fifteen cents, and often not so much. Some of Mr. Walker's cost in London fifty dollars each, and many of them from ten to twenty.

I have cultivated the tulip during a number of years, and had five thousand in bloom at one time, three thousand of which were in a bed, and the remainder scattered in the borders of the avenues and garden walks; but as a show of flowers, it was, in all respects, inferior to that of Mr. Walker's bed of only eight hundred, from the inferiority of the kinds, small number of distinguished varieties, negligent mode of cultivation, and imperfect florescence.

To give this superb flower an opportunity of displaying all its charming attributes, the soil must be deeply trenched, and enriched by a peculiar compost of thoroughly decomposed barn-yard manure, river sand, and decayed leaves or other vegetable matter, while a screen is indispensable to protect the plants, from the cold night air, the direct rays of the sun, and violent winds, when bursting into flower and during the period of their bloom. This Mr. Walker provided, at an expense of several hundred dollars, in a neat and complete manner, in the form of a beautiful pavilion, which was covered with stout white cotton cloth, so arranged, as to be easily rolled up, and let down, by means of pullies.

Tulips have been a favorite florist's flower for centuries, not only in Holland, but in England and other European nations; and as early as 1630, Parkinson, after enumerating one hundred and forty sorts, observes in his quaint manner, that "to tell of all the kinds which are the pride of delight, they are so many, as to pass my ability, and, as I believe, the skill of any other." He was a celebrated herbist and botanist, and acted in that capacity to James I, and Charles I. His book on gardening is the first which was published in Great Britain, worthy of consideration. It is entitled "Paradisi Insole Paradisus Terrestres; or a garden of all sorts of pleasant flowers, which our English ayre will admit to be nursed up; with a kitchen garden of all manner of herbes, roots and fruits for meate, and sause used with us; and an orchard of all sorts of fruit bearing trees and shrubbes, fit for our land, together with the right ordering, planting and preparing of them, and their use and virtues."

In Parkinson's time tulips were divided into *præcoces*, or early blowers, and *scrotinæ* or late blowers, with an intermediate class of *dubiæ mediæ*, doubtful or middle blowers, as they flowered between the two others. The early blowers, have short stems and the Duc Van Throll is almost the only variety in repute, among modern florists. The great number of distinguished and admired varieties are all produced from the late blowers, which, having tall stems and much finer colors, engross nearly the whole attention of the cultivators of tulips. The modern mode of classing the late blowers by the Dutch florists is as follows.

Prime Baguets, from the French word baguette, a rod, or wand; they are very tall, with handsome cups and white bottoms, well broken with fine brown, and all from the same breeder.

Rigaut's Baguets.—This variety is supposed to have received its distinctive appellation from some individual by the name of Rigaut, who was eminent in this branch of floriculture. They are not quite so tall as the former, but have strong stems, and very large well-formed cups, with white bottoms, handsomely broken with rich brown color, and all from the same breeder.

Incomparable Verports.—A particular kind of Bybloemens. Cups very perfect, cherry-red and rose-color and white bottoms, well broken with shining brown. Some of these are from ten to twenty-five dollars a root.

Bybloemens, or next flowers, called by the French *Flamands*. They have white ground, or nearly so, and are beautifully broken, with shades of purple and a variety of colors. They are from different breeders.

Bizarres, from the French odd, or irregular. Ground yellow, from different breeders, and broken with a variety of colors.

Paroquets, or Parrot Tulips.—The edges of the petals are fringed, colors brilliant crimson and yellow, with shades of bright green; but still they are held in no sort of esteem among florists.

Double.—These are of various, brilliant red, yellow and mixed colors; but, like many other double flowers, are deemed monsters, and not appreciated by flower fanciers, although they have an elegant appearance, from their upright, tall, and firm stems, and crowns of large pæony-shaped flowers, and when scattered, with the parrot, among the small shrubs and other plants in the borders of avenues and walks, or planted out in separate beds, they have a pleasing effect.

In the catalogue of Mosan for 1820, there are six sorts of early tulips, four of Paroquets, twenty-two double, and upward of six hundred late kinds.

Breeders are such as have been procured from the seed, and consist of one color, which is red, purple, violet, gray, brown, black, yellow, or some other individual color, without any sort of variation. These are cultivated in a rather poor and dry soil, and become broken, or variegated, in in from one to twenty years, and produce new varieties; but so uncertain is the prospect of a favorable result, that but few persons have been willing to make experiments, for after many years of patient and unremitted attention, there may not be one remarkable and choice variety, out of a thousand seedling bulbs. It is from this circumstance, that a new and superb tulip commands the high prices in Europe which have been named, and actually paid, within a few years.

When the tulip has broken, the colors are unchangeable, and are perpetuated by offsets from the parent bulb.

The tulips which are deemed worthy of special attention, by amateurs, belong chiefly to the classes of Bizarres and Bybloemens; and the properties of a fine variegated late variety, according to the best modern florists, are as follows:

Petals of a graceful form, the three exterior ones larger at the base than those of the interior; colors delicate, yet conspicuous, from the manner in which the tints are displayed, whether spotted, striped, feathered, blotched, splashed, pencilled, mottled, flaked, or as the French more significantly term the breakings of this flower *panaché*; edges entire and rounded, or but slightly crenated, at the summit, and so symmetrically arranged, as to form a perfect cup-shaped corolla, with a round bottom—except in some anomalous and remarkable kinds, like that called the mountain of snow, whose petals are slightly acuminated, recurved, a little undulate, and the flower leaning to one side. Stem strong, upright, and nearly thirty inches high; radical foliage, long, broad, undulating, and of deep rich green. The ground color of the bottoms of the cups should be clear, white, or yellow; the centre of each petal should contain one or more bold blotches or stripes, intermixed with small portions of the original color, abruptly broken into many irregular obtuse points. The colors which are generally held in the greatest estimation, in variegated striped sorts, are black, golden-yellow, purple, violet, rose, and vermilion, each of which being varied in different ways; but such as are striped with three different colors, in a distinct and unmixed manner, with strong regular streaks, and but little or no tinge of the breeder, are considered the most perfect.

An uncle of Mr. Walker, who resides near Windsor Castle, is celebrated for his tulips and ranunculuses, having produced several magnificent varieties of the former and many of the latter from the seed. His exhibitions of those universally admired flowers have been so superb, that his garden has been annually visited by the sovereigns, nobility, and that numerous portion of the population, of Great Britain who have a taste for ornamental plants. From him, the nephew has received many of his superior roots.

Besides the commendable exertions of Mr. Walker to present an interesting display of well cultivated and choice tulips, he has eminently succeeded in raising from imported plants and seed, numerous new varieties of the *viola grandiflora*—the most admirable of that large family of charming flowers. He has, in fact, made this large and brilliant pansy, known to New England, by the extensive seminaries, which he has established, and the multitude of plants which decorate his ground. He had seven hundred varieties in bloom at the time his tulips were in flower, and the corollas of some of them, were more than two inches in diameter. He also cultivates the ranunculus—one of the most delicate, beautiful, but difficult of all herbaceous perennial plants, to bring into a full and perfect florescence. He has two beds, this season, containing over two thousand tubers, and one hundred and thirty kinds, which, if the weather should not have been too hot, will present an exhibition of flowers as rare and interesting as that of his tulips.

To the above-named plants and the dahlia, Mr. Walker has devoted his sole attention, leaving to others the vast field of floriculture for the selection of their favorite flowers, and the distinction they have attained, or may acquire, from the intelligence, skill, and industry bestowed on their cultivation, and that complete success, which so amply rewards the ardent amateur.

The necessity of a division of attention to the several departments of ornamental and useful plants, is as obvious, as that of labor in the mechanical arts; and the advantages derived therefrom are as certain, as they are conspicuous and satisfactory.

Colonel Wilder is unrivalled, in this country, in the number, variety and successful cultivation of the camellia, the rhododendron, azalea, and rose, having over three hundred kinds of the first, and upwards of four hundred of the last named plants.

Mr. Manning, of Salem, has the largest variety of pears, he having made that delicious fruit his favorite object of culture, while the apple and plum have claimed his next regard. Mr. Wm. Kenrick is well known for his extensive and well-managed nursery of forest, fruit, and ornamental trees, shrubs, and herbaceous flowering plants; and for several years he has made most honorable efforts to introduce the morus multicaulis and other valuable species of the mulberry, for affording the best aliment to the silk worm. He has also the merit of establishing the first extensive nursery in New England, and has published a very interesting and useful work on fruit trees. He, with Mr. Manning, first succeeded in obtaining Mr. Van Mon's new kind of pears, and he has a collection of that kind of fruit trees, of great value, from the number of varieties.

Mr. Pond, of Cambridgeport, has become eminent for rearing large numbers of plum-trees of the most choice varieties, and also for his superior mode of raising asparagus.

The Messrs. Winship of Brighton, have a vast nursery, a large green-house and forcing-house, in which are collected a greater number and variety of useful and ornamental trees and plants, than are to be found in any other like establishment north of Long Island. Their importations of European forest-trees, and exotic shrubs, and herbaceous flowers, have been extensive, and contributed, in an eminent degree, to extend a taste for rural embellishment in the eastern section of of the union. Their collection of foreign new kinds of roses, rivals that of Col. Wilder, as they have some 500 varieties. Pæonies have also claimed their special attention, and they exhibit nearly 40 kinds.

Other highly commendable efforts have been made to multiply the fruits, culinary vegetables, and plants of all kinds, and especially by seeds. The establishments of Joseph Breck & Co., and of Hovey and Co., are well known, for they have so far kept pace with the rapidly increasing demand, and have so faithfully discharged their very responsible duties, in either raising or collecting the best varieties and of the most perfect quality, that they have merited and received the grateful acknowledgments of their numerous fellow citizens, who "drive their team a-field," or delight in the society, or the culture of the silent, yet eloquent, beautiful, useful, and ever interesting families of the vegetable realm.

As proprietors and editors of three of the most valuable agricultural and horticultural publications in this country, we are under the greatest obligations to them; and it is earnestly to be wished, that for all their diversified and indefatigable labors, they should receive that encouragement and reward, which will render their patriotic exertions annually more profitable to themselves, and useful to the public. In the diffusion of intelligence among the farmers and gardeners, and the extension of a taste for their honorable and important occupations, as well as for the improvement of the aspect of the country generally, by inducing a greater attention to all the branches of cultivation, those periodicals have already accomplished much, and if they receive that liberal patronage to which they are justly entitled, the beneficial results will be as universally conspicuous as they are desirable.

The new garden at Mount Washington, with its ranges of green and forcing houses, is becoming an object of great interest, and will soon rank among the first, which are now the most celebrated, as the intelligent and experienced Mr. McCollough has fully shown that he is well qualified for the station he has assumed.

The Charlestown vineyard, with its departments of other fruits, conservatories, graperies, and valuable, as well as ornamental plants, has given a well deserved reputation to the Messrs. Mason, from the successful manner in which the whole of their spacious establishment is managed.

The valuable, new, and excellent varieties of the strawberry, with which our market is enriched, have rendered Mr. William Mason of Charlestown, and Mr. J. L. L. F. Warren of Brighton, celebrated, for the zealous and successful exertions they have made to grow that delicious fruit. The Downton, Wilmot's, Keen's Seedling, Roseberry, Mulberry, Methven Castle, and other distinguished new kinds, are now abundant, and maintain the high character which they had acquired in England.

Mr. Town, of Snowhill street, in Boston, has a neat and well-conducted green-house, which may be truly called a floral gem.

There is an humble little cottage garden on the Dorchester road, near Grove Hall, which reflects great credit on the unassuming and respectable old man, who carefully tills it with his own hands; and many a passer-by has stopped to admire his beautiful collection of choice varieties of pinks. May he be made happy in his commendable efforts to contribute to the happiness of others, is a blessing which every visiter must spontaneously bestow on the venerable Meller, and at the same time, attempt to enable him to realize the benediction, in the purchase of a single root, or a bouquet of flowers. How interesting and imposing is it to behold the aged calmly and studiously engaged in the culture of a garden of flowers. They appear to be appropriately occupied in a kind of religious rite, and as if actuated by a presentiment that their end was near, devoting their last moments in the preparation of the materials of a garland for the decoration of their own grave, and thus seeming to ask the grateful tribute of approbation, from a life industriously and reputably passed, and now approaching its close, in the anticipation of that good name which all desire, and hope encourages us to believe may have been attained, and will be perpetuated when "we sleep in the narrow house of death."

There is very much wanted a large nursery of native forest-trees, where they shall be raised in such quantities, as to be afforded to purchasers at as cheap a rate as they can import them from England and Scotland. So great is the demand, that not only our nurserymen, but many individuals, have recently imported vast numbers. Two gentlemen, one residing in Watertown, and the other in Salem, have received ten thousand each, this season, which cost only a few cents a-piece. The quantities which might be sold, if furnished at even a liberal price, would be enormous; but the expense of obtaining trees from the forest, the mutilated manner in which they are taken up, and the consequent difficulty of making them flourish vigorously, deters those who would be glad to embellish their estates, or plant out wood-lots, or groves for timber, from making the experiment.

The rapidity of the growth of seedling trees, reared in nurseries, compared with such as are selected from the forest, is well known to those who have attempted the culture of both kinds.

A pleasing illustration may be seen on the magnificent ground of Col. Th. H. Perkins, who imported about thirteen years since, 15,000 plants which were not more than two feet high, and now they are large, healthy and beautiful trees.

Very respectfully,

Your ob't. servant,

H. A. S. Dearborn.

Hawthorn Cottage, Roxbury, June 20, 1838.

From the Mining Journal.

ANTI-DRY-ROT.

The following letter has been addressed to the the secretary of the Anti-Dry-Rot Company, by Mr. Samuel Beazley, the architect.

"Sir—At the commencement of the year 1836, I surveyed and accurately examined the posts and paling in the Regent's Park, for the purpose of ascertaining the comparative states of those timbers which had been prepared by Kyan's patent, and those which had not been submitted to the process of solution. In my report of that period, I stated that indications of decay were already perceptible in most of the unprepared timbers, both at the bottom of the posts, and in those arris edges and ends of paling which were placed, or had come, at all, in contact with the earth, while those timbers which were marked as having passed through the solution, were quite free from any such symptoms. I now beg leave to state, that I have this day, after a lapse of two years and a quarter from my previous survey, again accurately examined several of the same posts and paling, digging away the earth from the foundations for that purpose, and find that the symptoms of decay mentioned in my preceding report as having commenced in the unprepared timber, have so considerably increased, as to have rendered the bottoms of the posts completely rotten, to a depth of from one to two inches, and that, in several instances, fungi have been the consequences of the decay; while I find the prepared timbers which are in the earth sound and in the same state, with the exception of mere discoloration upon the surface, probably arising from the damp state of the earth at the time of its removal. As a farther proof of the difference existing between the unprepared and the prepared timber, we could cut with the greatest ease large pieces from the former with the spade, without using any force, while it required great exertion to chip off very small pieces from the latter."

From the Farmers' Magazine.

TEMPLEMOYLE AGRICULTURAL SCHOOL.

Any one who duly reflects upon the infinite importance of giving to the youth of our country an education wisely adapted to their prospects in life—to the peculiar character of an American citizen—to the nature of our institutions,—to our social polity and republican habits—must, we think, regret the failure of the bill so favorably introduced into the legislature, and so ably supported, of establishing a School of Arts under the supervisions and management of the Franklin Institute. It might be difficult to add much to the arguments so forcibly urged by the principal advocates of the bill; and we cannot but believe, that extended observation and maturity of reflection will eventually satisfy every parent and guardian that he could make no better provision for the prosperity of a son or a ward, destined to fill an active and productive sphere of life, than to place him in a school where, in addition to the requisite amount of literary instruction, he may acquire a knowledge of those practical sciences, to which his time and energies must necessarily be devoted. Such a school as that whose outlines and objects were presented to the legislature, would furnish incalculable advantages to those who have in prospect an engagement in any of the arts, trades and manufactories which are becoming so immensely important to the wealth of our country. To those whose views are more exclusively agricultural, such establishments as the one described in the subjoined article would be worthy of all imitation.

G.

To the Editors of the Irish Farmer's and Gardener's Magazine.

Gentlemen—You will render a service to Ireland, and advance the interests of that branch of her industry (agricultural) whence she derives her principal resources, by giving a place in your widely circulated pages to the following account of an establishment now in operation for ten years, the extension of which, and the formation of similar schools elsewhere, are the sole rewards aimed at by the noblemen and gentlemen who were the founders of it, of whom many are still zealous, as the committee of management, in promoting its success.

I have the honour to remain, gentlemen, your ob't. humble serv't.

One of the Committee.

The Agricultural Seminary of Templemoyle originated at a very numerous meeting of the North-west of Ireland Farming Society at Londonderry, and it was at first intended that it should consist of two establishments, taking Mons. Fellenberg's Institution at Hoffwyll in Switzerland in some degree as the model: the first to be a school affording instruction in every science and accomplishment aimed at by the children of the higher orders; the second for the education of the sons of respectable farmers and tradesmen, in the hope of disseminating the advantages of an improved system of farming with greater certainty by combining the practice and theory of it in the instruction of those who were afterwards to make agriculture their pursuit, it was hoped, that the extended scale of the institution would have allowed of a greater variety of masters and lecturers, and that the profit derived from the superior school would have contributed towards the maintenance of the secondary one; but a short experience convinced the subscribers that such a scheme was impracticable without much larger and more certain funds than they could rely on; they then gave their undivided attention to the agricultural seminary, which through their increasing exertion has attained such eminence as may justly entitle them to look forward with confidence to its increasing usefulness, and to its becoming a model for establishments of a similar nature in other parts of Ireland.

The school and farm of Templemoyle are situated about six miles from Londonderry; about a mile distant from the mail-coach road leading from Londonderry to Newtowlimavady. The house, placed on an eminence, commands an extensive and beautiful view over a rich and highly cultivated country, terminated by Lough Foyle. The base of the hill is occupied by a kitchen and ornamented garden, cultivated by the youths of the establishment, under an experienced gardener. The ground between the garden and house is laid out in beds in which all the different grasses, clovers, &c., are cultivated with the greatest care. The house is in the form of an ||=||, with ranges of farming offices behind, containing spacious, lofty, and well ventilated school-rooms; refectory, dormitories, apartments for the masters, matrons, servants, &c.

Each pupil occupies a separate bed; the house can accommodate seventy-six, and the number of pupils amounts to sixty. They receive an excellent education in reading, writing, and arithmetic; book-keeping, mathematics, land-surveying, and geography. This department is managed by an excellent head master and assistant master, both resident in the house. The pupils are so classed that one-half are receiving their education in the house, while the remainder are engaged in the cultivation of a farm of 130 Cunningham or 165 statute acres, in the management of which they are directed by the head farmer, an experienced and clever man, a native of Scotland, who has a skilful ploughman under him. The pupils who are employed one part of the day on the farm, are replaced by those in the school, so that the education always advances in and out of doors *pari passu*.

The pupils are thus instructed in all the practical parts of farming, and are also lectured several times a week on the theory of agriculture. They are made acquainted with all the properties of different soils, the manures most applicable, and the crops best adapted to each; points in which most of our practical farmers display great ignorance. They are also made acquainted with all the numerous varieties of cattle, and their qualities, such as early maturity in some breeds, hardihood in others; and have strongly impressed on them that one of the most essential points in farming, is to select the cattle and the crops best adapted to the situation, soil, &c.

The stables, harness-rooms, cow-houses, winter-feeding houses, piggeries, barn, tool-houses, are arranged in the best manner, and the pupils are required to keep them and their contents in the highest order. A respectable and intelligent matron has the superintendence of the dairy, cooking, and cleaning the house, and the charge of the domestic servants.

The formation of this establishment has caused its founders an expenditure of above four thousand pounds; of which about three thousand were raised at its commencement by shares of £25 each, by the noblemen, gentlemen, and members of the North-west Society. The Grocers' Company, on whose estate it is situated, have been most liberal in their assistance, and have earned a just reward in the improvement of their property, by the valuable example the farm of Templemoyle presents to their tenantry; and it is gratifying to state, that the example is not confined to so limited a circle, but is followed, to a very great extent, by the farmers to a considerable distance.

In sending a pupil to Templemoyle it is necessary to have a nomination from one of the shareholders, or from a subscriber of £2 annually. The annual payment for pupils is £10 a year; and for this trfling sum they are found in board, lodging, and washing, and are educated so as to fit them for land-stewards, directing agents, practical farmers, or surveyors, schoolmasters, or clerks.

From fifteen to seventeen is the age best suited for entrance at Templemoyle, as three years are quite sufficient to qualify a student possessed of ordinary talents and a knowledge of the rudiments of reading and writing, to occupy any of the above situations. If this very short and imperfect sketch of what must and will become a more generally useful institution, as it is more known and appreciated, should lead the reader to wish any fuller information, he may easily be gratified by visiting the agricultural seminary, or by applying to the zealous secretary to the committee, Pitt Shipton, esq., Londonderry, under cover to Sir R. A. Ferguson, Bart, M. P., who will furnish printed reports containing the history of the rise and progress, the names of the shareholders, the rules and regulations of the society, hours of school and labor, dietary, and a variety of minutiæ, which, though extremely valuable and necessary to be known, yet from their length might prevent the insertion of this outline of the Templemoyle Seminary in those works which, from their circulation, may both increase the utility of the publication, and the knowledge of an institution of which the advantages have been felt and appreciated in the north of Ireland.

N. B.—Upwards of two hundred young men, natives of sixteen different counties in Ireland have passed through, or remain in the school. Of these between forty and fifty have been placed in different situations, such as land-stewards, agents, schoolmasters, and clerks, or employed on the ordnance survey. Nearly one hundred are now conducting their own or their fathers' farms in a manner very superior to that of olden time; and the accounts of those who have been placed from the seminary are such as to gratify the gentlemen who have its interest at heart, and to convince them that the good seed sown is producing an ample and valuable harvest.

Templemoyle, Oct. 14, 1837.

[It gives us unqualified pleasure to lay before our readers the above gratifying account of an institution so eminently calculated to confer lasting benefits upon the country. We have been long strenuous advocates for the establishment of agricultural schools in all parts of Ireland, feeling assured that they would ultimately be the means of breaking down those absurd prejudices which have been hitherto the most insurmountable obstacles with which agricultural improvement had to contend.—*Editors.*]

NEW PLAN PROPOSED FOR DUNNING DELINQUENT SUBSCRIBERS. MARYLAND TWIN-CORN.

To the Editor of the Farmers' Register.

Chillow, April 20th, 1838.

Dear Sir—Enclosed I send you ten dollars; whether more or less than the amount due you, I can't say; if less, please advise me by an account upon your next number.

You publish in every number the names of those who make payments; why not publish on another leaf the names of delinquents and the amount due by each? I think it would be an excellent regulation. It would have very much the effect of mounting a truant school-boy upon a "dunce-block"—none ever desire to attain that honorable destinction a second time, nor would your subscribers ever desire to appear twice upon the delinquent list. In ninety-nine cases of a hundred it is procrastination, and not inability to pay, that keeps us delinquents from forwarding our subscriptions. It would be a cheap and sure substitute for the impertinent little gentlemen who so uncivilly remind one "that they will be glad to get your subscription for the Farmers' Register, Whig, Enquirer," &c.

In your article upon "Hobbies and Humbugs" you quote from Mr. Carmichael the following, viz: "My experience (speaking of the Maryland twin-corn,) induces me to think that no great advantage is derived, if this corn is planted on lands naturally poor, or exhausted by cultivation; but when in a state of fertility, either naturally, or by improvements. I think the [increase of] product from this kind of corn will be more than fifteen per cent. My whole crop the last year was Maryland twin-corn, and I thought I observed a manifest advantage from its cultivation upon bottom land and good up-land. I am not prepared to say what per cent. it yielded above the average crops of common corn heretofore made upon the same land; but it was, I am perfectly sure, much the heaviest crop I ever saw upon the bottom and good up-land. I should *guess* at least by one-fourth. The case, however, was very different upon the exhausted parts of the field—for there, the corn over-shot, and produced very little more than stalk and fodder. It will not do, so far as my limited observation extends, upon any other than land that is (in common parlance) in "good heart," so well as our old corn, viz: gourd-seed and Dearing corn.

This, however, I do not consider any objection, for no man ought to put exhausted land in any crop for profit; for, if he does, he will verify the vulgar maxim of "working for nothing and finding himself"—this I have learned by sad experience. I have tried it ten years, and have always found my profits on the wrong side of the leger—and of a man who would have the nerve to push such an experiment farther, it might be truly said, that "there is more hope of a fool than of such a man." Can you not coax some good man of meadows to give us more light upon the art of grass culture? For one, I should be very thankful if you would convert a part of your domain, (the Farmers' Register,) into meadows of a standing pasture, where we corn-fed nags might luxuriate in fine grass; and mix hay with our grain—*Verbum sat.* With hearty good wishes for the success of your efforts, I am, dear sir, your obedient servant,

P. A. Bolling.

REMARKS SUGGESTED BY THE PLAN ABOVE PROPOSED.

If all subscribers were as well disposed as our correspondent, to be reminded of, and to correct, their errors of omission or procrastination, then the very simple and cheap plan of notification which he proposes, would save a great deal of trouble and of expense, of vexation and sore feeling, both to the publisher and to delinquent subscribers, which is now necessarily incurred, in the sending bills separately (and often repeatedly) by mail, and the maintaining the usual system of collecting debts through travelling agents. And though (for reasons stated at large in a former number) the use of collecting agents, in Virginia, has been entirely abandoned for this publication, the discontinuance of that mode of personal application makes written applications the more necessary, and leaves in action abundant sources of discontent and displeasure to persons so notified, and of vexation, and wounded feelings, besides "patronage" forfeited, and pecuniary loss incurred, by the publisher. This is, by far, the most disagreeable and galling of all the burdens which the publisher of a periodical work has to bear. It is not so much the enormous per centage of loss, upon the whole amount of debts due, that is and must be sustained, as the numerous cases of offence, unintentionally given, and not unfrequently of greater offence, intentionally returned, in consequence of the mere notification to delinquent subscribers of their dues, in such general form, of circular letters or otherwise, as the cases in general require. No man, who has the sensibility of feeling, and delicate sense of honor, that a gentleman should have, would undertake the endurance of this odious duty and burden, if he knew its magnitude before he commenced the labors of editor and publisher. For our own part, we thought that the plan of printed receipts for monthly payments, which was adopted from the beginning of this work, would prevent any continued ground of mistake or misapprehension of subscribers, or of just complaint on that head; and leave us no ground for the "wear and tear" of feeling, and of temper, in contemptible and irritating contests about five-dollar debts. In these printed lists, (unless omitted by mistake,) the payment of every subscriber appears in the month in which it is received; and the preservation of that cover, or a mere reference to it, is the most convenient and best of vouchers, inasmuch, as so many hundreds are printed, that it is scarcely possible that every copy of the receipt can be lost. Moreover, the notification of any omission or mistake in these receipts is requested in every list, and immediate correction of all such promised; and in every case of information of error, whether given early or late, (and no matter how defective the proof,) the correction has been promptly granted. With such ample means afforded by our regular usages, it is manifest, that if any subscriber is overcharged, (by omitting his proper credit of payment,) and remains so, it is his own fault, in not furnishing the means of correction. With all the care that can be used, some mistakes, and consequent overcharges, cannot be avoided; but no such overcharge can remain two months on our accounts, if subscribers will merely look for their names in the lists, preserve the copy, or a reference to it, and give notice of errors discovered. With such a system, the publisher may *lose* in many cases by mistakes made in entries, but cannot possibly *gain* by one. And it is as foolish and unreasonable as it is unjust, for any overcharge to be imputed to design, which would be an act of dishonesty as contemptible in its object, as for its motive. We have committed very few mistakes of this kind, compared to the number made by our subscribers—and much fewer than their mistakes of the opposite kind, where they have paid more than they owed, and consequently were credited for a year more than they expected. It never entered our mind to suspect that any subscriber meant to defraud, by his statement of his dues and payments falling short of the true amount; and when the publisher has every thing to lose, and nothing to gain, by similar mistakes and misstatements of account, surely he is entitled to at least as much indulgence and respect.

But the mere possibility of any such overcharge existing, would be a sufficient objection to the plan proposed, of printing the list of names of all supposed indebted subscribers; and, besides, we should be very unwilling to take that mode of reminding debtors, who had not been *very* forgetful of, and remiss in, performing their obligations. But neither objection applies to cases of long-continued neglect and denial of payment, even after a year or more has elapsed after the names have been erased from the subscription list, for non-payment of still older arrears. Such a list as this, may be published before another volume of the Farmers' Register is commenced; and we fear (from present appearances) that it will be a long one.

From the American Journal of Science and Arts.

HYDROGEN GAS IN A LEAD PIPE, USED AS AN AQUEDUCT.

In a letter to the Editor from Nelson Walkly.

I was at the house of a friend during the last summer, and while there, he was engaged in laying lead pipe, from a spring to his house, for conducting the water, a distance of three-quarters of a mile.

Between the spring and his house was a hill several feet higher than the spring, and several whose summits were not as high. His house was fifteen feet lower than the spring. He informed me that he had laid down his pipe several times and set the water running, but it never had continued to run over ten days at a time. He had repeatedly taken it up and tried it, supposing it contained a leak. He called on the man whom he had originally employed to lay his pipe, for a cause, and found that he knew nothing, except that the stoppage was occasioned by air, and that air could not get in, unless there was a leak in the pipe. My friend, when I arrived, was taking up his pipe for the last time, to try whether there was a leak. After trying it with a pressure of 50 lbs. to the inch, he found no leak and laid down his pipe, and by means of a forcing pump set the water running again. As formerly, after running less and less for about ten days, it entirely ceased. I then took it in hand, determined to find out, if possible, the cause of the obstruction. I made a puncture in the pipe at one of the high places lower than the spring, and found that the pipe contained not air, but hydrogen gas. I was now more embarrassed than before, as I could not imagine what was the source of the hydrogen. I happened about that time to take a tin cup of water, and noticed a row of minute bubbles along the seam; the thought struck me, that it was the combination of metals in the pipe that occasioned galvanic action sufficiently powerful gradually to decompose the water.

To try it, I put a small piece of the same pipe into a tumbler of water, and after standing two days, I found the pipe covered with a coat of white oxide, with the exception of the seam where it was soldered together, and there the tin which composed the solder was perfectly bright. From this I inferred, that the galvanic action of the pipe on the water produced decomposition, the oxygen combining with the lead, and the hydrogen carried along by the water until it came to the high places in the pipe, and there accumulated until it filled the pipe and entirely obstructed the water.

To remedy this difficulty, I made holes into the pipe at every high place, and soldered over them a vertical tube, open at the top, excepting the hill that was higher than the spring, and to that part of the pipe I soldered a tube similar to the others, with this exception, that I soldered it up at the top. The first mentioned tubes let the gas escape as it came along, and the one on the highest elevation suffered the gas to accumulate in it until a small bubble protruded below the end of the vertical tube, and was detached from the body of the gas in the tube and carried on by the water. After the above arrangement was effected, the water was set running, and has continued to run without any sensible diminution ever since, upwards of eight months. Query, Is not the action of water upon lead, mentioned in vol. xxxiv. p. 25, of this journal, occasioned by a combination of some other metal with the lead?

Tuscaloosa, Ala. May 25th, 1838.

From the Genesee Farmer.

WHITE-WASHING TREES.

The practice of white-washing trees, particularly fruit trees, which at one time prevailed extensively, seems to have been mostly discontinued, but for what reason, is not, we apprehend, generally understood. Washing trees with lime was adopted for the purpose of removing mosses, cleaning the bark, destroying insects, particularly the aphis, and that it was efficient for these purposes, few who have tried it will deny. The objections made against the practice were that the coating of white-wash excluded from the bark the action of air and moisture, and that by causing the rough bark to scale off, the tree was deprived of a covering which might be beneficial in protecting it from frosts in our severe winters. These objections we are inclined, from our own experience and observation, to consider of little weight when compared with the positive advantages of the application. We have never known a tree injured from the white-washing process; on the contrary, we have seen trees covered with the aphis, or with dead rough bark, effectually cleaned, and rendered vigorous and healthy, the bark looking green and the foliage vigorous. To produce the beneficial effects, it is not necessary to have the white-wash laid on of the consistence and thickness of a coat of mortar; but thin and even with a common brush. If the tree is very mossy, or has much dead bark, rubbing it with a stiff broom, or otherwise cleaning the trunk, should precede the application of the white-wash. Experiments have shown, that in nurseries of trees, those that have been washed either with lye or lime, grew much more rapidly than those not subjected to the process. We should be pleased to have the opinions of our farming friends, on this subject.

From the Genesee Farmer.

OIL-CAKE AND BONES EXPORTED FROM AMERICA TO EUROPE.

A vessel lately sailed from New York for England, carrying out more than one hundred tons of oil-cake, for stall-feeding cattle. This shows that the English farmers understand the nature and value of that material better than we do, or instead of sending it abroad, we should use it in fattening beef at home. The exportation of oil cake we do not, however, consider so suicidal to the interest of the farmers as that of bones; of which, within a few years past, very large quantities have been collected in the vicinity of the principal cities and sent abroad. This is directly robbing ourselves, by depriving us of the means of communicating and perpetuating fertility to the soil. The beef made by the oil cake will not, it is probable, be sent to this country for sale, but from the example of the past, it is very possible that the grain produced by the application of this bone dust may be returned to our shores, when by its use here, the same wheat would have been raised, and the land at the same time permanently benefited. Our farmers will do well to think of these things.

From the Quarterly Journal of Agriculture.

ABUSES OF BONE-MANURE.

The character of bone-dust as a trusty manure for turnips, runs the risk of being depreciated by the injudicious manner in which that manure is sometimes applied to the soil. It is found, in singling the turnip crop, that the bone-dust is liable to be brought up to the surface of the ground by the root-fibres of the ejected plants. From this circumstance, it is conceived, that a stratum of earth betwixt the bone-dust and the turnip seed would prevent the recurrence of the evil; and accordingly, to effect this purpose, the bone-dust, in some instances, is either dropped into the drill by the hand, covered up by the plough, and the turnip-seed sown in the drill by the common turnip sowing-machine, as in the case of farm-yard manure; or the bone-dust is first sown by one machine, and then the turnip-seed by another, immediately or shortly afterwards. These plans are practised in the borders of England, and Scotland, a part of the country which is occupied by farmers, whose common sense, independently of their agricultural skill, might have warned them against their dangerous consequences. Such a practice could only have originated from giving no heed to the nature of bone-dust, and the growth of the turnip plants towards maturity.

It is clear, that if a stratum of earth intervenes betwixt the manure and the turnip-seed, a *quick* braird of the turnip plant cannot be insured. It was the slow brairding of that plant which formed the ground-work of the universal complaint against farm-yard manure, however well prepared, for raising turnips, on dry soil in a dry season, and especially on strong land in a dry season; and the great recommendation given with bone-dust, was that of its *insuring* the early braird of the turnip-plant in all seasons. The complaint now, under the practice above described and condemned, is, that bone-dust does not insure an early braird of turnip in strong land; but, so long as the practice of placing earth betwixt the manure and the seed is followed, a quick braird ought not to be expected. Contact with manure will cause turnip-seed to vegetate in a short time. Could the seed have been placed in contact with farm-yard manure as easily as with bone-dust, the latter would never have acquired the fame it has as a turnip manure. The firmness with which the roots of the turnip grasp the manure, shows the great capacity for manure which they possess in the early stage of their growth. It is this tenacity for manure of the root-fibres which raises so much of the bone-dust to the surface of the ground, by adhering to the roots of the ejected plants; and whenever turnip seed vegetates in contact with farm-yard manure, the same inconvenience results. In the case of dung being brought to the surface, it there becomes wasted, but in the case of bone-dust, the resurrection of the bones not in contact with the growing plants, is of no consequence, because, while exposed to the air, the bones lose none of their fertilizing properties; and none of them which are brought up escape being again covered by the subsequent operations of hoeing, scuffling, and earthing-up. Although the bone-dust should be scattered between the drills, if it is at all under the surface of the ground, the long and tender fibres from the turnip-plant, which extend a considerable distance around every plant, will eventually derive benefit from it. But even should any of the bone-dust be left exposed to the air, on the surface of the ground, after all the operations are completed, it is much better to suffer that loss, than run the risk of losing the whole crop by improperly checking the braird. Eventually the bone-dust cannot be lost, for whenever, by any means, by ploughing, by tramping of sheep, it is pushed into the soil, it immediately imparts its properties to the soil. The increasing scarcity of bones, and the consequent advance in price of bone-dust, from 2s. 6d. to at least 3s. if not 3s. 6d. per bushel, and which difference of price, small as it may appear, constitutes a considerable additional expense in the turnip-crop on a large farm, has no doubt suggested the adoption of this pernicious practice; but although economy in the use of bone-dust is a laudable endeavour, it should never be attempted at the risk of the well-being of the crop. Bone-dust may be economically used by mixing it with ashes, whether derived from the combustion of coals or peat; or where farm-yard manure is abundant on any farm, let some of it be spread in the drills in the usual form, and the seed afterwards sown along with bone-dust on the tops of the drills. In this case, the manure need not be much prepared, as it will have time to ferment in the ground before becoming useful to the turnip-crop, while one-half of the usual quantity of the bone-dust, namely, one-quarter per imperial acre will suffice for the brairding of the plant and its nurture, until it finally depends for support upon the manure.

On considering the effects of bone-dust on land, it is not improbable that the experience of years may prove the abatement of its efficacy as a manure, after repetition of its application on the same ground. This appears to be the opinion of the Duke of Portland, as expressed in a communication by the duke himself, in Bell's Weekly Messenger of 23d April, 1838. As we know that his grace is an accurate observer of the operations of the field, his statement is worthy of an attentive perusal.

"In 1834, two fields of sand-land adjacent to Clumber Park," says his grace, "the one at right angles to the other, each containing about twenty acres, were sown with seeds among barley. Whenever these fields had been sown with turnips for twenty years before 1825, they had always been manured with bones. In that year they were largely so manured. The seeds sown with barley in 1826 having been burnt up in that dry summer, in 1828 the land in both these fields was again broken up. In 1829 it was again fallowed with turnips and manured with bones. In 1833, both these fields were again sown with turnips, parts of each of which were manured with bones, and the remainder with farm-yard dung.

"In 1834, when the corn was out, it was found that the seeds had failed in each of these fields where the bones had been applied; and that they were very good where they had been manured with dung. In one of these fields the failure exactly followed the line of the difference of the manures, with two exceptions, that the seeds did not quite fail in two spots where formerly there had been dung heaps. In the other field the failure did not so exactly follow the line of demarcation, but the exceptions were very few. Generally speaking, the manured land is better than the boned land, but the difference of quality is not great, the crop of barley on the manured land had been at the rate of five quarters per acre, on the other four.

"Immediately after harvest, fresh seeds were sown on the boned land. They came up very thick, but in six weeks died and disappeared. During the winter the land was again fallowed, and fresh seeds were again sown in the spring of 1835. They cannot be said to have failed, but they were a very inferior crop; and, notwithstanding a manuring of farm-yard dung applied as a top-dressing the following spring, they have not yet recovered a parity with the rest of the fields. In this case it seems impossible to attribute the failure of these seeds, where they have failed, to any other cause than the bones, which had certainly been applied with unusual abundance; and it is the more surprising that such a cause should have produced such an effect, because, in the early periods of the use of that manure, it appeared to be in no respects more advantageous than in its tendency to encourage the growth of the clovers. Of this tendency, the most remarkable instances have been repeatedly seen on very poor land, and none more so than one which occurred on a very poor piece of land prepared for a plantation by a crop of turnips, manured with forty bushels per acre, on which, between the trees, a great deal of clover has spontaneously sprung up. Previously to this land having been broke up for turnips, scarcely a plant of clover was to be seen. Now the fields on which the seeds have failed had (as above stated) received, much more frequently than usual, complete dressings of bones.

"Combining the great advantages of bones on the first application of them with this failure, it seems difficult to avoid the conclusion, that as the bones, while they are new to the land, have produced the most beneficial effects, and as this failure has taken place where their application has been most frequently repeated, the success is in a great measure owing to the novelty, and the failure to the repetition of their application.

"If the preceding statement required any confirmation, it has received it in 1837. In this year, a field which had been turnips in 1836, had been laid down to grass. The north side of this field is very inferior sand-land; and as, till lately, it was supposed that such land would not pay for the expense of bones, they had never been applied to it. For the first time in 1836, bones were used for the turnip fallow. The south side of this field, which for many years has always been manured with bones when in fallow for turnips, was divided into four divisions; the western side was manured with farm-yard dung; that next to it with bones; the two eastern divisions were manured, the one with rape-dust, and the other with malt-culms. After harvest, the seeds on the north side appeared to be best; then those on the western side of the field; then those on the two eastern divisions, which were rather inferior; and those on that where the bones had been applied were visibly the worst. The frost has been so injurious to the seeds, that this difference between the three eastern divisions is not now so marked as it was before the frost; but the superiority of the northern side and the western division is very apparent.

"This field lies nearly opposite to Scotland Farm, on the other side of the road leading from Ollerton to Worksop, and three miles from the latter."

In this statement the soil is described as "*sand-land*:" the rotation followed on it a four-shift, viz. turnip-fallow, barley, grass, and a white crop; and the quantity of bone-dust applied forty bushels per acre. The remarks we would venture to make on this statement are, that a rotation of four is not adapted to any "sand-land" with even an unlimited command of manure; for that course keeps light land too much under the plough, makes it too pulverulent, and thereby endangers its texture with deafness. Such land should always be *pastured* at least two years, and better still for three, in order that it may be consolidated into a firm condition by time and rain, and the tread of animals. It is not stated whether the turnips were wholly carried off the ground, or partly eaten on the ground by sheep. We have, universally in Scotland, a notion that the half, at least, of the turnips raised by means of bone-dust ought to be eaten off by sheep; for, without such assistance from other manure, we conceive the bone-dust would have too much to do of itself in supporting all the crops during the rotation. This being the notion in Scotland, the practice originating from it is, that never more than sixteen bushels generally, though some farmers apply 20 bushels, is applied to the imperial acre. We have also a notion in Scotland that bone-dust has a caustic quality, and that considerably more than sixteen bushels to the acre on light soils, would do more harm than good. We have ourselves experimentally tried the effects of different quantities of bone-dust in raising turnips on light gravelly soil from twelve to twenty-five bushels per imperial acre, and found the crop improved decidedly to sixteen bushels, but not in the least beyond that quantity. So far, therefore, as the turnip crop was concerned, any quantity above the sixteen bushels was thrown away. The circumstance, as expressed in the statement, that farm-yard manure yielded more barley on the "sand-land" than bone-manure, after the land had been previously boned, shows analogically the fertilizing effects of feeding sheep at turnips on land that had been manured with bones. Until, therefore, we learn that turnips had been raised on the "sand-land" with only sixteen bushels per acre; that at least, the half of them had been eaten off the ground by sheep; and that the grass after the barley had been pastured at least two years, we are more disposed to ascribe the failure of the grasses to the system of farming described by the duke, as being quite inapplicable to such soil, than to injurious effects from the bone-dust.

From the Franklin Farmer.

HARVESTING OF CORN.

To the Editor—As the season is approaching in which the farmers will commence the securing the abundant crop of corn with which a bountiful Providence has blessed our country, it may be pertinent to the occasion to offer a few remarks upon the best mode of harvesting the crop.

Our Virginia ancestors and those who think it wise to plant and cultivate and gather as our fathers have done, pursue the old method; about this time they gather the blades below the ears of corn—after they consider the corn to be ripe, they top the stalks and secure all of the fodder in stacks for winter use. In November they pull the corn and remove it to cribs, where it is husked out at leisure. This mode is rapidly yielding in the stock districts to that first introduced among the graziers on the south branch of the Potomac. The farmers in the northern and middle districts of Kentucky, and in the Scioto valley of Ohio, have generally adopted this latter mode; which is to cut the stalks, corn, fodder and all, and place them in shocks commonly embracing sixteen hills square.

I have seen the richest crops of many climates gathered, and there is no operation in husbandry so animating as that of cutting corn in the mode just mentioned. It is a most cheering prospect to see twenty acres of corn pass in one or two days to a condition in which it is prepared to keep in the field throughout the winter. This remark is predicated particularly upon the plan of riddling the squares, instead of cutting the whole square at once. It will readily occur to any observing mind, that as corn does not ripen with precise regularity, if the entire square is cut out at once, some of the corn will mould and sometimes even the fodder will be affected, if the cutting shall be followed by warm or wet weather. To avoid this contingency, some graziers commence with the process of riddling, that is, they select only such part of the sixteen hills square as may be ripe —go through the field in this way, and in ten days complete the cutting of the square. By this process several important advantages are obtained— the greatest amount of fodder is secured, consistently with the paramount object of saving the corn, and a nucleus for the shock being formed by the first cutting in the square, the shock becomes settled and stands better during the winter. In the rich counties of Clark and Bourbon, they sometimes cut half of the square on one side and then in ten days finish it. Whilst many graziers in Fayette, Lincoln and Shelby, prefer the process of riddling.

In the course of October and November, these shocks are shucked out, the corn placed in cribs and two of the shocks placed together, or one placed upon the ground and two others put around it.

It is the opinion of practical farmers, that the practice of cutting corn in this mode secures the greatest amount of corn and fodder with the least expense, and is decidedly an improvement on the old Virginia plan, more especially when applied to the feeding of cattle or mules.

THE ADVANTAGE OF "SWATHING" WHEAT, IN REAPING, INSTEAD OF "HANDING."

To the Editor of the Farmers' Register.

This year the luxuriant growth of my wheat induced me to think that it could not be saved by the long scythe and cradle, and handled by the binders, in the usual way, to advantage. I reduced my scythes and cradles to forty-eight inches, and swathed my wheat. Being satisfied, from observation, that this method of saving my wheat is greatly to be preferred to the one I formerly pursued, I will state the manner in which the work was done; and if you or your readers should esteem this hobby-riding, I am quite willing you should indulge the laugh. I do not think, according to your definition, you can bring it within the class of humbugs. As I understand you, hobbies generally bring loss to the owners; humbugs are started by the jockeys for profit.

The stroke of the cradler brings him half round on the land, and, by raising the heel of the cradle, he lays the wheat across it; his hands both remain firm on the sneed, the weight of the wheat rests upon him, but for a moment. The motions being freer than when he gathers by the hand, he cuts faster, and with more ease to himself. My people disliked the change at first, but soon became accustomed to it. I had two or three lands cut before the rakers and binders started. Four rakers (the rakers collecting two lands) and seven binders kept without difficulty the distance at which they started, and would have overtaken the cradlers, if I had permitted, and sometimes, in my absence, did so. The task of rakers is easy; by a little care they collect all the wheat which is cut off, and by gathering it in bunches of a proper size, the binder has to make but one stoop for a sheaf, and there are no scattered heads to be collected by hand, which greatly lessens and lightens his labor. My crop was unusually heavy; but I never gathered wheat at so little loss. My usual practice has been to run a horse-rake after the binders: but so little was left this time, that I deemed it not worth the cost. The experience of the harvest has convinced me, that by this method, unless the wheat is much down, it can be better saved than by the sickle.

In New York and Pennsylvania, swathing is the usual method of gathering wheat; but I never before saw it in Maryland. If it be the common practice in Virginia, it would be useless to give this a place in the Register. To communicate to farmers what they know, is in as bad taste, as to tell to a company a good story which they had heard before. Among the complaints made by Sir John Falstaff against Justice Shallow, one was, that he was ever on the rearward of the fashion, and sung old tunes which carmen whistled. I have no inclination to be numbered in the family of the Shallows, though the connexion is pretty numerous, and some of them wear fine linen, and sit in high places.

Mr. Hussey, the patentee, had his wheat-cutter in this neighborhood during the harvest, which did its work perfectly. I saw the performance, and do not think it left one head in a thousand. The only objection (which is a serious one) is, that it does not do enough. I understand that from fifteen to eighteen acres is as much as it can cut in a day; and you well know that a protracted harvest is often attended with serious loss.

RUSTICUS.

Eastern Shore, Md. July 28, 1838.

[The general practice in lower Virginia, is to catch the reaped wheat from the cradle in the left hand, and then to throw it, (two or more such handfuls together,) to be picked up by the binders. This usage could not have been commenced, except where the growth was light and thin; and nothing but the difficulty of changing the old practices of laborers, has prevented this mode being abandoned, on good lands, for that recommended by our correspondent.—ED. FAR. REG.]

From the Cultivator.

AGRICULTURE IN FRANCE.

There are at present in France 123 agricultural societies, and 303 agricultural committees, where, before 1803, there were scarcely ten, and they are constantly increasing. Every thing has been done by the present government to encourage agriculture in a pecuniary way, as well as by the different societies. The sum of 500,000 francs—nearly 100,000 dollars—has been placed at the disposal of the French minister of public works, for the encouragement of agriculture during the year 1838. There have been also several gentlemen travelling in Scotland, at the expense of the French Society of Agriculture, in order to examine the system of farming in that country.

From the Cultivator.

A HINT TO CATTLE BREEDERS.

T. A. Knight, the very distinguished horticulturist, publishes in the Farmers' Magazine, a communication on the ill effects of overfeeding young stock. Young cattle thus brought up, when taken into other districts, have been found, with their offspring, incapable of thriving upon common pastures. Animals, he thinks, which have been overfed from their birth, and whose ancestry have been subjected to the same treatment, acquire a power of eating and digesting a much larger portion of food than others. He admits that the improved Durhams are brought to market at a very early age, oxen of very great weight and excellence; yet he says it is well known that all those young animals come to market deeply insolvent, the sums for which they are sold being greatly less than those expended in feeding them. In illustration of their expensive keep, he cites the following facts:

"Three Herefords and three Durhams," says he, "were put into stalls, to be fatted on the third of November. The weight of the Herefords was then 33 cwt. and that of the Durhams 38 cwt. and 14 lbs. Between that period and the 30th March, when all were sold in Smithfield, the Durhams consumed 12,755 lbs. weight more of turnips, and 1,714 more pounds of hay, than the Hereford; but the Durhams, notwithstanding the larger size when put to fatten, and the greatly larger quantity of food consumed, sold for only twenty shillings more than the Herefords; and such I believe will ever be the result of similar trials, when one class of animals has been properly fed, and the other overfed, the merits of the breed being equal."

This reasoning is true in regard to perennial vegetables—trees for instance. If the nursery from which they are drawn, and in which they have been raised, is very rich, they will not thrive so well in a common soil, as those which are taken from a soil of an inferior quality. If the habit of gormandizing is established when the plant or animal is young, neither will thrive so well afterwards upon spare food, as if they have been brought upon more moderate fare.

From the Quarterly Journal of Agriculture.

EXTENDED USE OF MACHINES FOR SOWING GRAIN.

The extended use of sowing-machines, both drill and broadcast, will most probably supersede in a short time the practice of sowing grain by the hand. We own we should not like the idea of abandoning this ancient practice, though for nothing else than for the many pleasant associations by which it is endeared to every lover of field labor. These associations can never be recalled whilst using any sort of machine. Hand-sowing is also an accomplishment, and confers a superiority on the possessor. The season of the year in which it is most usually practised, inspiring the mind with the lively hope of a manifold produce; the measured step marking the time, and reminding of the progress of the work; the simultaneous action of the limbs, inducing the regular exercise of the muscular frame; the steady eye directing the flight of corn with a rainbow-like sweep to its destined place in the earth: all these tend to interest the sower in the continuance of the operation. Sowing by the hand, too, is a quick operation, one man keeping two pairs of horses, two men, and a woman in constant occupation. In this respect it is doubtful that machine is cheaper than hand sowing. It is, however, a difficult art, and can only be exactly performed after much practice; and as a proof of the difficulty of its acquirement, there are many men who never become neat, expert, and safe sowers all their lives. Being thus a difficult operation to acquire, and at all times performed with much labor, machine-labor will no doubt supersede it on all large farms, and, indeed, on all farms on which the grass-seed sowing-machine is used. The precision and beauty with which the broadcast sowing-machine distributes the grass-seeds on the ground, in all states of dry weather, in comparison with the hand, and the easy adaptation of that machine to the sowing of corn, has already substituted it for the hand on many farms. The quantity of seed to be sown can be regulated with much greater precision by any machine than by the hand. Besides, the broadcast-machine, the drill-machine, we perceive, is now much in use on the borders, particularly in sowing wheat. There are various sizes of those drills, but all are formed for the same purpose, and on the same principles. Their object is to deposit the seed at a given depth in the soil, and cover it up so as to require little harrowing afterwards. There is a practice of drill-sowing in Cumberland and Dumfriesshire, which deserves imitation in other districts. A person brings a large Suffolk drill from Suffolk, and undertakes to sow the autumnal wheat with it, at 2s. per acre. This is a very efficient implement, and as it costs £40 when new, employing it in this manner seems a very good plan of getting the wheat seed sown. The annual interest and tear and wear attending the ownership of this drill, would be equivalent to the sowing of twenty-four acres of wheat land. It is generally believed that drill-sowing saves seed. Whether the saving is an object, appears doubtful from the following statements of Lord Western, in a letter to Lord Rayleigh, dated from Felix Hall, in last March. He addresses his lordship to inform him "of the result of a mode of wheat sowing, which differs from the practice of this neighborhood, and which I have tried eight or ten years with great success, and the advantages of which are peculiarly striking this year, when the failures of plants are so prevalent. Any person now may have ocular proof of it. I can show them 100 acres of wheat, upon every acre of which I have a sufficient plant—I may say a full and thriving plant upon 90 of the 100. It is a nice question at all times to determine cause and effect, but I have no doubt in this case that the superiority of my wheat plant to most of my neighbors this year (which will generally be admitted by them) is owing entirely to my mode of putting the wheat into the ground. I use the drill in rows, nine inches apart, and put in at least three bushels per acre. I adopted the plan in consequence of what I saw at Holkham about eight or nine years ago, and from the strenuous advice of my friend the Earl of Leicester, and the example of himself and several of his very intelligent and experienced farmers, who joined him in urging me to this course. One old farmer, who occupied a very large farm under him, told me he had uniformly pursued that system above fifty years with the greatest success; he was of opinion that the quantity of seed was generally too small (of course the quantity should vary according to circumstances,) but he was satisfied an increase of seed would increase the growth of the country most essentially. Since that time I have sown all my wheat in this manner, and I have had great crops, I may say quite equal to the best farmers around me. I by no means ascribe these large crops of wheat exclusively to this drill system, because the seasons have been so good, and I have farmed high. I confidently believe, however, that something is due to the system, and that this year has shown that great advantages are derivable from it in seasons, and under circumstances that are unfavorable for the preservation of a good plant—the first object of every practical farmer, particularly on heavy land, whereon are so many failures. The general objection to the plan is, that the wheat will be thick in the rows, that it will grow up without tillowing, and with many short ears. I do not, on experience, find this objection well founded. I think the number of short ears to be found in this mode is not greater than in the wheat that has more room to tillow, and they are generally filled with good corn, full-sized grains. I hardly have heard any other objection made, and the advantages of the thick plant are many, some rather peculiar to this country. One considerable difficulty we have to encounter in our clay-bottom lands arises from the tardiness of our early vegetation, which renders our early plants comparatively a more easy prey to vermin of every sort, such as the slug, the worm, &c., and bad ungenial weather. Where there are any rabbits, destruction will often ensue in these lands from the weakness of growth in the plant, which would be overcome in warmer and quicker vegetating grounds. This remark of course does not apply to gravel-bottom lands, which are to be found in some few and limited districts. Now, it will be admitted generally, that where the plant is thick, it will grow considerably quicker upon first coming out of the ground—the numerous blades seem to protect and keep each other warm; and the roots partly matted together, get a better hold of the ground, so that they are not loosened by the biting off the blade, nor are they so loosened by succession of frost and thaw; they are by no means so likely to be root-fallen, which is productive always of the worst consequences when it occurs, and the mischiefs of which are peculiarly striking in many instances this year. I can drill with the heavy Suffolk drill, covering ten feet or twelve furrows at a time; nearly if not quite as straight as is practised in the light land of Norfolk and Suffolk."

We were glad to observe the prevalence of ribbing with the small plough the seed-furrow for spring wheat or barley on a winter ploughed furrow. There is no better mode of obtaining a fine mould, a good depth of bed for the seed, and of avoiding the bringing up of a raw clod which the ordinary plough would inevitably do in a late or damp season, and of dispensing with much harrowing. This ribbing is applicable to all soils, and particularly to those which are apt to throw out in severe frosts and bright sunshine in spring.

From the New England Farmer.

NOTICE OF THE CHINESE TREATISE ON SILK CULTURE.

[The following article, from a late English publication, relates to the curious old Chinese treatise, of which a translation has recently been published, and from which an extract was republished in the 4th number of this volume. These remarks will not be uninteresting to those who have read that extract; and may induce others, who have passed it over, to return to it, and give it due attention.—ED. FAR. REG.]

Not very many years have elapsed since the project of introducing the silkworm into this country was seriously taken up by several scientific persons; and the probability of its becoming eventually a source of wealth was warmly discussed. Gradually, however, the ardor of these projectors was found to cool, and the matter fell to the ground; and was soon as little spoken of, as if an enterprise had been meditated which sensible men ought to disavow. Notwithstanding this implied reflection on the good sense of the supporters of the plan, a few gentlemen shortly after might be found scattered through England, who still cherished the conviction that the introduction of this insect was perfectly feasible. They planted mulberry trees and bred silkworms as an innocent source of amusement; and to this day they continue to occupy their spare time in trying experiments on a limited scale, on the best modes of bringing up their favorites; but if the project was eagerly received here, in Ireland it was hailed with enthusiasm as a certain mode of realizing a fortune. The ardent imagination of the Irish easily overleaped the barriers which inexperience or want of capital threw in the way; and for any one not to have implicit faith in the silkworm speculation, was looked on as a mark of meanness of spirit, or of total disregard to personal advancement. A joint-stock company was even proposed, and a vast number of names were marked down for shares; but when the day of paying the first instalment came round, the absentees were found to be so abundant, "that the company dissolved itself," as a wag afterwards remarked, "even before it was formed." The zeal of individuals was but little manifested in mulberry plantations or silkworm nurseries. One person only showed that he had been perfectly serious in his enthusiastic advocacy of the enterprise; he planted some thousands of the trees, and when we passed through some dozen or fifteen years ago, we saw the plantations in a most flourishing condition. The Earl of Kingston it was who had given this proof of his being serious in the silkworm project; and even to the last, we believe he spoke with every appearance of being thoroughly persuaded of the possibility of the plan. Both in this country and in Ireland, the great objection was that the climate was too severe for so delicate an insect as the silkworm. The slightest variations of cold and heat were known to affect it; and sudden changes were frequently found to cause its destruction; modern discoveries have proved this notion to be hastily assumed, and perfectly erroneous. The insect is now known to be capable, with proper management and due precaution, of supporting our climate; and it is with the intention of showing the truth of this important fact to our readers, that we have determined to lay before them some valuable information which has but lately come to light.

The source from which we derive this information, is a treatise by the Chinese themselves, which has been lately translated and given to the public in France. When we consider the acknowledged advancement of the Chinese in the arts and sciences, evidenced by their knowledge of printing—of the mariner's compass—of gunpowder, and many other curious discoveries, long before the inhabitants of Europe, it is a matter of wonder that their literature has not been more carefully studied, and the results of such studies made public. All that we have until lately known of the Chinese, and their habits, manners, customs, and knowledge, has come at first through the early missionaries, and next through the embassies sent over from this country. A third spring of information has now been opened; and we are not over sanguine, in predicting that a most important stream of curious knowledge will be found to flow from it. Should it be asked, how it happens that this particular juncture has had the merit of making public the contents of the Chinese work, we answer, that it is the same cause which, in the days of Perseus, caused the Roman parrots, when hungry, to salute their mistresses in the Greek words they had been taught, namely, self-interest, a most prolific source of research and invention. Thus it was that the work was translated.

The production of silk, at the present day, in France, amounts to a value of more than 60,000,000 francs a year; which is, however, quite insufficient for the consumption, as the foreign trade alone reaches 50,000,000 francs a year. Silk is one of the principal products of China: for not only is it used to a great extent in the fabrication of their clothes, but a vast quantity is exported in the raw state, as well as in the shape of fabricated articles. For forty centuries have they devoted their attention to study, in its minutest details, the rearing of the worm which furnishes them with this source of their national wealth; and as a natural consequence, this long experience, always stimulated by the sense of self-interest, has caused them to discover a crowd of attentions, of proceedings, and of practices, most likely to procure for them certain and advantageous produce.

The missionaries were at once struck with the importance of these practices to the European cultivator of the silkworm; and they determined to mark down some of their modes of treatment, for the benefit of their countrymen. Two treatises were drawn up, and afterwards published in France. One of them, by Father d'Entrecolles, gives the extract of an old Chinese work respecting the treatment of silkworms; and the other, composed by Father d'Incarville (or rather, from notes left by him,) describes the treatment given to three other species of worms, which the natives designate "wild silkworms," because their nature requires that they should be permitted to live at full liberty on the trees from whence they take their food. Some of the methods of treatment described by d'Entrecolles, were not long ago put in practice by M. Camille Beauvais, a large breeder of silkworms at Senart. He found them to be most serviceable, and most certain and faithful in their results; but above all, he found that the adoption of the Chinese treatment was of wonderful efficiency in preventing accidents, which before had dreadfully puzzled and annoyed him.

As the abridgment of a work is always incomplete in details, M. Beauvais thought that it would be important to have the original Chinese work translated. He applied to the Minister of Commerce on the subject, and laid before him the importance of the case. M. Passy was at that time minister; and he applied, in his turn, to M. Stanislas Julien, as the first Chinese scholar in France, or perhaps in Europe. He directed this eminent *savant* to undertake the task; and M. Martin (du Nord,) who succeeded to the ministry of commerce, made the work complete, by desiring M. Julien also to translate the Chinese work on the culture of the mulberry tree, which is always annexed to the work on the treatment of silkworms. M. Julien undertook this arduous task; and has just given to the public a translation of the two treatises, of rare precision and clearness. To this has been added, Father d'Incarville's treatise on the wild silkworms; and the whole has been published at the royal printing office. The French scientific men speak of the work as containing a vast quantity of useful details; and they declare that it will be the means of greatly increasing the wealth of France. Without going the whole length of their sanguine anticipations, we can see that the information thus given is highly important, and that it may be of great value to this country as well as to France. One peculiarity of the work is, that the Chinese have followed no fixed plan; there is no succession of ideas in natural logical order in the Chinese writings. Down they put whatever thought occurs to them; satisfied apparently, like the sibyl of old, with having marked it down, but totally regardless of its fate afterwards. It might be a curious question to discuss the reason of this want of order; whether it arose from habit, or from some defect of organization: this, however, is beside our present purpose; we only desire to speak of the works before us. In considering them, it will not be found an easy task to place all in proper order. The little treatise by Father d'Entrecolles will be found of use as a sort of guide; but as it may not be practicable to obtain this work, we purpose culling from the translations some of the facts which strike us as useful and singular.

The silkworm, when it has just burst into life, is at first a little black caterpillar, about the length and thickness of an ant. In this state, its growth is so rapid, that after twenty-five or thirty days it has arrived at a size some hundreds of times more considerable. It then spins its cocoon, and is transformed into the chrysalid form; it emerges from thence a gay butterfly, engages in the work of generation, lays its eggs, and dies. The care of the Chinese follows the insect in all the phases of its short existence, without losing sight of it a single instant. The rapidity of its development as caterpillar, requires that it should several times get rid of its skin, and replace it by a larger covering. Every one of these changes constitutes a perilous crisis in the insect's existence; because it then remains without movement, and as if benumbed, during the period that nature urges on her handiwork.

It is easy to conceive, that the temperature, the food, and treatment, ought to be different for the insect when approaching its state of torpidity, from those which are most beneficial to it when in its time of health and vigor. The first and grand provision, therefore, for successfully rearing a season's insects, ought to be, to obtain a collection which, born at the same time, and under the same circumstances, shall be endowed with constitutions of like vigor, in order that the changes of their activity, of their torpidity, and of their final transformation, shall arrive simultaneously or nearly so. It is almost impossible to picture to one's self the multitude of cares which the Chinese devote to this fundamental condition. They commence their attention in the very choice of the butterflies destined to produce the eggs, rejecting such members of the two sexes as are born amongst the first or the last, and making use only of the intermediate ones; and even using their discretion in putting together, for the work of generation, those insects which their experience shows them are best suited to each other. Next the eggs become the objects of their solicitude. Here also they cast away the first and the last which are produced; and they pay great attention to having the batch equally distributed over the paper on which they contrive that the laying should take place. They thus avoid all heaping of the eggs, which would, when the hatching was concluded, place the insects in unequal circumstances; or if the eggs should, notwithstanding their precautions, be heaped on each other, they reject the mass altogether as intelligible for their purpose. Afterwards, they preserve these eggs with a thousand precautions, causing them to undergo various washings and other preparations, before the moment when the insect is about to burst into life.

So great is their ability in managing the education (if we may so term it) of the silkworm, that they generally contrive that all the insects should come from the eggs in the same day. Here again they reject the precocious and the tardy ones, in order to retain and bring up only those of the middle class. Having procured the fulfilment of this principle of original simultaneousness, they make every exertion to maintain all the phases attendant on the insect's existence. The cleverness of the Chinese is such, as to enable them to reduce the period of these changes, at most, to twenty-five, or even twenty-three days: whilst our unskillfulness obliges us to prolong the period to thirty or thirty-five days, to the serious detriment of the silk produced; for the Chinese have ascertained this important fact to be true, that the quantity of silk produced by the worm, is less in proportion to the length of time that it remains in the caterpillar form—the longer it remains, the less is the produce; and the rapidity of the reduction is enormous. To make this position clear, let us suppose that a number of worms, which have been developed in twenty-five days, have given twenty-five ounces of silk; if they remain, through any want of nourishment or necessary care, in the catterpillar state for twenty-eight days, the amount of the silk produced will not be more than twenty ounces: and should they delay to the thirtieth day, not more than ten ounces will be given. This is not only a very curious fact, but of great importance in a commercial point of view, and well worthy our serious attention. The Chinese have been long aware of it: and hence they deem no care too great which will hasten the birth of the insect. We must also look with admiration on the minute and delicate attentions with which they regulate the insect throughout. They are particularly cautious never to detach the eggs from the papers on which they have been deposited, to place them in heaps, as is so unreasonably practised in France, but they leave them their separate station and their hold on the surface, both which are found to be favorable to a speedy hatching. They also take care never to handle, or even to touch with the end of a pair of pincers, the little worms when they are born, in order to place them on the mulberry leaves: they would fear to run a risk of tainting them. How different is the practice in Europe, where it is quite a matter of daily occurrence to detach the eggs from the paper and place them in heaps: afterwards they are tied up in linen and transported to a distance. May not this be the cause of those frequent malformations which appear in the European silk nurseries, and which occasion such tremendous losses afterwards? a circumstance, be it observed, never seen amongst the Chinese. Their practice is, to gently place on the leaves the papers on which the worms have come into existence, in order that they may of themselves descend and take their food; nor do they place within their reach entire leaves at first, but little morsels, cut very neatly and scattered through a small sieve, in order that they may be distributed uniformly and in proportion to the number and the age of the worms. The quantity given at each repast is exceedingly small; and the increase is made in the number of repasts, but never in the mass of food given at each. The practice, we may remark, is founded on just principles; and the proofs of its efficiency are seen every day in our farms in this country, where cattle are found to thrive best on small and frequent repasts; not only because such are most easy of digestion, but because the animals eat more eagerly, and with a better relish, their food, when fresh, than trampled on, or tainted by their breath, when given in large quantities.

It would be an endless task to follow the Chinese through all their minute details, the influence of which, however, must be exceedingly great on the silk produced. Their treatment of the cocoons—their proceedings with regard to their silk crop; and their mode of winding the thread, are exceedingly curious. Our limits will not permit us to delay much longer; we shall, therefore, only add an interesting fact or two before we close. The Chinese use two sorts of artificial food for their silkworm; one of these is a leaf of a tree called *tche*, and a plant which bears the title of *Ouo-kin:* these are employed when the mulberry tree has not yet pushed forth its leaves, or when there is a scarcity of them. What these two productions are we have no means of ascertaining; that they are used throughout China for silkworms is certain, for mention is made of them in an old Chinese almanac, apparently intended for the working classes. The *tche* tree is also noticed by d'Entrecolles, who describes it as a prickly tree, which grew on exposed and lofty situations, and had a fruit like pepper. In the work translated by M. Julien, a rude sketch is given of the tree; but so vague is the outline, that we are unable to assign it to any particular class. The same incertitude exists as to the *Ouo-kin.* Remusat identified it with the wild chicorry; while in the *Amœnitates Exoticæ* of Kœmpler, it is suggested that it resembles our lettuce; it surely will be worth while to try both plants, and judge by the manner in which the silkworms receive them. The Chinese also employ, in feeding the worms, mulberry leaves gathered towards the end of the preceding season; these they dry and reduce to powder; and having lightly sprinkled the fresh leaves, they scatter it gently over them. The worms are always found eager to feed on it; and one advantage of it is, that it can be used at all times. Rice is also found to answer. It is first husked and then boiled by steam; this is then ground, and the flour is given to the worms. A small sort of pea, after being first allowed to germinate a little, is also employed; and all these preparations are said to render the silk stronger and more abundant. All these expedients are favorable to the introduction of the silkworm into England; which the Chinese mode of treatment proves to be perfectly practicable.

The long experience of the Chinese has made them aware of the fact, that the artificial education of silkworms requires a succession of different temperatures, suited to the different changes of their existence; and that, at the same time, the air which they inhale ought to be constantly purified of their perspiration, their evacuation and the bed of leaves on which they are placed. To effect this, they have found it necessary to erect close buildings, where an artificial increase or diminution of heat can be given when required, and where fresh air is constantly admitted. They have also discovered that these transitions of temperature must be almost insensible; and all their skill and ingenuity are taxed to accomplish this desirable object.

The Chinese author enters into a most minute description of the structure, materials, and situation of a silkworm nursery. He gives an account of the mode of heating it; and, at great length, details the form and use of the different instruments and utensils required in the concern. We do not intend following him in these details, curious as they certainly are; we shall only mention one circumstance connected with the heating of the nursery, which will show to what extent their cares are given. In addition to their scientific modes of maintaining the exact temperature beneficial to the worms, they employ what they deem the best indicator of a proper equilibrium, and even superior to a thermometer—this is the woman who takes care of the worms, and who is called their *mother.* This personage is clad in a single thin vestment, in order that her sensibility to cold or heat may be constantly awakened. These women are considered persons of importance; and whether from organization or habit, can at once detect the slightest change of temperature.

It is owing to this judicious use of air and light, (which we should have mentioned is particularly dwelt on,) that the Chinese are quite ignorant of those dreadful epidemics caused by mould, which in France makes its appearance on the bodies of the worms, in even the best regulated nurseries. In Italy also it is a matter of notoriety, that a vast quantity of worms perish every year from a similar disease; it is to be hoped, that from the present time the evil will be materially diminished. The best plan of a nursery yet tried in France, is one designed and erected by M. Darcet for M. Beauvais, of whom we have already spoken. This plan is considered, by some cultivators of silkworms, as most efficient; while others declare that it is little superior to a common workshop. The Chinese treatise shows that in many respects it is founded on wrong principles; and we may soon expect to hear that some modifications in its structure have taken place.

From what we have stated of the contents of the Chinese treatise, it may be seen that the cultivation of the silkworm is perfectly easy in this country. The difference of climate has been deemed by some scientific men as an insuperable bar; but this objection is taken away by the work which establishes the fact, that the greatest produce of silk in China takes place in the central provinces, lying between 25° and 35° of north latitude. Thermometrical observations have also proved that the mean temperature of the northern and southern provinces of China differs but little from that of Provence in France, the winters being somewhat more severe, and the summers a little hotter. The work also shows, that the cultivation of the silkworm was carried on to an enormous extent in the most northern provinces of of China, and we have no reason to suppose that the cultivation has been discontinued. Nor is it at all necessary that these silkworms should be reared in vast quantities or in large buildings; if this was necessary, how could the Chinese peasants pay their taxes, which are generally given in silk? The population of the country being exceedingly great, the land has been for ages divided into very small holdings; indeed, to this cause only can we attribute the declaration of Barrow and other travellers, that the appearance of the country is rather that of a vast collection of gardens, than that of an agricultural district. The philosopher Meng-Tsu, who lived in the fourth century before the Christain era, says, "that of the portion of land allotted to each family, it is sufficient to plant the twentieth part with mulberry trees, to enable the family to clothe themselves;" and since then, the tax imposed on each peasant's family is generally paid by a certain number of bushels of grain, a fixed quantity of silk stuffs, and some ounces of silk thread. This proves incontestably that each family rears worms to clothe themselves, as they cultivate the fields with their hands to feed themselves. Hence we may reasonably infer, that the methods prescribed in the Chinese treatise are equally applicable to private nurseries on a small scale; indeed, we might go much further and say, that the great establishments are exceptions, rather than the cottage of the husbandman; for as the work was drawn up for the general instruction of the nation, can we suppose that the writers had not in view the circumstances and condition of those for whom the work was intended? And as the vast majority of the inhabitants are of moderate means, ought we not to believe that the work was chiefly written for them, rather than for rich capitalists possessing large establishments?

We feel convinced that this branch of industry can easily be introduced into this country; and we do not deem the day far distant, when it will prove a source of wealth to thousands. Should our remarks lead to this desirable result, it will certainly be a source of great gratification to us; should we fail to excite public interest, we shall still have the consolation of thinking that we have faithfully discharged our duty.

CHINESE OPINIONS AND PRACTICES IN MULBERRY CULTURE.

[The few short extracts which follow, are from the Chinese work referred to in the foregoing article. In the enumeration and description of the various kinds of mulberry tree, it will be perceived that not one resembles the *morus multicaulis*, commonly called the Chinese mulberry.—Ed. Far. Reg.]

Different kinds of mulberry trees.

1st. The small mulberry trees (dwarf trees) have long branches, called *niu-sang* (ladies' mulberry trees) and *i-sang*. [*Eul-ya* Dictionary.]

2d. The *yen-sang* or *chan-sang* is the wild mulberry tree, the mountain tree. [Same work.]

3d. The *tseu-sang* or seed mulberry tree; its fruit shoots out before its leaves. [Japanese Encyclopedia, book LXXXIV, fol. 1.]

4th. The mulberry tree called *khi-sang* (that is to say, chicken mulberries) have leaves veined with red; they are rather thick. The silk worms that are fed on them produce a thin cocoon, which furnishes little silk. [*Tchong-chou-chou.*]

5th. The white mulberry tree bears thick leaves, that are as large as any one's hand. The cocoons of the worms that are fed on them, enclose a strong and abundant silk. This leaf furnishes twice as much silk as that of the ordinary mulberry tree. [Ibidem.]

6th. The mulberry tree, of which the leaves are plaited, and covered with a yellow pellicle, is called *kin-sang*, or the gilded mulberry tree. All the silkworms cannot be fed on the leaves of this tree, of which the color foretells that the tree will soon dry and perish. [Ibidem.]

There are some mulberry trees that do not produce fruit; they are vulgarly called *nan-sang* or male mulberry trees. [Japanese Encyclopedia.] The mulberry trees, of which the fruit sprouts out before the leaves, necessarily bears very few leaves. [*Tchong-chou-chou.*]

To sow mulberries, the fruit of the black mulberry tree of *Lou* must be taken. The yellow mulberry trees of the country of *Lou* cannot be preserved a long time. [*Thsi-min-yao-chou.*]

The mulberry trees of the country of *Khing* (ancient name of the province of *Hou-kouang*) and of the country of *Lou*, may be planted in level plains, where the ground is limey and clayey, and also in light earth. If the ground touches a mountain or hill, that is hard and mixed with red veins, it is only suitable for the mulberry trees of the country of *Khing*. [*Nong-sang-yao-tchi.*]

The different kinds of mulberry trees are very numerous, we cannot describe them all.

The best are those of the country of *Lou*, and of the country of *Khing*. The mulberry trees of *Khing* yield a great quantity of fruit, but those of *Lou* very little. Those of which the leaves are thin, pointed, and divided in lobes, are the trees of the country of *Khing*. They bear solid and hard leaves.

The mulberry trees of the country of *Lou* have round, thick, and juicy leaves.

The mulberry trees of which the branches and leaves are large, and thick, are a species of those of *Lou*.

The mulberry trees of *Khing* have solid roots and full hearts; they last for a long time. Those are the kind to be planted.

The mulberry trees of *Lou* have less solid roots, and hearts not so full; they cannot last for any length of time, (dwarf mulberry trees.) Trees called *ti-sang* are formed from them; but the trees of *Khing* have neither as many branches, nor as many leaves, as those of *Lou*. Branches of the mulberry tree of *Lou* may be grafted upon them; they then live for a long time, and yield an abundance of leaves.

If the mulberry trees of *Lou* be employed to obtain the species of tree called *ti-sang*, (dwarf trees) and if they be reproduced by twigs, they propagate without interruption, and last an infinite time.

The silkworms that are fed with the leaves of the mulberry trees of *Khing*, produce a firm and strong silk; it is fit to make *cha* and *lo-cha*, (kinds of thick gauze and crape.)

The leaves of the mulberry trees of *Lou* agree with the worms that are large; those of the trees of *Khing* with the small worms. [*Nong-sang-thong-khiouè.*]

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Propagation of mulberry trees.

The work entitled *Thsi-min-yao-chou*, describes the manner of obtaining the best seed of the black mulberry trees.

The two ends of the mulberry must be cut off with a pair of scissors, and only the middle part taken. The seed of the two extremities are comparatively smaller than the others, and if sown they produce little mulberry trees, called *khi-sang*, (chicken mulberry trees) and *hoa-sang*, (flowering mulberry trees.)

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The intermedial part of the mulberry has larger and harder seed. The trees that proceed from them have firmer and stronger branches, and they bear thick and nourishing leaves. [*Nong-sang-thong-khioué.*]

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The mulberry trees called *ti-sang* (dwarf trees) ought to be planted in a garden near a well. If grass springs up around the roots of the trees, the earth must be turned up with a spade. When it does not rain they must be watered. When the silkworms are hatched they ought to be watered three times a-day; the leaves will then grow very quickly.

Among the different kinds of mulberry trees there are some that sprout out early, others late. It is from among the mulberry trees which are in leaf the earliest, that those are chosen, from which the trees called *ti-sang*, or dwarf mulberry trees, are formed. [*Nong-tching-tsiouen-chou.*]

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In the work, entitled *Tchong-hoa-min*, it is read: There are two kinds of mulberry trees: one bears the fruit of which we sow the seed: it sprouts out in the first or second month, (February or March.)

The following is the manner the other kind is multiplied:

A pliant branch is bent to the ground, and maintained in that position by a clod of clay. Each bud produces a branch. When this mulberry tree has attained the height of two or three feet, its roots are then formed. The mother branch to which it belongs is then cut, and it is transplanted in another place. It soon becomes a tree. [Same work.]

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Observations upon the choice of mulberry plants.

The mulberry with a wrinkled bark yields only small and thin leaves; those of which the bark is white, the joints long, and have large buds, are the leafy trees of *Chi*, (diospyros; they always bear large and thick leaves. The cocoons spun by worms fed on them are firm, and furnish a great deal of silk.

The tall white mulberries succeed well upon the declivity of hills, in the angle of a wall, or by the side of a hedge.

The mulberry trees of less height, with a black bark, should be planted in moist ground. [Same work.]

The mulberry trees with black bark, which produce no seed, when the leaves are not too thick, are good for the nourishment of newly hatched silkworms. (Same work.)

The trees of the country of *Wang-haï*, are multiplied in the same manner as those with the white bark. The tree called *thsé-teng-sang* (or mulberry tree with rose-like branches) grows high and strong.

The white mulberry tree, or the tree with white bark, yields very little seed, it is multiplied by layers. If a person has seed they can sow it, but it must be in the shade. Heavy well filled cocoons will be formed, which will produce twice as much silk as the ordinary ones. [Same work.]

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Manner of pruning large mulberry trees.

The branches must be thinned, and above all, pruned in time. It ought to be done in order that the branches may acquire strength and push early, and that the silkworms may not want leaves.

If the branches are cut off, those that remain will acquire strength, and the leaves will become thicker and more nourishing. If this year they are pruned at the proper time, the long branches will become strong and vigorous; the leaves of the next year will shoot out early, and they will be thick and glossy.

All the branches from the centre must be cut, so that a man may stand up and easily make use of the axe. The branches and leaves fall outside of the tree; that is much better, than to be obliged to remove all around the tree a heavy ladder. A man thus placed in the centre of the tree, can do as much work as two persons placed outside of the tree. Too many branches must not be allowed to grow, otherwise they cannot be cut without hard work; moreover, the leaves will be thin and destitute of taste.

Moreover, the art of properly pruning the mulberry trees, is one of the most important points for the raising of silkworms. Many persons do not know how to make beforehand the necessary preparations when the cessation of agricultural work gives them leisure. They only occupy themselves with the mulberry trees, when the season of tending the silkworms has overloaded them with trouble. In this manner they are overcharged with double work, and often the silk worms want necessary nourishment. If, on the contrary, these mulberry trees have been pruned, according to the rules, so that the branches can be easily reached, and the leaves obtained with facility, the silkworms will not wait for their food, the leaves will come in proper time, and, moreover, they will be thick and glossy.

The method used in the country of *Thsin* is called *lo-sang*. In the last month of the year, (January,) all the superfluous branches must be pruned away, and those that are left be much thinned; afterwards upon the branches that are preserved, four eyes must be left, and the others picked off. The next year the branches that were left will have become strong; the black twigs which will have grown from the middle of the eyes will be three feet in length; the leaves will be twice as thick as usual, and will present a smooth and brilliant surface. During the raising of the silkworms, they can be gathered with the hand; the external branches only, that shoot forth, must be left. After having grown luxuriantly, until the autumn, they will have obtained the length of eight or ten feet. In the last month of the year, (January,) they must be again pruned, as before. After the expiration of several years, if the branches that have been left appear to overload the tree, they must be pruned at their base.

This method is followed in the country of *Lo-yang*, to the east of the Yellow river; but a different mode is adopted north of this river, in the province of *Chan-tong*.

When the mulberry tree has attained the height of five to seven feet, from the period of its transplantation, the tops of the branches must be cut. As the branches of the centre have been removed, those that remain will grow in a horizontal direction, and extend outward. When the tree has become large and strong, a man can stand up in the centre.

When the tree has attained its *maximum* of strength and growth, the stalk and the branches must be cut in the centre.

There are three kinds of branches that must of necessity be removed.

1st. The branches inclining towards the root;

2d. Those which bend inward, towards the trunk;

3d. Those which grow in pairs; one must be cut;

4th. Those growing in a good direction, but which are too thick and too bushy.

The last month of the year, (January,) is the most favorable for pruning: the month that follows is less so. In the last month of the year the sap is quiescent, and the cessation of labor in the country leaves much leisure to the cultivators. Those persons who prune in the spring, only do it in order to peel them easily, (to make paper,) but that causes the mulberry trees to lose a great quantity of sap.

Those persons who wish to make use of the bark of the mulberry tree can take the branches, cut in the last month, (January,) and deposit them, with a southern exposure, in a hole, covered up with earth. They must be taken out in the second month, (March,) and they then peel very easily. [*Nong-sse-pi-yong.*]

From the Farmer and Gardener.

THE SILK CULTURE IN NEW JERSEY.

To the Editor—I have been spending a few days in the ancient city of Burlington; and as far as my observations and inquiries enable me to form an opinion, I should say that this was the head quarters of the silk culture in the United States. I have visited several places, whose fame in connexion with the advancement of this branch of industry, has been spread far and wide—and I have often been obliged to make diligent inquiries, before I could ascertain, *on the spot*, that any thing was doing at said places. But Burlington does not hide her light under a bushel: she places it on an eminence, so that all may see, and peradventure imitate her good works. You cannot pass along the pavements, without hearing questions asked about silkworms or mulberries: you can scarcely go into a house but you find the inmates engaged in feeding worms. All classes and conditions, from the dignified functionary of the government to the humble occupant of a village lot—rich and poor—publicans and sinners—have caught the contagion: and recently even a periodical—and a most respectable one too—has been established to promote the culture, and disseminate all useful information on the subject. And if you knew the character of the population here, you would say that the good work must succeed. You would be far from thinking it was the ebullition of the moment—a feverish paroxyism—a day dream; which would subside on the slightest abstraction of the stimulus which now supports and sustains it. Such, I take it, is not the character of this people. On the contrary, they are grave, sedate, industrious—not given to violent and momentary excitement—not liable to be entrapped, and inveigled by designing men, into speculative pursuits; but a people thoughtful and reflecting, forming their own judgments upon evidence, and when once formed, pursuing their object with an eye that does not slumber, and a wing that never tires. In this city, a large proportion of the population consists of the descendants of the illustrious Penn—remarkable, you know, for their industry, perseverance and neatness—and by the force of contact and example, these characteristics have been visibly impressed on all the surrounding population.

Gentle reader! who takest an interest in the progress of this interesting pursuit, you might spend a few days here with both profit and pleasure. You will have all your inquiries answered without hesitation. You will find nothing enveloped in mystery. You will see every one willing and anxious to impart all he knows—and finally, I think you will be convinced that the silk culture is no humbug.

POWHATAN

Burlington, 3d July.

From the Burlington Gazette.

THE MORUS MULTICAULIS.

It is known to the public, a considerable distance round Burlington, that large quantities of this most invaluable tree are now growing in the vicinity of this city. A larger quantity would have been raised the present year, but for the cold wet spell of weather which occurred at the planting season, causing numbers to rot in the ground; this was succeeded by a drought of three weeks' duration, accompanied by intensely hot weather, producing effects decidedly more injurious to the young sprouts, than the cold damp which preceded it. From these causes the crop of trees is very far short of what was expected. The plants which survived these disasters, are now growing with a luxuriance of foliage that realize to the mind by a single glance of the eye, the sterling value of the multicaulis for the production of silk. It is true that different modes of planting, and a different course of cultivation, have produced different *quantities* as well as different *qualities* of trees, some having succeeded better than others. But from the stock of trees now growing, it is certain that the short supply will be more than compensated by the high prices they will command. There can be no doubt that trees will sell higher the coming fall and spring than they have ever done yet. The character of the multicaulis is now well established in the middle states, from practical acquaintance with it, and it has lived uninjured, in the open fields of Burlington, during the whole of the past winter. As its value becomes better known, the demand for it increases from all parts of the United States. The high bounties on the production of silk which are given by the states of New Jersey and Pennsylvania, have been found sufficient to pay all the expenses of producing the cocoons and of reeling the silk, making the whole produce clear profit. This fact, when added to that of an acre of ground planted with trees two years old, producing a net profit of $300 to $400 per annum, has stimulated the farmers in various sections of the middle states to embark largely in the business of planting trees for the sole purpose of raising silk.

From notices we have read in our exchange papers, of nurseries in various places, an impression appears, to exist that all the trees now growing throughout the country are *for sale*. Nothing could be more contrary to the fact; and those persons who expect to make large purchases of trees this fall, will find themselves greatly mistaken. Some growers in our neighborhood could not be induced to sell at *any* reasonable price. We know one instance of a company which intended going into the business last spring, with a stock of 30,000 trees, being compelled to begin with about 5000 only, such was the impossibility of getting trees. Of all the trees now growing, probably but one-third are raised for sale—full two-thirds being grown to feed the worms. So far as the business has progressed in Burlington, it has answered every expectation that was formed of it. Very great profits have been realized from small lots of ground, and there is every prospect of our ancient city becoming the emporium of American silk.

SELECTION OF SEEDS.

The August No. of the Southern Agriculturist contains an editorial general notice of the contents of the July No. of the Farmers' Register, with the kind and approving tone of which we have reason to feel gratified, and find no exception to that feeling in the following comment upon our (alleged) heterodox opinion, and the vain attempts to defend that opinion from the attacks of assailants. We have often enough, in these volumes, readily confessed mistaken opinions, to free ourselves from the charge of holding obstinately to any, for the purpose of maintaining a claim to consistency. An agriculturist, more especially than other men, who never changes his opinions on the subjects of his profession, must necessarily remain as ignorant in the end, as his "consistency" would show him to be narrow-minded in the beginning; and one who does not frequently change his views of the relative advantages of practical details, must profit very little by investigation and by experience. It may be supposed, that the farmer or the politician who changes his opinion, is at least wiser than he had been before; and we have never valued the virtue of consistency of opinion so much as to defend our claim to it, if our brother editor had correctly understood and reported either our first declaration, or the alleged "unsaying of it." We shall not here repeat again at length what we have several times stated; but merely refer to all that has been said on this subject, to show, 1st, that we did not in any sense "venture a sweeping condemnation of those who look for profit in the selection of seeds;" and 2d, that we maintain now, as stoutly as before, that the *principle and manner of selection* which were condemned are worthless.

The following is the passage referred to:

"The Editor ventured a sweeping condemnation of those who look for profit in the selection of seed; he is met by one of his correspondents on the question, which it seems has two sides, and the strongest against him. Our unhappy brother finds himself involved in the necessity of unsaying his rash opinion; while he insists upon his consistency as sturdily as a politician who may happen to prefer the reputation of far-sighted wisdom, to a frank confession of mistake. The examples of benefit from the selection of seed, are too numerous and too familiar to daily observation, to leave a doubt that much depends upon it. Sometimes the opinion has been placed in unnecessary contrast, with the acknowledged advantage of an occasional change of seed from one climate or kind of soil to another. Which is productive of the greatest good, is not very easily determined. But there is no very plausible reason why both means of improvement should not be combined. For example, corn very fruitful in ears, or bearing ears of an extraordinary size, may be simultaneously cultivated in situations distant and differing from each other, and mutual exchanges profit both parties."

CAPONS.

To the Editor of the Farmers' Register.

Hanover, August 4, 1838.

Sir—Your last number has just arrived; and I see in it a communication, from some one who signs himself "Rusticus," in regard to capons. He says that he has never seen one in this country, and that every person of his acquaintance, who has attempted to make them, has failed. Now, there are living near me some young men who raise great quantities of fowls, and who, for their amusement, have performed the operation on several young cocks, and have succeeded in every instance but one, and that failure was owing to the bird being too large.

The capons are a good deal larger than a cock, their plumage, I think, much richer; and it is really a beautiful sight, to see half a dozen or so of these fine-looking birds in a flock. They take no notice whatever of the hens, are very cowardly, and have a cluck similar to that of a setting hen.

These gentlemen let me know, about a year ago, the day on which they would make some of them, and I went down, and found the operation a very simple one, and was able to do it myself, after having seen some two or three operations performed. After the next communication of "Civis," if his method does not agree with mine, I will let you have my *modus operandi.*

S. R. M.

From the Farmers' Cabinet.

HOW TO FORM A JUDGMENT OF THE AGE OF A HORSE BY HIS TEETH.

At two years old, the horse sheds the two middle teeth of the under jaw. At three years old, he sheds two other teeth, one on each side of those he shed the year before. At four years old, he sheds the two remaining, or corner teeth. At five years old, the two middle teeth are full, no longer hollow, as all the others are, and the teeth have penetrated the gums. At six years old, the four middle teeth are full, the corner teeth only remaining hollow: the tusks are sharp, with the sides fluted. At seven years old, the corner teeth are full, the tusks longer and thicker, and the horse is said to be *aged.*

Note. It is not meant that exactly at the periods above mentioned these changes take place in the horse; much depends upon his constitution; whether he be a late or early foal; also upon the manner in which he has been reared, as to food and shelter, &c. The corner tooth, too, might remain a little hollow after the age of seven, but the appearance is still very unlike the mere shells, which they are, at the age of six.

COMMON SCHOOL LIBRARIES.

[It will be seen, by the following article, that the legislature of New York has made an appropriation for common school libraries, upon the large scale of munificence and liberality, and enlightened regard to public interests, for which that great state has been distinguished, and by which wise course of policy it has already so eminently profited. New York is a *great* state, not so much by the natural advantages of her territory—great as these are—as by her wise and liberal legislation, for nourishing and sustaining education, agriculture, and all the important interests of the people. When shall we see the legislature of Virginia making even the tithe of the magnificent grant of that of New York, in the purchase of facilities for popular instruction, or any other mode for diffusing information, for the benefit of the agricultural community?

But while applauding the act, in general, its object and its tendency, we concur heartily with the editor of the 'Cultivator,' in preferring that the *subjects* of the books furnished should be very different. It is unnecessary here to repeat, in another form, the views presented to our readers in our recent remarks on the propriety of the state's furnishing agricultural books for the primary schools, (pp. 263-4); as all then said, if the case were applicable to Virginia, might as well be brought to bear on the libraries, as the ordinary school-books, for common schools. We are glad to have this indirect support of the editor of the 'Cultivator' thus given to our views. If his own excellent agricultural periodical were made to form so large a proportion of the school libraries of New York, as to be placed in the hands of every otherwise destitute boy, who is to be a tiller of the soil, it would be worth ten times the other value of the proposed libraries, and far more than the whole amount of the money appropriated for the annual purchases.—ED. FAR. REG.]

From the Cultivator.

We were unadvised of the fact, until we saw it announced in a late Jeffersonian, that the legislature made an appropriation at its last session, of $45,000 per annum, for three years, for the establishment of common school libraries. We fully concur in the sentiments expressed in the following extract which we make from the Jeffersonian, as to the salutary influence which this judicious appropriation is likely to have in enlarging the sphere of useful knowledge, and in improving the condition of the producing classes of the community.

"We trust no friend of the great cause of universal education, no parent, no youth, no lover of his country, has forgotten or will forget the provision so wisely made by our last legislature for the establishment and support of *common school libraries.* We feel a proud satisfaction in contemplating the fact that New-York stands forth in this matter a pioneer and a glorious example to her sister states. The law making provision for the distribution of the annual revenue of the new common school fund, (arising from the deposit of the late surplus revenue with the states,) appropriates forty-five thousand dollars a year exclusively to this beneficent purpose. Each district in the state is entitled to draw its share of this fund, proportioned to the number of its scholars; and, estimating the whole number of districts at forty-five hundred, this sum would allow an average of ten dollars to each district, or thirty dollars in the course of the three years' duration of the law. We believe this estimate is rather under than above the truth; and that, with a very moderate display of public spirit on the part of the people, a very comprehensive and most useful library may be immediately secured to every school district in the state.

"The great advantages of this noble enterprise, to that very large proportion of our citizens who are unable to buy large collections of books, cannot be over-estimated. Not alone to children and youth will its benefits be dispensed. Parents and others of mature years can readily avail themselves of the fund of useful and instructive reading, which is thus brought to their doors. Even should the library consist of but fifty volumes at first, each family in the district may draw one volume from it per week for the whole year, returning it at the week's end for another; and thus enjoying a supply of information and entertainment for the whole period without the cost of a cent. At the end of the year, a new instalment of the appropriation will be doubled, and another year's reading commenced. We firmly believe that in this way the library will be found a great auxiliary to the school, by creating a new interest in its management and its welfare. Should the district conclude to have a little gathering every Saturday evening, or some other evening, to exchange books, or return and draw again, a lyceum, or association for mutual improvement, would soon grow out of it, and still greater benefits be realized. Each parent and scholar would feel that he had a personal interest in the library, as well as the school; and thousands would spend their leisure hours in reading, which would otherwise be given, almost of necessity, to frivolous, if not corrupting amusements."

Thus far our quotation. But we are not prepared to go farther with the Jeffersonian—in its approbation of the selection of books designated and recommended as the *basis* of common school libraries. The Messrs. Harpers, to whom we accord great credit for their enterprise and industry, have printed, we are told, under the direction of the American Society for the diffusion of useful knowledge, a series of fifty handsome volumes, of uniform size and appearance, to be comprised in a neat case, and furnished at twenty dollars. These books, of which a list is given in the Jeffersonian, treat mostly of foreigners, foreign lands, and of matters foreign to the great pursuits of our country. They are the Lives of Bonaparte, Alexander the great, Peter the great, Oliver Cromwell, of celebrated travellers and female sovereigns; ancient and modern Europe, the Holy Land, the Crusades, Arabia, the Chinese, voyages, travels, &c. We see but eight volumes that seem from their title to relate particularly to our continent, and but about the same number that are written by Americans. But we do not recognize one, among these books—which are designed almost exclusively for an agricultural community—we do not recognise a single volume on agricutural chemistry, or on agricultural botany, or on agricultural geology, or on the mechanics of agriculture, the great modern lever which simplifies, abridges, and at the same time augments the products and profits of human labor; we see nothing on the veterinary art, or the management of cattle—nothing upon practical agriculture or horticulture—and little, if any thing, upon the moral, relative and political duties of life. The studies to which we have last alluded, ought to form the foundation, the basis, of a rural education; those selected might become auxiliary, or supplemental; or, the two classes might be blended like brick and mortar in the walls of a building, to give beauty, as well as solidity, to the structure.

It needs no argument of ours to convince any reasonable man, that the proper study of youth, is the business which is to employ them in manhood. Thus we give to the law student elementary books in the business which is to constitute his living; and to students in divinity and physic, the elementary books suited to their several professions; and we require a four years' study in these elementary works, in order that the student may fully understand the principles upon which he is to preach or practice, before we permit him to put on the toga of manhood, and to take rank with his profession. And shall not the student of agriculture, whose business embraces a wider range of useful science than either of the before mentioned classes, be permitted, during his minority, to study the elementary principles of *his* profession?—to store his mind with the precepts and practices of eminent men in that profession? We say, lay the *foundation* in usefulness—in that knowledge which will tend to make intelligent, useful and contented farmers, and good citizens, of the boys of our common schools. You may then build whatever superstructure you please upon this solid foundation, and embellish it to your taste.

But we are reminded, that we are treading on hallowed ground; that the society for the promotion of useful knowledge, with Gov. Marcy as its head, have sanctioned the selection that has been made, and, as if to silence every doubt, that Gen. Dix, superintendent of common schools, has also given it his approbation. Without wishing to derogate, in the least, from the high character of the gentlemen who constitute the society, or to depreciate their efforts to do good, we must be permitted to doubt their pre-eminent qualifications for selecting a suitable library for an agricultural community. Most of the gentlemen, we believe, belong to the learned professions, or to the mercantile class; and we are willing to award to them a high standing in literature and general science; yet few of them, we apprehend, know much of the practice or theory of farming, a business which stands first on the roll of usefulness, and which it is the interest of every class of the community to enlighten and improve; and they are therefore not exactly best qualified to promote this great object of national prosperity, be their intentions ever so patriotic. Or at least so we are obliged to infer, from the catalogue of books which have been published. And as for our highly respected secretary of state, he is no doubt well qualified to select a law or literary library, or to thread the mazes of politics—yet we should not venture to trust him, with all his qualifications, to select *our* library, or manage *our* farm. Would these gentlemen trust an association of farmers, however intelligent, to select their *professional* libraries? We think not.

But perhaps we are going too far: something on agriculture is promised in the next series, and we ardently hope it will be furnished.

After all, it may be said, and will be said, and by thousands of farmers too, that agriculture wants no auxiliary aids; that it has done well enough, heretofore, without the aid of books or of science—and that it can continue to do so. How would such a remark apply to the other arts of labor? Look at the cotton factory for instance—a yard of cotton goods may now be purchased for half the price which was paid for barely *weaving* a yard thirty years ago. The manipulations in most of the other arts have been so abridged by machinery, and the processes so simplified by science, that the fabrics produced by these labors are greatly lessened in price. In these arts, the improvements of the age are speedily registered and promulgated in books and periodicals. Mechanics and manufacturers know how to appreciate this sort of book knowledge; and it enables them to keep pace with the improvements of the age.

Not so our farmers generally. They have little intercourse with each other; they have no access to agricultural books, and many are too old or too prejudiced to seek for or receive information. The consequence is, that we are making slow progress in agricultural improvement, while agriculture is being made to double, treble and quadruple its products upon the old continent. Youth is the appointed time, and the only time that can be relied on, for implanting the knowledge and the principles which should guide and govern in the business of manhood—and of laying the foundation for good citizens and intelligent, prosperous farmers.

From the Maine Farmer.

TO PREVENT DOGS SUCKING EGGS.

It sometimes happens that the *sometimes useful, and sometimes useless* animal called a dog, finds out eggs are very good eating, and takes the liberty to "lay his jaws" to every one that he meets with—taking, also, like some other servants, with not quite so many legs—the meat to himself, and leaving the shell to his master.

A friend of ours once had a "Bose," which he was very found of, and which was in most respects, a very sedate, worthy sort of a dog, but he had the trick of sucking every egg he could find.

Having heard that a dose or two of tartar emetic would make him sick of that business, he accordingly tapped one end of an egg, put in a lot of the tartar emetic, and laid it down in his dogship's path, who forthwith helped himself to its contents, without ceremony. He was then kept without water, and occasionally, from time to time, supplied with a *medicated* egg, till Bose began to find that the very sight of them was a signal for a fit of sickness, and wisely resolved to quit the business, which resolve he kept, as a good and faithful dog should. If you have a "good for nothing dog," and he sucks eggs, shoot him. If you have a good dog and he sucks eggs—*doctor* him.

MANURING IN SOUTH CAROLINA. MARSH GRASS, MARSH MUD, AND LEAF-LITTERED COW-PENS.

Extract from the Address of Joseph E. Jenkins, to the Agricultural Society of St. John's.

All animal, vegetable, and many mineral substances, may be converted into manure. With the two first we are most conversant; the last has not yet sufficiently occupied our attention, with perhaps the exception of salt, which, as a component part of the marsh mud, has been long and successfully used. Some of our members have, within a year or two, used it in its raw state, but the results have not yet been sufficiently satisfactory, nor the trial sufficiently extended, that we should at present dwell upon them. On those gentlemen, we may with confidence rely for statements at the proper time. The manure most commonly in use amongst us, is vegetable, decomposed in our cow-pens, where leaves of trees (principally of the pine) are dunged upon and trampled by the cattle. It is the common usage of this section of country, to lay by, or more properly speaking, leave off working the growing crop at or about the tenth day of the present month, (July), after that period, it is considered by some of our best planters as rather hazardous to meddle with, as any new excitement, by stirring the earth around the root of the plant, which would cause a new growth, would at the same time cause a disastrous falling of the young fruit or capsules. We may consider it, therefore, as a pretty general rule, growing out of experience, (that best of teachers,) at this period as most advantageous to go to something else, and that something else is the collection of manure. We are bountifully supplied with all the requisites; the leaves of the pine appear to be prolific for the especial purpose of furnishing us with an excellent substance for our use. The borders of our rivers, which are numerous, intersecting our islands in every direction, abound in a highly nutritious marsh grass, of easy access, of a tender stalk, very convertible into muck manure. A few months' trampling, either in the cow-pen or stable, renders it a mass the most powerfully stimulative of any manure with which we are conversant, so much so indeed, as to have induced the belief, that its exhibition upon what is called table lands of a dark loam, has a tendency to cause the cotton plant to overgrow; and on lands impregnated with whatever substance it is that causes blue, to fall more certainly, and to run into vines. In this state, its product is beggarly indeed. I have seen portions of cotton fields, whose product was not a solitary pod.

Marsh mud is our next important material. This substance is abundant to superfluity, and the experience of every planter on this Island, with the exception of one or two, has sustained it as highly advantageous and profitable. Its tendency is to render loose lands more tenacious—to restore the original stamina to worn out or exhausted soils, causing thereon the stalks to hold the fruit, as in its virgin or original state, but it has been doubted whether it has a direct action in producing luxuriance of vegetation. This is a matter of little importance, and I shall not stop to consider it. There is a remedy, if it is so, which the very nature of the location points out emphatically to our view—this is simply a combination of the marsh grass with it. To effect this, two years ago I commenced the following process—eight fellows were furnished with scythes to mow down the marsh [grass;] eight more placed in boats and flats, to gather up and convey it to a place of deposit at the margin of the river. They thus conveyed each day sixteen cords, or a cord a piece for each hand employed. Day by day we did this, from Monday morning to Friday night, depositing along the margin of the river, within the reach of the high tide, consecutively, each day's cutting. On Saturday, at low water, all hands upon the plantation, both these and others, let their employment be what it may, were called, and with hand-barrows, covered the whole surface of the marsh with mud, from one to one and a-half foot thick. The weight of the mud compressed, and held firmly in its position, the marsh under it—the tide at high water passed through the compressed marsh, hastening wonderfully the process of decomposition, and at the time when it was taken up in the spring to be conveyed upon the land, it had (that is the marsh) a black look, as if ready to be resolved into its original elements. The hoes with which it was cut away, passed through it with peculiar ease and facility, as much so almost, as if it had been all mud. This process of making manure, recommends itself on several grounds—first, its entire and perfect mingling, and thereby meliorating the condition of each of two substances, the one thought dangerous from the excess of strength; the other held useless by some for the want of it. Secondly, the saving of extra carting to the cow-pen, to be trampled as in the usual way—and thirdly, the great facility with which they are brought to the place of deposit. I have seen the negroes, when cutting on the side of the river where the heap was to be made, leaving the boats, collect into great masses the cut marsh, and getting behind them, push up an immense quantity to the shore with the greatest ease. With the mixture thus collected last summer, I manured this spring fifty-nine acres, at the rate of forty loads to the acre, which I hold to be as profitable an investment of the work of sixteen hands for two months, as well can be made, being at the rate of three acres and three quarters to the hand.

The making of cow-pen compost, with pine trash and other leaves, was effected by the women. The light trash was raked up and placed at the edge of the woods, whence the trash carts conveyed it to the pen. Here I would remark upon the advantages which result from the proper structure of the trash carts. An entire body of light stuff, in open lattices, should be so fixed up at the sides and back, as that a two ox wagon should hold a cord of pressed leaves; two oxen in proper keep, will, with apparent ease, draw this much. These useful animals, patient and sturdy, require in the summer much care and attention—an inhuman driver, inattentive to their wants, will soon destroy them. They cannot work long without water; they require immeasurably more than either the mule or the horse to sustain them—but with this requisite properly attended to, they can perform from their superior strength, although slow of gait, almost as much work as either. The primest fellows, therefore, and most industrious, should be detailed for this service, otherwise time will be idled away in the morning, which to regain, the animals will be overworked in the afternoon, and thus suffer much maltreatment and abuse. Drivers of oxen should never be indulged in carrying large sticks in their hands; a small switch, or a thong of leather fastened to a handle, is quite sufficient, for these docile and tractable animals easily learn the word, and are as well so directed, indeed better, than by the most severe blows that can possibly be inflicted. Their yokes should be light, with the haimes or bows fitting tight around the neck; by allowing them to be too loose, they play upon the working of the shoulder blade, and inflict dreadful wounds, lacerating the skin in a shocking manner, and incapacitating the animals for the performance of one half their labor. With regard to the application of manures, that must mainly depend upon the previous state of the lands on which they are to be used. The usual quantity allowed to the cotton crops, is from twenty to thirty loads of compost to the acre, and from forty to eighty of marsh mud, but it is seldom that these extremes are reached, more commonly the lesser than the greater. The apprehension which, when we first commenced manuring, I heard expressed by some, that manuring would in the long run prove more injurious than beneficial, has I think entirely subsided. I presume there is not within the sound of my voice, I may say indeed within the bounds of this parish, a planter who would now be willing to subscribe to such an opinion. Like other schemes of improvement, it at first had its opponents, but like all useful innovations, it has outlived to detraction. Could I learn the name of the first man in this parish who made a compost pen, and had I it within my power, his fame should be spread abroad, and his name be immortalized; for he has rendered to us an inestimable blessing, and far be it from any one to withhold his meed of praise.

From the Farmers' Cabinet.

WHAT IS THE GREATEST QUANTITY OF MANURE TO BE OBTAINED FROM GIVEN MEANS.

Mr. Editor—There are in agriculture, as perhaps in every science, some leading propositions, calculated in a particular manner to arrest attention by their prominent importance. Such I hold that of a "Subscriber" in your May number—"*What will an acre of land produce?*" and also the question which heads this article.

Were it possible at once to afford a complete and palpable solution to these two propositions, what mind can calculate the vast increase of treasures that would instantly become accessible to humanity? As then, we cannot inquire too strictly, or know too much regarding them, I propose, after recapitulating a few of the principal statements of a "Subscriber" concerning the latter question, to furnish my own experiments upon the former.

He informs us that a single acre of his land, *with abundant manuring and superior cultivation,* was made to produce the sum of $348 40 cents per annum, for five successive years, besides the vegetables used in a small family. He further states in substance, as his present convictions that the quantity of soil cultivated has nothing to do with the secret of gathering money out of it; that "this altogether depends on a judicious selection of soil, *on the facility of obtaining manure;* and on the proper application of it as food for plants," &c.; that he found, by actual experiment, made upon a large scale, "that the profit of capital laid out in land produced an interest of only *five* per cent. per annum, the capital laid out in manure upon the same land produced *twenty* per cent."

Now, my own experience, as I shall presently show, abundantly confirms the probable accuracy of all these statements. Let us distinctly understand, then, that it is not the great quantity of land, but *the abundance of manure* upon a little, that is alone required to give wealth and independence; that the man who owns five or six acres may, (according to the above data,) with the aid of manure and good management, draw from $1,800 to $2,000 from them each year, while he of a hundred acres may scarcely obtain half of it upon the common plan.

But where is the requisite manure to be obtained that shall so suddenly and surely enrich the farmer? In reply to this, I will simply give my own experience, and by it endeavor to convince the reflecting farmer what amount can, and in fact *has* been made from means incomparably more limited than is generally imagined possible.

Previous to 1829 I had followed in Philadelphia a sedentary occupation, which, by excessive application in it, had so enfeebled my constitution, that I was obliged to seek in the country for that measure of health which I might no longer hope for in the city. So I bought, with my scanty savings, a small place of ten and a half acres, and moved upon it the same fall, of 1829.

Not being acquainted with farming, I hired a man to plough two and a half acres, and sow it in rye. The cost of seed and labor, in putting in, gathering, and thrashing the said crop, was $8 56 cents. The crop yielded five and a half bushels of very poor black rye, fit only for hay feed—say at forty cents per bushel, (as good rye was then selling at fifty-six cents per bushel,) was worth $2 02 cents, and the net loss sustained upon farming the ground was $6 36 cents. The season was moderately good for grain, and the two and a half acres rather a favorable specimen of the rest of my land! I planted a potato patch the following spring (1830,) of about one-fourth of an acre, which I manured in the hills with one load of marl only, and the crop yielded but three and a half bushels!

Being a total stranger to the nature and character of soils, but having previously, from some cause, entertained the notion that land in general produced about twenty-five bushels of wheat, or forty bushels of corn, or four or five loads of hay to the acre, the conviction I had now received of the absolute worthlessness of my land fell upon me like the shock of a thunder-clap. Discouraged by the greatness of my disappointment, but not quite confounded, I determined that manure, in future, should be every thing to me, and stand in the stead of both land and crop. Being greatly improved in health, by the change of situation and exercise, I plied my avocation with increased diligence for the maintenance of my family, and made it the amusement of my leisure hours and leisure moments to collect from every corner, and pannel of fence, every thing that I imagined could furnish a vegetable nutriment, and placed it in my cow-yard, so combined with the litter as to absorb and retain every thing of a putrescent character that might be deposited there. By such means I have gone on, every year increasing the quantity of manure, to an extent that I believe has astonished most of our neighbors. The following is a sketch of the means I possessed, and the methods I took to obtain manure for the present year.

I commenced last summer by collecting into the outer part of my hog-pen every thing of the weed kind I could find about the place, till I had a layer about twelve inches deep, which I covered with a layer of earth about five inches thick, continuing the process till the pen was filled to about two and a-half feet deep. In the fall I littered my loose corn-cobs and the principal part of the buckwheat straw into the pen, interspersed with layers of earth in the same manner. The two stalls of my stables I served also the same, taking care to save therein all the chaff and refuse straw after thrashing. In these stalls I poured weekly, through the fall and winter, (for I had no cattle in them except in bad storms,) the soap-suds and such putrescent fluids that might be obtained, keeping the corners, and outsides, and under the mangers, carefully saturated.

As soon as my corn was gathered in the fall, I cut the stubs close to the ground, and wheeled them immediately, *while yet heavy*, into the barn-yard, where I packed them in every part of it, and also under the shed, being an area of ground about forty feet by twenty, and in a few days covered them also with a layer of earth, from a fence-row close by, to the depth of about eight or ten inches. Upon this earth I foddered my cattle during the winter, occasionally depositing more earth upon the litter as it collected there.

Your readers will readily judge, that the object of all this preparation was not so much for the sake of saving the materials collected there as to obtain a menstruum, or rather *sponge*, if I may so call it, calculated to absorb and retain all the urine deposited in the yard during the winter. The compost masses, however, or layers, thus collected together, are not to be considered as manure prepared for the soil, but only as *materials* that require to be thoroughly *mixed*, in order to reduce them to a state fitted for a rapid and complete incorporation with the soil. Accordingly, with this view, I commenced late in April the operation of turning it, which, from its having become closely packed to the depth of twenty inches, with the stalks at the bottom, could only be done with the aid of a grubbing hoe, turning it in strips about a foot wide, reaching across the yard, and throwing the loosened manure back a sufficient space to allow a trench between, wide enough to work in. After removing the whole cover from the stalks along a strip, as before mentioned, they were easily grubbed up, first cutting them through all along the solid edge of the strip with the hoe, it being made pretty sharp for the purpose. In addition to this pile of yard manure, I have also emptied the contents of my hog-pen and stables, extending the pile several feet, and lying upon the ground, when first loosened, more than two and a half feet deep. Of this manure I have used sixteen loads this spring, for truck and garden, and, judging from the size of the pile yet remaining, there cannot be less than sixty loads, which, being turned once more, I intend to use for wheat next fall.

In this manner, from only three head of cattle, and the fattening of four hogs, I have made from seventy to eighty-two horse loads of manure, the highly fertilizing properties of which are abundantly attested by my own former experience. I will not say that it is stronger than the best barn-yard manure, but from its closer affinity to the nature of the soil, and greater facility for being rapidly combined and incorporated, without loss by evaporation, I have no doubt it will be frequently found, upon trial, more effective and more durable.

In the process of turning manure, thus prepared, I hold it of the highest importance to mix well the earthy and vegetable parts together. Few persons are perhaps aware how rapidly the earth facilitates vegetable decomposition, and to what a surprising degree *it absorbs the excess of fertilizing effluvia*, which must otherwise be evaporated during the process of decomposition. This circumstance, I believe, taken in connexion with the careful economizing of all animal excretions, constitutes chiefly the great secret (I might, perhaps, add *alleged* necromancy,) that has added already so much verdure to my previously exhausted soil, and been so profitable to me, and so surprising to my neighbors.

No farmer can imagine, that has not tried the experiment, what a prodigious quantity of rich, vegetable, and fibrous earth may be collected from corners and by-places, which lie out of the way of cultivation, and which, from their retired position, have, perhaps, never so much as attracted his notice. All such refuse trash, and fibrous earths and weeds, by being conveyed to his barnyard, at intervals, during the fall and winter, and judiciously combined with its contents, will be converted into a rich, fertilizing, and durable manure, merely by absorbing and retaining *that excess of putrescent fluids and effluvia*, which is otherwise lost by filtration and evaporation; that is, by soaking away and drying up. W. H.

Pittstown, Salem Co. N. J., May 20th, 1838.—

From the Farmer's Series of the Library of Useful Knowledge.

FLEMISH HUSBANDRY.

The poor sandy heaths, which have been converted into productive farms, evince the indefatigable industry and perseverance of the Flemings. They seem to want nothing but a space to work upon; whatever be the quality or texture of the soil, in time they will make it produce something. The sand in the Campine can be compared to nothing but the sands on the sea-shore, which they probably were originally. It is highly interesting to follow, step by step, the progress of improvement. Here you see a cottage and rude cow-shed erected on a spot of the most unpromising aspect. The loose white sand blown into irregular mounds is only kept together by the roots of the heath: a small spot only is levelled and surrounded by a ditch; part of this is covered with young broom, part is planted with potatoes, and perhaps a small patch of diminutive clover may show itself: but there is a heap of dung and compost forming. The urine of the cow is collected in a small tank, or perhaps in a cask sunk in the earth; and this is the nucleus from which, in a few years, a little farm will spread around.

In another spot more extensive improvements are going on; a wealthy proprietor or lessee is trenching and levelling the surface, sowing broom-seed, and planting young fir-trees, which are to be cut down in a few years. In another, the process has gone on further, the firs or the broom are already cut down: a vein of loam has been found, and is dug out to be spread over the sandy surface: the cart with liquid manure is preparing the surface for the reception of seed, or the same, diluted with water, is poured over the young blade just appearing above ground. The soil is created, and, if the cost and labor were reckoned, is paid for at a dear rate: but perseverance insures success, and there are few instances of improvements being abandoned, after they are fairly begun, unless they were undertaken on too large a scale; but then the land is soon divided into smaller portions, and improvements go on from different centres, and with more certainty.

We are here describing the labor of bringing a soil absolutely barren into a state of cultivation; but in most of the districts which have been originally waste and covered with heath, and which are now fertilized, a less ungrateful soil was found. Deep trenching and levelling at once presented a surface which required only to be manured to produce rye, flax, and potatoes. This is what we should call a moderately good sand, in which a small portion of clay and oxide of iron produces a certain degree of compactness, so as at least to retain moisture: under this kind of sand a stratum of loam is usually found at the depth of two or three feet, and, almost invariably between the sand and the loam, an indurated crust of earth cemented by carbonate of iron, which is well known to all improvers of poor sands by the name of the *iron pan:* this pan must be broken up and the loam under it mixed with the sandy surface, before any cultivation can succeed; and in this operation the Flemings are very dexterous. The instrument they use is a light wooden trenching spade, the end of the blade only being shod with iron: the handle of this spade is about two feet long, the blade from twelve to fifteen inches. A light pick-axe is used to break the pan where it appears. A ditch is dug with the trenching spade, two or three feet wide, and as deep as the trenching is intended, generally two feet, or at least twenty inches; this ditch is filled with the earth which is taken in long thin slices from the edge of the solid side of the ditch. Every slice is distributed carefully, so as to mix the whole, and keep the best soil at top, and likewise to fill up hollows and level eminences. If there is more than can conveniently be spread level, little heaps are made of the superfluous earth, which are afterwards carried, in an ingenious manner, to fill up more distant hollows, by means of horses and an instrument which is called a *mollebart*. Wherever there is a pan, it is carefully broken, and the loam, which is always found under it, is mixed with the sand dug out. Draining is seldom required here, except that which is effected by making deep ditches to carry off the superfluous rain-water, which, in a country almost as level as a lake, is no great difficulty. A canal near at hand is, however, an essential condition of extensive improvement, to bring manure, and carry off the produce of the land, as well as to be an outlet for the water in the ditches. When Count Chaptal traversed a barren part of Flanders, accompanying the Emperor Napoleon, the latter expressed his surprise, at a meeting of the Council of the Department, that so great a tract of land remained uncultivated in so industrious a nation. The answer was, "If your majesty will order a canal to be made through this district, we pledge ourselves that in five years it will be all converted into fertile fields." The canal was ordered to be made without delay, and in less time than they promised not an unproductive spot remained. (See Chaptal, "Chimie appliquée à l'Agriculture," vol. i. p. 347.) One great cause of the agricultural prosperity of Flanders is the ready transportation of manure and produce by canals. But to return to the newly trenched land. If there is no manure at hand, the only thing that can be sown on poor sand, at first, is broom: this grows in the most barren soils; in three years it is fit to cut, and produces some return in fagots for the bakers and brickmakers. The leaves which have fallen have somewhat enriched the soil, and the fibres of the roots have given a certain degree of compactness. It may now be ploughed and sown with buckwheat, or even with rye without manure. By the time this is reaped some manure may have been collected, and a regular course of cropping may begin. As soon as clover and potatoes enable the farmer to keep cows and make manure, the improvement goes on rapidly; in a few years the soil undergoes a complete change: it becomes mellow and retentive of moisture, and enriched by the vegetable matter afforded by the decomposition of the roots of clover and other plants. It is surprising that so few sheep should be kept on these new farms. Sheep folded would do good by their tread, as well as their manure, but the management and feeding of sheep is a part of husbandry in which the Flemings, with very few exceptions, are decidedly as much behind our light land farmers, as they are before us in the feeding of their cows, and preparation and economy of manure.

If about twenty small cart-loads of dung can be brought on each acre of the newly trenched ground, the progress is much more rapid. Potatoes are then the first crop, and generally give a good return. The same quantity of dung is required for the next crop, which is rye, in which clover is sown in the succeeding spring; and a small portion is sown with carrots, of which they have a white sort, which is very productive and large in good ground, and which, even in this poor soil, gives a tolerable supply of food to the cows in winter. Should the clover fail, which sometimes happens, the ground is ploughed in spring and sown with oats and clover again. But if the clover comes up well amongst the rye stubble, it is cut twice, after having been dressed with Dutch ashes early in spring. It is mostly consumed in the green state. The clover-ley is manured with ten cart-loads of dung to the acre, and rye sown again, but not clover. After the rye comes buckwheat, without any manure; then potatoes again, manured as at first, and the same rotation of crops follows. It is found that the poor land gradually improves at each rotation from the quantity of dung used: and, as this is essential, it will be easily seen that without water-carriage the improvement could not go on: for the necessary quantity of dung could never be brought to the ground by land-carriage through the deep sandy roads, which are mere tracks.

For want of sufficient manure, broom-seed is sometimes sown with the rye after the clover. The rye is heaped and the broom continues in the ground two years longer. It is then cut for fuel. The green tops are sometimes used for litter for the cows, and thus converted into manure. It is also occasionally ploughed in, when young and green, to enrich the land. Oats, clover, and broom are occasionally sown together. The oats are reaped the first year; the clover and young broom-tops the next, and the broom cut in the third. This is a curious practice, and its advantage appears rather problematical. All these various methods of bringing poor sands into cultivation show that no device is omitted, which ingenuity can suggest, to supply the want of manure.

After the land has been gradually brought into a good state, and is cultivated in a regular manner, there appears much less difference between the soils which have been originally good, and those which have been made so by labor and industry. At least the crops in both appear more nearly alike at harvest, than is the case in soils of different qualities in other countries. This is a great proof of the excellency of the Flemish system; for it shows that the land is in a constant state of improvement, and that the deficiency of the soil is compensated by greater attention to tillage and manuring; especially the latter. The maxim of the Flemish farmer is, that "without manure there is no corn—without cattle there is no manure—and without green crops and roots cattle cannot be kept." Every farmer calculates how much manure he requires for his land every year. If it can be bought at a reasonable rate, he never grudges the outlay. If it cannot be purchased, it must be made on the farm. A portion of land must be devoted to feed stock, which will make sufficient manure for the remainder: for he thinks it better to keep half the farm only in productive crops well manured, than double the amount of acres sown on badly prepared land. Hence also he does not reckon what the value would be of the food given to the cattle, if sold in the market, but how much labor it costs him to raise it, and what will be the increase of his crops from the manure collected. The land is never allowed to be idle, so long as the season will permit any thing to grow. If it is not stirred by the plough and harrows to clear it of weeds, some useful crop or other is growing in it. Hence the practice of sowing different seeds amongst growing crops, such as clover and carrots amongst corn or flax; and those which grow rapidly between the reaping of one crop and the sowing of another, such as spurrey or turnips, immediately after the rye is cut, to be taken off before wheat sowing. These crops seem sometimes scarcely worth the labor of ploughing and sowing; but the ploughing is useful to the next crop, so that the seed and sowing are the only expense; and while a useful crop is growing, weeds are kept down. These are the general principles of Flemish husbandry.

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The collection and application of manure is the great secret of Flemish husbandry. Upon their poor light soils nothing could be raised without an abundance of manure. It is, consequently, an object of minute attention to the Flemish farmer to collect as much as possible, and to apply it in the most advantageous manner. For this purpose the dung of the different domestic animals is generally kept separate, especially that of cows, from that of horses; the former being thought better for dry sandy soils, the latter for colder loams and clays. They look upon pigs' dung as being cold and inferior, adopting in this respect the opinions of the ancients. We think differently; but this may be easily accounted for. The Flemish store pigs are fed in the most miserable manner, and are merely kept alive on weeds taken from the fields, or by very scanty grazing in rough pastures. We need not be surprised, therefore, that their dung is poor. The cows are better fed, and their dung is consequently richer. Cow dung is thought to last longer in the soil, and its effects on the second crop are more conspicuous than that of horse dung, which stimulates more and is sooner effete. Sheep, which are so important to the light-land farmer in England and Scotland, for their manure, are not kept in sufficient quantities in Flanders, nor well enough fed to do much good to the land. They are commonly housed every night, and driven about in the day to gain a scanty subsistence along the roads and sides of the fields. The manure collected in the sheep-fold is carried out on the land, and its effects are duly appreciated. A flock is occasionally folded on a clover-ley before it is ploughed up, but never on the turnips, which are always given to the cows. This is owing to the small extent of the farms, which do not allow of a considerable flock of sheep being kept by any one farmer; but a flock is made up of different lots of sheep belonging to several proprietors, and put under the care of a common shepherd, or it is sometimes the property of the shepherd, who occupies no land, but lets out the sheep to fold, or sells the manure.

But the great auxiliary of the Flemish farmer is the URINE TANK, wherein are collected not only the urine of cows and horses, but also the drainings of the dunghills. The urine tanks are generally sunk below the level of the ground, and have the sides built of brick, and the bottom paved: they are of various dimensions, according to the numbers of cows and horses on the farm. Attached to the distilleries, where many beasts are constantly kept to consume the refuse wash, there are very large urine tanks of an oblong shape, divided by partitions into different chambers, so that the liquor may be of proper age when it is used, which some farmers think ought to be six months. Each chamber is about eight feet square and six or eight feet deep; these are sometimes vaulted over, but frequently only covered with loose boards. As urine and the emptying of privies are sold wholesale and retail, there are many large tanks near the rivers and canals, where the dealers have sometimes great quantities in store. Some of these consist of many square pits like tan-pits, bricked round, and the inside covered with a cement, which prevents loss by filtration. There is generally in a corner of each pit a graduated scale, by which the number of barrels, or tons of liquid in the tank may be ascertained by observing the height of the surface. These tanks are gradually filled by boat-loads brought from the large towns; and when the season arrives for sowing, in spring and autumn, the farmers come with their carts and tubs, and purchase as much as they may want. The price varies from three to five francs (two shillings sixpence to four shillings) per hogshead, according to the quality. In a small farm of thirty to forty acres the tank is generally about twenty feet long, twelve wide, and six deep, with a partition in the middle, and arched over, leaving an opening for the pump, and another sufficient to allow a man to go in to empty out the earthy deposit which falls to the bottom. A trap-door shuts over this aperture to prevent accidents. Sometimes the tank is round, like a well, with a domed top, and so deep in the ground, that it has a foot or two of earth over it. The situation of the tank is either in the farm-yard near the entrance of the cow-house, or immediately behind it; sometimes it is like a cellar under the building; but this is apt to cause a disagreeable smell in the cow-house. We here describe those which we consider the most convenient: the form and capacity of the tanks vary greatly according to the means and notions of the proprietors of the farms: but a tank of some kind or other is considered as indispensable an appendage to a farm as a barn or cow-house. The farmer would as soon think of dispensing with his plough as with his tank; and no expense or trouble is spared to keep this well suppled. The numerous towns and villages in Flanders afford great help in the way of manure. The thrifty housewife and her active substitute the maid, know the value of what in our households is thrown away or wasted and lost. A small tank, or a tub sunk in the ground in some corner contains all the liquid which can in any way be useful; soap-suds, washings of dishes, &c., are carefully kept in this reservoir, until, once a week, the farmer or contractor calls with his tub on a cart; and this, mixed with the contents of privies, which are frequently emptied, he keeps in large cisterns for use or sale.

But this supply is not always adequate to the wants of the farmer, and then he has recourse to rape cakes dissolved in water, or in the tank, which is expensive, and can only be profitable where flax bears a good price, this being the crop for which rape cakes are chiefly used as manure. Every means, therefore, of augmenting the supply of urine is had recourse to, and the most efficacious is the establishment of distilleries. These answer the double purpose of consuming produce and increasing manure by the number of beasts which are fattened on the refuse wash. It is calculated that every beast produces at the rate of ten or twelve tons of dung and twenty-six hogsheads of urine in the year. A moderate distillery has fifty or sixty head of cattle constantly stalled. Here then is a supply of manure for several hundred acres of land every year. Formerly there were a great many distilleries in Flanders, but the duty on spirits and the interference of the government has much reduced their number; so that the farmers complain of the loss of this manure, and the consequent deficiency of their crops.

The dung of pigeons and domestic fowls, where it can be collected in any quantity, is highly valued. The mode of using it is either in a dry and powdered state, to which it is reduced by thrashing with a flail, when it is sown with the seeds of leguminous plants, or else dissolved in the urine tank, and thus spread over the land. This manure is chiefly reserved for kitchen gardens; it promotes the growth of vegetables and produces no weeds.

The solid dung, from which the liquid has been allowed to run off into the tank, must be carefully attended to, that it may not be too dry and become *foxy*, as it is called, or burn. It is therefore mixed up with earth and any useless vegetable matter which can be collected into a heap or compost; and when it appears too dry some of the liquid from the tank is poured over it, to excite fermentation and accelerate decomposition, or it is merely watered, when there is sufficient strength in it to produce heat.

In order to increase as much as possible the quantity of solid manure, there is in most farms a place for the general reception of every kind of vegetable matter which can be collected: this is a shallow excavation, of a square or oblong form, of which the bottom has a gentle slope towards one end. It is generally lined on three sides with a wall of brick to keep the earth from falling in, and this wall sometimes rises a foot or more above the level of the ground. In this pit are collected parings of grass sods from the sides of roads and ditches, weeds taken out of the fields or canals, and every kind of refuse from the gardens: all this is occasionally moistened with the washings of the stables, or any other rich liquid; a small portion of dung and urine are added, if necessary, and when it has been accumulating for some time, it is taken out, a portion of lime is added, and the whole is well mixed together; thus it forms the beginning of a heap, which rises gradually, and in due time gives a very good supply of rich vegetable mould, or compost well adapted to every purpose to which manure is applied. The place where this accumulation is made is called in French a *croupissoir*, and in Flemish or Dutch *smoor hoop*, which may be translated *smothering heap*.

Besides the manure which is collected on the farm, the *vidanges*, or emptyings of privies obtained from the towns, and the sweepings of streets, a large quantity of peat ashes imported from Holland are used, principally as a dressing for clover. These are the ashes of the common fuel in use in Holland, and are sold in Flanders by the bushel, as the Newbury ashes are in Berkshire.

Wood ashes, after the greater part of the alkali has been extracted for bleaching, are still considered as of great use to the land. Soapers' ashes are in great request for cold heavy soils; and sugar scum from the refiners, if it could be procured in sufficient quantity, would be an excellent manure for every kind of soil. Where it can be obtained, they usually throw it into the urine tank; and the mixture is then considered as almost equal to the vidanges, which are looked upon as the *ne plus ultra* of manures. Soot is used as a top-dressing for wheat, or clover in spring, as it is with us. It is thought to destroy insects and hasten vegetation.

The weeds, which grow abundantly in all ponds, canals, and ditches in this level country, where the current is never rapid, are mown in spring, and used in the green state as manure for potatoes. They are laid in the furrows, and the sets placed over them; the furrow is then filled up by the plough, and the weeds decomposing very rapidly, greatly assist the growth of the potato plants: so rapidly do these weeds ferment, that much of their value is dissipated, if they are left only forty-eight hours in heaps before they are put into the earth.

The manner in which manure is applied to the land for different crops will be explained as these are separately treated of: but the general principle which pervades the whole system of manuring, is worthy of attention. Two great objects are always kept in view. The first is to obtain the most abundant crop of whatever is sown: the next is to impregnate the soil with an increasing power of production, if possible, or at least to maintain that which has been obtained. In consequence of this, almost every crop has a certain portion of manure applied to it, which varies according to the nature of the crop to be raised, and that which has preceded: experience having taught that some crops exhaust the soils more than others.

But it is not the mere surface that they desire to manure. They well know that the deeper the soil is fertilized, the greater will be the profit and the less the labor. They are not satisfied with enriching the land to receive the seed, they furnish food for the growing plant in different stages of its growth, if they think it necessary. There is in consequence no fluctuation in the growth, no check at a time when the plants require support. The seed is made to vegetate rapidly by being in contact with the rich juices of the manure; and hence a much smaller proportion of seed is required. The young blade is invigorated by a judicious watering, and is sooner out of danger of the attacks of insects.

Liquid manure is carried to the fields in common water-carts, which consist of two wheels and shafts, carrying a cask containing from sixty to one hundred and twenty gallons of liquid. The cask has in the under part a hole, two or three inches in diameter, secured inside by a valve: under this is a board a little slanting, to spread the liquid as it flows out of the cask. A man usually rides on the horse which draws the cart, and holds in his hand a string, which passes through a hole in the cask, and opens the valve when required. There is an advantage in riding on the horse, as it does not add to the weight of the load on the wheels, which in light soils would be apt to sink deep. In a momentary exertion it assists the horse by the weight on his back; and the heavy Flanders horses are well able to carry a man and draw a light load at the same time. When the cask is empty he trots home for another load, and no time is lost. It is astonishing what advantage there is in accustoming horses to trot when they have no load; it actually fatigues them less than the continued sleepy walk. Who would suppose that the Flemish and Dutch farmers surpassed us in activity? but whoever has been in the Netherlands in hay-time or harvest must acknowledge it.

The dung which is carried in a solid state, is generally used at a time when it is in a state of active fermentation, as it is then supposed to have the best effect. To ensure this in some districts, as the Waes country, where the minutest attention is paid to every circumstance which can increase fertility, the dung is laid on the field in moderate heaps, and on each heap a certain quantity of urine is poured to excite and renew the fermentation: when it becomes sensibly heated, the dung is spread out and immediately ploughed in. After ploughing in the manure, the land is left for some time, and then a second deep ploughing is given to incorporate the decomposed dung with the soil, but so as not to bring any to the surface. A short time before sowing, the liquid manure is poured over; and this enriches the surface to make the seed germinate sooner.

Lime is not much used in the light soils, but commonly in the cold and stiff. As it is generally brought from a distance, it is dear; and this prevents any extensive application of it. Marl is found in a few spots, and serves to improve the poorer lands within reach of it.

BONE MANURE.

In consequence of the extensive introduction of this new species of manure into our highly improved system of agriculture, thousands of acres that would have been doomed to nearly total barrenness have been brought under the most promising cultivation. As yet, the supply has not kept pace with the demand. It will somewhat surprise our readers, that, in the county of Forfar alone, 153,000 bushels of bones were used last year—a quantity which, at three shillings per bushel, would cost, as nearly as may be £23,000! This great supply came from Russia. But, for reasons not precisely known, the Russian government have issued an ukasé, whereby bones to be exported must, after the 1st of January next, pay a duty so high, that it is almost certain the supply from that country will be wholly cut off.—*Edinburgh Observer.*

From the Penny Magazine.

PIGEON-ROOSTS.

There is an extensive district of country stretching eastward from the head waters of the Ohio, through the northern parts of the states of Pennsylvania and New York, which, from the major part of the forest trees being beech, is known by the general appellation of the "Beechwoods." When there is a favorable season for the beech-tree bearing nuts, which is not always the case, the whole surface of the ground is strewn with them by the gales, about the period when the early snows begin to fall. The beech-nuts remain beneath the snow unmolested during the whole winter; about the time when the influence of the spring causes them to vegetate, myriads of pigeons are attracted to that part of the country, where they continue to sojourn, while this, their favorite food is in tolerable abundance. In case the temptation is exceedingly strong, the old birds will sometimes nest and breed again; the place they select being generally along some ridge or eminence, where the branches of every tree become literally loaded with their rudely-constructed nests. When the time of incubation is over, the neighboring settlers resort to the breeding-ground; and as powder and shot are expensive articles in the Backwoods, the woodsman's favorite weapon—the axe—is called into operation; such trees as are of a moderate thickness are hewn down, and hundreds of young and simple pigeons, some in the nests and others perched upon the branches, are brought to the ground. Bags and sacks are then put in requisition, and such as are of approved size are huddled by scores into those unsportsmanlike receptacles; whilst numbers of the rejected are left to perish by hunger, if they have unfortunately survived the concussion caused by the falling of the tree. When the parties get tired of "cutting down and picking up," and have got themselves and their horses (for many bring horses to those "pigeon frolics") pretty well loaded, they set out on an expedition of "pigeon peddling" among such as have either no time or taste to engage in this rude and barbarous recreation.

The breeding-ground is altogether distinct from the pigeon-roost; while the old ones are hatching their second broods, the young wanderers from the south are left to take care of themselves. Throughout the whole of the beechwoods there are low and swampy pieces of ground designated "Beaver Meadows." Those swamps, for the most part, are overgrown with tall coarse grass; and around many of their margins grows a profusion of alder bushes, seldom attaining more than fifteen or twenty feet. Why or wherefore the pigeons select those bushes for their roosting-places might be somewhat difficult to conceive, since the forest-trees in the immediate vicinity would afford them much greater security; but such is the case at present, and such it is known to have been.

Although the nests and their inhabitants are exceedingly numerous in the forests where they breed, yet the number of pigeons that roost in one of those "alder-swamps" upon which they chance to fix as a rendezvous, surpasses all belief. There are thousands and tens of thousands, and in some cases hundreds of thousands! and they are therefore so closely stowed together that they support and rest upon each other. The assailants, instead of going armed with guns, or even with axes, carry a pretty long pole or club, and a few dry pine-knots, to light up when they get to the roosting-place, not forgetting sacks wherein to deposit their victims. Having reached the pigeon-roost towards midnight, a light is struck, and the blaze of one or two of the pine-knots astonishes and confounds the unsuspecting occupants of the branches over-head. They move to and fro, they flutter, but do not attempt to quit the bushes, seemingly determined to retain possession of their roosting-place regardless of consequences. While one person holds the torch the other is busily engaged in dealing destruction; when in that particular place the ranks of the poor innocents seem somewhat thinned, the killed and wounded are placed promiscuously in the sacks, and in some other part of the roost the former scene is reacted.

Those torch-light excursions yield more than abundance to the adventurers; yet it generally happens that they resort by daylight to the scene of their nocturnal deeds, where they seldom fail to meet with scores of the dead and wounded birds they had overlooked in the hurry and darkness of the preceding night. It is exceedingly strange, that among the thousands of pigeons taken in the manner here described, there never happens, by any chance, to be any old birds! As soon as the second broods are capable of accompanying their parents in their onward journey to the far regions of the north and west, they all as with one accord, leave this section of country; for by this time their favorite food—the beech-nuts—is quite exhausted.

From the Southern Review.

ON MANURE.

Extract from an article on the "Principles of Agriculture," by Professor Thomas Cooper.

By a manure, in popular language, is meant any animal or vegetable substance added to the soil, which will undergo, or which has previously undergone decomposition by putrefying.

More accurately, manures comprehend any addition to a soil, by which it is rendered more capable of promoting the growth of vegetables planted in it.

Hence, a manure may act by altering the mechanical texture of a soil, *in relation to the roots* *of plants planted in it;* so as to enable them to take firm hold of the soil for support, or to penetrate more easily into the soil, in every direction that the roots may require. As when clay is added to sand, or sand to clay, to make it more or less adhesive.

A manure may also alter the texture of a soil, *in relation to its capacity for imbibing or retaining moisture.* The hot climate and long-continued droughts of the Carolinas and Georgia, require a different texture in this respect, from the moist and misty climates of Ireland, or the highlands of Scotland.

A portion of clay consisting of one hundred parts by weight, being wetted until no more water would drop from it, was found to have imbibed and retained two times and a half its weight of water: the same weight of chalk (carbonate of lime,) retained one half its weight; and the same weight of silicious sand, one quarter of its weight. These experiments made by Bergman, are cited by Mr. Kirwan, in his treatise "On Manures," (p. 45.) The experiments of Fabroni are to the same purpose. Hence, whether the first mentioned, or the last mentioned intention be required to be fulfilled, clay or marl is a proper manure for sand, and sand for clay, and calcareous earth for both. But the constituent portions of the various earths in a soil, fertile as to its capacity for retaining moisture, cannot be ascertained until very many facts and experiments have been observed and detailed, beyond what we know at present: and in relation also, not merely to the quantity of rain that falls in an average of years on a given place, but to the relative proportion of dry and wet weather on the average of a series of years. Thus, at Stockport and Manchester, in England, the yearly fall of rain will be about 36 inches, according to Dr. Percival, and the number of rainy days may amount to 234 in a year, as a friend of ours has counted. As many cubic inches of rain may fall in Charleston in a dozen days, as in the 234 days of rain in the neighborhood of Manchester; so that the expression of a moist and rainy climate, relates not so much to the quantity of rain that falls, as to the number of days and hours the rain occupies in falling. Fifty inches of rain per annum, with three months of drought, will not constitute a rainy climate.

Probably, five parts of silicious sand, three parts of calcareous earth, or carbonate of lime, and two parts of pure argillaceous earth, would be a mixture that might deserve to be regarded as fertile, as to the view now under consideration. The proposal of General Beatson to manure with clay baked in an oven, or half burnt, so as to be perfectly friable and pulverizable without losing its capacity for imbibing and retaining moisture, seems to us an improvement of no slight importance. Trusting to his description and calculations, we regard the expense as very moderate. So treated, the clay can be ground into a coarse powder, and intimately mixed with the soil which it is meant to improve.

Besides the ways and manners above mentioned, manures may be applied also to *stimulate the living fibres of the plant;* and they may be applied as a pabulum or food, *to nourish the plant.* Hitherto, in all the British publications on manures, they are considered either as acting mechanically, or by their chemical decomposition as affording the substances which are taken up as nutriment. Kirwan, indeed, "On Manures," (p. 48) seems to think that saline substances may act as condiments to plants; and enable them to take up more food. His excepting gypsum, arose from his considering this substance as a septic, a promoter of putrefaction in vegetables; and, therefore, as having no other action than what it exerted on the dead matter employed as a manure. Sir H. Davy, in his fifth Lecture, seems to think it necessary to combat the notion that vegetables are possessed of *life* in the same sense as animals; whose life he seems to consider as emanating from a superior immaterial principle. We shall cite the passage in a note,* and only observe upon

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* *Elements of Agricultural Chemistry,* (p. 170.)—"It is impossible to peruse any considerable part of the vegetable statics of Hales, without receiving a deep impression of the dependence of the motion of the sap upon *common physical agencies.* In the same tree, this sagacious person observed, that in a cold cloudy morning, when no sap ascended, a sudden change was produced by a gleam of sunshine of half an hour, and a vigorous motion of the fluid. The alteration of the wind from the south to the north, immediately checked the effect. On the coming on of a cold afternoon after a hot day, the sap that had been rising began to fall. A warm shower and a sleet storm produced opposite effects." [Well: is there any physiologist who denies the effect of heat and cold, upon physiological action? Are not the manifestations of life in the winter-torpidity of cold-blooded animals dependent on these changes?]

"Many of his observations likewise show, that the different powers which act on the adult tree, produce different effects at different seasons. Thus in the early spring, before the buds expand, the variations of temperature, and changes of the state of the atmosphere, with regard to moisture and dryness, exert their great effects upon the expansion and contraction of the vessels; and then the tree is in what the gardeners call, its bleeding season." [And is not the physiological effect of atmospheric dryness and moisture equally apparent in the human frame; in phtisis, in asthma, in rheumatism, in gout?] "When the leaves are fully expanded: the great determination of the sap is to these new organs. Hence, a tree which emits sap copiously from a wound, while the buds are opening, will no longer emit it in summer when leaves are perfect; but in the variable weather towards the end of autumn, when the leaves are falling, it will again possess the power of bleeding in a very slight degree in the warmest days, but at no other time." [Who ever doubted that heat and cold acted respectively as a stimulus and a sedative on the animal fibre?]

"In all these circumstances, there is nothing analogous to the irritable action of animal systems. In animal systems, the heart and arteries are in constant pulsation. Their functions are unceasingly performed in all climates and in all seasons; in winter as well as in spring, upon the arctic snows and under the tropical suns. They neither cease in the periodical returns of their nocturnal sleep, common to most animals, nor in the long sleep of winter peculiar to a few species. The power is connected with animation, is limited to beings possessing the means of voluntary locomotion; it co-exists with the first appearance of vitality, it disappears only with the last spark of life." [Can Sir H. Davy tell us how the partial suspension of vitality during winter in vegetables, differs from the same phenomenon in cold-blooded animals? Have not both the one and the other a vital power of resisting to a great degree, the effects of cold, and of preserving the vegetable and animal temperature unaffected by the atmospheric change? Can Sir H. Davy make the alligator it here, that a man may be an excellent chemist, and a miserable physiologist; and that his notion of the life of animals being a sub-agent of some governing superior principle, will carry him just as far beyond the bounds of common sense, as of orthodoxy. This is reviving the Archæus of Van Helmont, and the Anima of Stahl. That the superior immaterial principle which is usually ascribed to man, as a characteristic of his species, is common to the whole tribe of animals from the human being to the musquito, the oyster or the earth-worm, is an opinion not warranted by known facts or sound philosophy.

The best account we can give of a vegetable and animal, is nearly that of Mr. Keith, in his *System of Physiological Botany*, (Vol. II, p. 471. London, 1816.)

A vegetable is an organized and living substance, springing from a seed or a germ which it reproduces: effecting the development of its parts by the introsusception and assimilation of *unorganized* matter, derived from the soil by means of the roots, or from the atmosphere by the action of the leaves; and possessing fibres irritable and contractile on the application of stimulus; but possessing no nervous apparatus, serving as the organ of feeling or of voluntary locomotion.

An animal is an organized and living substance, springing from an egg, or embryo, which it again produces; effecting the development of its parts by means of the introsusception of *organized* substances or their products: possessing fibres irritable and contractile on the application of stimulus; and a nervous apparatus, the organ of perception or feeling, of intellect, of moral qualities, and of voluntary motion.

Animal matter can generally be distinguished from vegetable matter, by the strong phosphoric odor which the former does, and the latter does not exhale while burning.

and the sea-horse, or the white bear, companions of the same climate.]

"Vegetables may be truly said to be living systems in this sense, that they possess the means of converting the elements of common matter into organized structures, both by assimilation and reproduction." [In the name of common sense what are these but the peculiar and characteristic powers of life? Of life, acting independently in these respects of any law of mechanical or chemical philosophy? Is the production of progeny one of the common *physical agencies?*] "But we must not suffer ourselves to be deluded by the very extensive application of the word *life*, to conceive in the life of plants, any power similar to that producing the life of animals. In calling forth the vegetable functions, *physical agents* alone seem to operate; but in the animal system, these agents are made subservient to a superior principle. To give the argument in plainer language, there are few philosophers who would incline to assert the existence of any thing immaterial in the vegetable economy"—[no more than in the animal economy of a elephant, or a sponge.] "Such a doctrine is worthy only of a poetic form. The imagination may easily give dryads to our trees, and sylphs to our flowers, but neither dryads nor sylphs can be admitted in vegetable physiology; and for reasons nearly as strong, *irritability and animation ought to be excluded.*" [Upon this strange assertion, it will not be unfair to observe, that Sir H. Davy ought to have furnished more unexceptionable reasons, in support of an opinion, contradicted by every known botanist and physiologist, during a century past, and universally rejected in the present day.]

It is probable that the decompositions and combinations which take place during digestion, assimilation and secretion, both in animals and vegetables, are results of galvanic action, put in force by the principle of life; but no other power or principle than that of life, can account for reproduction, as the result of the stimulus given to the ovum, the seed or the germ, by the male of every species, both in vegetables and animals. No chemistry of the laboratory, no "physical agency" can explain this.

The introsusception, digestion, assimilation and secretion of food, both in animals and in vegetables, are processes carried on in direct defiance of all mechanical and chemical laws of action, (Sir H. Davy's Physical Agencies,) chemical action takes place and prevails in dead only, not in living matter. The living powers of vegetables and animals counteract and control chemical action.

That irritability, contractility, and increased action, can be produced in the vegetable as well as the animal fibre, by the application of any stimulating substance, is well known to botanists; particularly in the more manifest instances of the mimosa, the dionœa muscipula, the drosera, the cactus tuna, the berberis, the stylidium glandulosum, &c. So, the action of light upon the motion of a plant; the action of heat on the development and maturation of leaves, flowers and fruits; the attraction of distant nutriment and moisture on roots, and above all, the phenomena of impregnation and assimilation, seem to have no more to do with Sir Humphrey Davy's Physical Agencies than they have with the phenomena of a game of chess, or the music of a ball-room. Can any "physical agency" account for the apparent voluntarity that so frequently takes place in the impregnation of the water-lily? Or for the sleep of plants, or the incessant motion of the leaves of hedysarum gyrans? Respect for the well-earned reputation of Sir H. Davy, as a chemist second to no other, has induced us to dwell upon this refutation, perhaps needlessly. We shall, therefore, proceed, and in the course of our reasoning, consider a plant as other botanists and physiologists consider it, a living being.

Manures then may act by *stimulating the fibres of a plant to stronger action.* By inducing them to eat and drink more, and digest and assimilate more perfectly: as when we take pepper and mustard, and salt and wine in reasonable quantity, or quinine, when vital action is languid. Also, by exciting the healthy living fibre to throw off a diseased or dead fibre; as we apply stimulant applications to ill-conditioned sores to excite the healthy parts to slough off the diseased parts.

The substances used that produce this effect, are generally lime, gypsum, salt and soap-boiler's ashes. Hitherto, they have been employed empirically; the point of view in which they are now considered, was hinted at by Kirwan, in a solitary sentence already quoted, and stated at length in Cooper's edition of the *Domestic Encyclopædia;* but no where else that we recollect.

If these substances do not act as forming part of the pabulum or food of the plant; if they do not act by altering the mechanical texture of the soil, there is no other mode of accounting for their action than that now suggested; unless, indeed, we recur to Kirwan's theory of their *septic* power, which is by no means established by experience in practice, or by sufficient experiments instituted for the purpose. Nor if it were, will it account for the effects produced. We are not prepared or disposed to deny, that these substances, employed in useful proportions, *may* act as septics upon undecomposed manure in the ground; but nothing certain of this nature is yet known on sufficient authority.

They do not constitute the food of plants. Nothing can enter into the composition of a plant, unless accidentally, that is not an essentially component part of a vegetable. We find silicious, aluminous, calcareous earths in plants; we find common salt, gypsum, soda, potash, phosphate of lime and other substances in plants, when these substances are found in the soil wherein the plants grow. But the same plants can and do grow to perfection without them. When these substances are dissolved in minute quantities in the juices which the plants by their roots drink up from the soil, they will of course enter into the sap; and if the vital power of the secretory vessels be not strong enough to excrete them, they will be deposited in the vessels and joints of the plants. As the silicious tabasheer in the joints of the bamboo; as the silicious earth in the straw of the cerealia, and the scowring flag. So, the charcoal of an old tree will very often strike fire with steel; not so the charcoal of a young tree. So, gypsum has been found in rhubarb, and calcareous earth in potatoes manured with lime. So, the salsola sodæ will yield soda near the seaside, and potash, when planted for some time inland. All these instances are manifestly cases of accidental product and the substances enumerated are by no means essential parts of the plants wherein they happen to be found.

I conclude, therefore, that they cannot be considered as pabula. Moreover, the increase in weight of vegetable food from these manures cannot be accounted for from the weight of the manure put on. Thus we were present at the laying out of a clover-field, of which one half was sown with clover without manure of any kind, and the other half was sown with ground gypsum after the clover had just appeared above ground, in the proportion of not quite two bushels, but more than a bushel and a half to the acre. The clover hay from the unmanured part, was a ton and a half per acre; and double that quantity from the portion of the field manured with gypsum. Now, the quantity of gypsum employed, even if every particle of it had been taken up and converted into food, could not have added more than its own weight, or about 120 lbs.; but its effect was, to produce an increase of a ton and a half. So, when lime is strewed on the soil, it remains there; it is not eaten and digested by the plant. Both lime and gypsum also, are manures for more than one or two years. Hence, the increase of vegetation cannot be accounted for from their mechanical action, or from any chemical action, or from their forming any part of the food of plants. As to chemical action, it is none; for gypsum is not decomposable in the common atmospheric temperature; and the lime in a week becomes carbonated by attracting carbonic acid from the atmosphere.

As to common salt, we know too little, experimentally, about it. Mr. Legrand (*Young's Annals of Agriculture*, Vol. V. p. 149) found that so far as sixteen bushels per acre, it was a useful manure; from thence to forty bushels, it gradually destroyed vegetation. Mr. Parke, the chemist, published a letter on the advantages of using salt as a manure, which Judge Peters procured to be republished in Philadelphia, but we know no result of experience on this subject.

Soap-boiler's ashes are a common manure in England; they consist of Glauber's salt, common salt, sulphuret of soda, and various impurities, whose action can only be explained on the suggestions we have just made.

Sea-sand, the mud of salt marshes, and other substances of a saline nature, must be referred to the same explanation. They are all stimuli—they irritate the fibres of the roots—they excite stronger action. The perspiration from the leaves in a clover-field manured with gypsum, is obviously increased, as well as the general vigor and growth of the plant.

Manures may act by *furnishing nutriment to the plant:* as a pabulum or food, convertible into the substance of the plant itself. Nothing can be an essential part of a plant that does not, when decomposed, furnish the substance of which a plant consists. Of what substances does a plant consist? Take a piece of oak-wood, fresh from the tree; weigh it; cut it into small pieces; put it into a glass retort; lute on a glass receiver; and to this, lute on also a bent glass-tube to go under the shelf of a pneumatic trough, and convey into inverted receivers the gases that would otherwise escape; apply fire gradually; distil and receive all the products. First, an aqueous and acid vapor will come over, which may be condensed in the receiver. This is accompanied with an empyreumatic oil, and is, in fact, the pyroligneous acid procured by the gunpowder-makers, when they distil wood to make their charcoal. Then come over gases, viz.: carbonic acid gas, carburetted hydrogen, carbonic oxide and hydrogen. In the the retort, when more products come over, you get charcoal, the same bulk as the wood, and about one-fourth or one-fifth part in weight.* Burn the charcoal, and about one part in 250, by weight, in an old tree, will be ashes; the rest will burn away in the open air, in the form of carbonic acid gas. Of these ashes, part are carbonate of potash, and the rest, earths of the same nature with the soil in which the tree grew. The carbonate of potash in the ashes of oak-wood, amounts to about four pounds in a bushel, or 1-15 part. In hickory they amount to six pounds in a bushel of ashes.

The essential oil of the pyroligneous acid, is convertible by means of a red heat in an iron retort, into carbonic acid and carburetted hydrogen; that is, into carbon and hydrogen.

The acid liquor, which is vinegar, is formed out of oxygen, carbon and hydrogen.

The water is oxygen and hydrogen.

The gases that come over, are chiefly carbon and hydrogen; in the carbonic oxide, a small quantity of oxygen.

The earths are not essential to the plant, either in kind or quantity; and the alkali is about $\frac{1}{15}$ of

* By the experiments of Mr. Mushet, of the Clyde iron works, 100 parts by weight of oak-wood, furnish 76,895 of gas, water and acid; 22,682 of charcoal; and 0,432 of ashes, of which last, we know about 1-15th is carbonate of potash.

$\frac{1}{250}$th, and of this nearly one-half is carbonic acid, which is oxygen and carbon.

Hence, a plant may be considered as composed of carbon and hydrogen, with oxygen in a far less proportion than either.

Suppose we take pine-wood instead of oak: the only difference will be, that from the resin of the pine we shall obtain more carburetted hydrogen by means of a red heat, but the elements of the plant will be the same; and so will it be whatever plant we take for the experiment. In this analysis nothing is lost. The whole plant, decomposed into its elements, is there. Hence, if a plant contain nothing as a uniform and constant part of it, but carbon, hydrogen and oxygen, and about $\frac{1}{7000}$th part of potash, nothing can afford nourishment to a plant; but what is decomposable into carbon, hydrogen, and oxygen, either spontaneously when exposed to the atmosphere, or by the action of the vegetable organs of the plant itself.

It is true, in some plants already mentioned, and which contain gluten and albumen, nitrogen becomes a constituent part; this can be furnished either by the atmosphere, or by animal manure.

We make use of chemical reasoning and chemical terms, and we call in the aid of physiology, because we are not addressing ourselves to the servant who ploughs the ground, but to his master. It is in vain to suppose that the theory of husbandry can be understood by a man who is not well acquainted with the elements of chemistry and physiology. This last most useful branch of knowledge, is strangely neglected in our colleges and universities; although it lays at the root of all physics, of all metaphysics, and of every disquisition relating to the nature of animals and vegetables. The wagon loads of words without meaning, that an accurate knowledge of the elements of physiology would enable us to dispense with, is truly astonishing. But, *à nos moutons*.

Under what forms, when applied, are carbon, hydrogen and oxygen taken into a plant as nutriment?

What parts of the plant does nature employ for the purpose?

Hazenfratz and Kirwan were both persuaded that carbon was the chief pabulum of plants. It is true, that we procure from 20 to 25 per cent. of charcoal, and that the carbon in the condensed liquor, and in the gases obtained, is considerable: but, we should probably mistake, in ascribing more than one-half of the weight of a plant to carbon; the hydrogen and the water (hydrogen and oxygen) will, probably, make up the other half.

Carbon alone, whether applied in the shape of charcoal, coal, or soot, is utterly indecomposable. Sir H. Davy says he dissolved a small part of charcoal in water in a tube hermetically sealed: but the only experiment really worth noticing, is one by Arthur Young, who dissolved charcoal by boiling it in a solution of carbonate of potash; in which form, it was a most powerful manure. I know of no way in which it can become part of the food of plants, but when taken up by the roots in its nascent state of extrication, by decomposition of the substances, fluids, or gases containing it, or by the decomposition of atmospherical carbonic acid by the leaves; which, indeed, is the great source of its supply.

Hydrogen is found in connexion with water, and almost every other decomposable substance acting as a manure, whether producing fluids or gases.

Nor is there any difficulty in accounting for oxygen contained in plants, so abundant on every side are the sources of it.

But let us examine the most usual manures of nutriment.

Stable-yard manure.—As this has been a vegetable before, there can be no difficulty in conceiving that it may become a vegetable again. It has either fermented into the soluble butyraceous mass of the old farm-yard management, or it is employed fresh, and permitted to undergo a gradual decomposition in the soil. In the first method, it acts sooner, and in the same quantity more efficaciously: but this management of a dung-heap, occasions a loss of at least one-half of the nutritious matter, dissipated in the various gases that are extricated, or permitted to run away by the rains falling on the dung-heap. Every such heap of dung should have a covering over it, to preserve it from excessive heat and from moisture.

The great advantage of a long previous fermentation of the dung, especially when mixed with fresh lime, *is to kill the seeds of weeds*, which the mere digestive powers of horses and cattle are unable to effect. In every other respect, the most advantageous and economical use of dung, is to plough it under ground in its fresh and recent state.

Night-soil:—Beyond all doubt the most powerful and efficacious of all manures. It would be no exaggeration to say, that if the economy used by the Chinese, or even by the French and other inhabitants of the continent of Europe, were used in America, at least ten millions worth of produce might be added to the crops of this country. In France, the *fosses d'áisance inodores*, and the dried night-soil sold as a poudrette for manure, are in common use. This substance should be mixed with at least an equal quantity of slacked lime, which takes away all odor, and then, with three or four times its quantity of common earth, and made into a compost.

Mud from ponds—the cleanings of ditches, &c.; Require to be previously fermented to kill the seeds of weeds.

The sweepings of streets are liable to the same remark.

Ground bones.—These contain phosphate of lime, carbonate of lime, and from one-third to one-half of animal gelly fat, and albumen. In Paris, bones are employed in the manufacture of portable soup. The bones are boiled in water to get at the fat and mucilage; and they are digested in diluted muriatic acid for about ten or twelve days; then washed in cold water to separate the solution of lime and phosphate of lime: the transparent gelatine remains in shape of the bone. It is dissolved in boiling water; it is flavored to the palate of the cook who manufactures it; concentrated into portable soup, and so sold.

When young, we attended a veterinary school in London, and a repository of dead horses, at St. John's, Clerkenwell. Let us give the history of a DEAD HORSE. The owner sends him to the currier, to whom he is worth about half a guinea. The currier sends him to the repository, where he is skinned, and dissected before the pupils who attend, and who pay from a guinea to two guineas a year for the privilege. The currier takes the skin. The flesh is cut off, boiled, and sold to the retailers of cats' meat and dogs' meat, who sell it about the streets of London at three half-pence per pound. The bones being broken and boiled, the fat, when cold, is taken off and sold to the makers of cart-grease for carriages. The bones are then ground by means of a steam-engine, and sold in powder to the farmers, to be used (like soot) as a top dressing for wheat: both these manures containing volatile alkali when decomposed, and supplying nitrogen. The bones contain, after being boiled, full one-third of their weight of animal gelatine, which, undergoing putrefaction and gradual decomposition, becomes a valuable manure. All the bones from the plains of Waterloo, were actually collected and exported to England, principally to Hull. The price of ground bones at that port, about three years ago, was 2s. 10½*d.* sterling per bushel.

The bodies at Waterloo, were first searched over for money, watches, trinkets and clothes. Then came the purveyors of human hair, for the supply of the makers of false hair, wigs, curls and frizettes; then came another class, who extracted from the dead bodies, all the sound teeth, for the supply of the dentists; then, when the flesh had putrefied, the collectors of bones searched the field for *their* harvest.

Frequently, the ground bones, instead of being bought by the farmers for manure, are sold to the manufacturers of volatile alkali and sal ammoniac, for distillation; sometimes, for the hafts of knives and forks, and the common imitations of ivory.

Woollen rags, refuse parings of skins, and other animal matters, having previously been vegetables, are well adapted, by gradual decomposition, to be converted into vegetables again.

Spring crops of tares, vetches, buckwheat, or any other vegetable sown early, and ploughed in, just as they begin to flower, constitute a very judicious mode of supplying manure to the earth, when no other is to be procured. It may be asked, if you plough into the ground the crop which the ground has already nourished, what do you gain? The reply is, you gain the whole of the nutriment that the crop has acquired from the air, and from the decomposition of water: an amount of nutriment, probably, equal to one-fourth, *at least*, of what the plant can furnish by gradual decomposition. This brings us to the question, what parts of the plant does nature set to work to obtain nutriment and supply the growth?

First—The *roots*. There is no evidence whatever, that the roots of a plant can take in any solid matter, or any gaseous matter, unless previously dissolved in water. The sap of every tree and plant, whether ascending or descending, is a fluid: holding in solution more or less of the substances destined to become parts of the plant itself. How does this fluid ascend by means of the roots? Assuredly not by capillary attraction, which would stop at an inch or two; nor by any of Sir H. Davy's "physical agencies," which are utterly worthless to account for the phenomenon. Our mode of explaining it, is as follows: a drop of fluid, containing nutriment, comes in contact with a root fibre in search of nutriment. The mouth of the fibre, that is, the internal sides of the tube, become stimulated; they contract on the drop of fluid. and by a contraction *à tergo*, propel it upwards, where another part of the containing tube being stimulated in like manner, contracts in like manner, and the drop is thus propelled to the very top of its course, in consequence of the irritability of the living fibres of the containing vessels.* In its course, it undergoes the processes necessary to form it into the nutriment, and assimilate it to the substance of the plant. This is done by means of the peculiar organization of each plant, acting as the nature of the plant requires.

Were we to propose a theory, it should be, that the organization of vegetables and animals, includes and arranges a series of galvanic batteries; by means whereof, decompositions and recompositions are effected in organized bodies, which the chemistry of the laboratory cannot explain. We strongly suspect, that when two dissimilar bodies come in contact, electrical effects, chemical effects, and caloric, more or less, are always produced: whenever two dissimilar bodies, with an intervening conducting fluid, capable of acting upon one of them, come together, galvanic effects are produced. And these arrangements are certainly found in every living vegetable and animal. But the view we can as yet take, is not clear: we see as yet through a glass darkly; and, to use the language of the poet, "the present affords but a glimpse through the gloom." However, discoveries are in progress, and in this, as in every other respect, we may cheeringly say of the march of mind, *Ca Ira.*

During the decompositions of the sap, the observations of Gay-Lussac and Thenard, which we see nothing to controvert, will apply. Whenever hydrogen and oxygen unite in a vegetable, so that the oxygen is to the hydrogen in a greater proportion than is found in water, the result is an acid. Whenever they unite in the same proportions that form water, the produce is saccharine, or mucilaginous, or fecula, or woody fibre. Whenever they unite so that the oxygen is in a less proportion than in water, we have resins, oils, gum-resins, caoutchouc, &c. In these cases, carbon forms the third ingredient.

In pine and fir trees, there seems no doubt but water itself is decomposed, and oxygen is given out, during the formation of pitch, turpentine, &c. Is the common prejudice, so prevalent in South Carolina, in favor of a summer's residence in the pine-woods, confirmed by this explanation? It seems so to us.

So much for the function of the *roots*. But the

* We are aware of the theory of Monsieur Dutrochet in his late book, "*L'Agent immediate du mouvement vital dévoilé dans sa nature, et dans sa mode d'action, chez les végétaux et chez les animaux.*"—8vo. Paris; 1826. M. Dutrochet is of opinion that the lymphatic tubes through which the sap ascends, are incontractile; but for no valid reason in support of this doubt that we can discover. If the vegetable fibre be possessed of vegetable life, it must be contractile; this being the characteristic property of living fibre. Nor can his obscure explanation by endosmose and exosmose be satisfactorily admitted, without admitting the contractile property of the cells and membranes introduced in his explanation, nor does the application of galvanism in the experiment of M. Porret, or in that of M. Dutrochet, negative the contractility of the living fibre—especially as those experiments did not succeed with inorganic substances.

leaves also play their part in the business of nutriment. The experiments of Priestley, Ingenhouz, Sennebier, and Woodhouse of Philadelphia, have established the fact, beyond all doubt, that the carbonic acid of the atmosphere, is decomposed by the leaves of a plant, when the leaves are stimulated into action by the light of the sun. This, we suspect, is one of the great sources of the supply of carbon; and of course, a crop ploughed in, adds to the soil as so much gain, all that the leaves have acquired from the atmosphere. But this addition of carbon, induces also from the roots, a greater supply of hydrogen and of oxygen; which would not have been needed, had not this additional carbon been procured by the industry of the leaves. The theory of manure, therefore, by means of crops ploughed in, while in early flower, is supported by all the considerations above suggested.

From the Rev. O. Dewey's "Old and New World."

ENGLISH AND AMERICAN ECONOMY.

I observed that a considerable number of passengers (on board a steamboat) carried a comfortable pic-nic box or basket with them, and spread their own table. With some, doubtless, this provision proceeded from a fastidious taste that feared some poisonous dirt would be found in the common fare of a steamboat. But with many, I presume, it arose from a habit which presents a marked difference between the people of Eng'and and of America—I mean the habit of economy. In America we are ashamed of economy. It is this feeling which would forbid among us such a practice as that referred to, and not only this, but a great many more and better practices. In England economy stands out prominently; it presides over the arrangements of a family; it is openly professed, and fears no reproach. A man is not ashamed to say of a certain indulgence, that he cannot afford it. A gentleman says to you, "I drive a pony-chaise this year; I have put down my horse and gig, because I cannot pay the tax." A man whose income and expenses and style of living far exceed almost any thing to be found amongst us, still says of something quite beyond him, which his wealthier neighbor does, "We are not rich enough for that." One of the most distinguished men in Europe said to me, when speaking of wines at his table, "The wine I should prefer is claret, but I cannot afford it; and so I drink my own gooseberry." I have heard that many families carry the principle so far, that they determine exactly how many dinners they can give in a year, and to how many guests; nay more, and how many dishes they can put upon the table when they do entertain.

This frankness on the subject of economy is amongst us a thing almost unheard of. Not that we are more wealthy, but, as I conceive, less wise. The competition of domestic life among us is too keen to admit of any such confessions of internal weakness. We practice economy by stealth. Nor is that the worst of it; for one consequence of this habit of feeling is, that we practise too little. When a stranger looks upon the strife of business in our villages and cities, he imagines that he sees a very covetous people; but a nearer observation would show him that much of this eager and absorbing, and almost slavish, occupation, is necessary to sustain the heavy drains of domestic expenditure. It is extravagance at home that chains many a man to the counter and counting-room. And this extravagance is of his own choosing; because he knows no other way of distinguishing himself but by the style of living. Would he but conceive that he might better elevate himself in society by having a well-read library, by improving his mind and conversation, by cultivating some graceful but comparatively cheap accomplishment, he might live a wiser and die a richer man. Who could hesitate to choose between such a family, and one whose house was filled with gorgeous furniture; where the wife and daughters are dressed in the gayest of the fashion, and the husband and father banishes himself the live-long day, and half the night, from that pleasant mansion, to toil and drudge in the dusty warehouse? He sleeps in a very grand house; he lives in a counting-room!

From the Penny Magazine.

WOLF-CATCHING IN NORWAY.

In Norway, and perhaps in some other northern countries, the following very simple contrivance is used for the capture of the wolf:—In a circle of about six or eight feet in diameter, stakes are driven so close to each other that a wolf cannot creep through, and which are high enough to prevent his leaping over them. In the midst of this circle a single stake is driven, to which a lamb or a young kid is bound. Around this circle a second is formed, of which the stakes are as close and as high as the inner one, and at a distance not greater than will permit of a wolf to pass conveniently, but not to allow of his turning round. In the outer circle a door is formed, which opens inward, and rests against the inner circle, but moves easily on its hinges, and fastens itself on shutting. Through this door the wolves enter, sometimes in such a number as to fill the enclosure. The first wolf now paces the circle in order to discover some opening through which he can get at the lamb. When he comes to the back of the door which is in his way, he pushes it with his muzzle, it closes and fastens, he passes by, and goes the round for the second time, without being able either to enter the inner circle, or to retreat from the outer. At length he perceives that he is a prisoner, and his hideous howling announces to those who have constructed the trap that he is taken, who immediately come and despatch him. It is said that this sort of trap is also used for foxes, and even occasionally for mice.

From the Maine Farmer.

MAKING BUTTER.

In a few remarks on this subject, it is not necessary for us to tell the dairy-woman that it is of the first importance that her milk-pails, pans, pots, churn, &c., should be kept perfectly clean and sweet, for they are as fully aware as we can be, that unless this first grand essential of dairy management is *strictly* attended to, their whole efforts to produce either good butter or cheese, are in vain. But after all their care and precaution, their expectations are sometimes disappointed—the produce of this labor does not, in quality, come up to what they anticipate, and for what earthly reason they are not able to tell. It appears to them, that no neglect on their part can be the cause—they have been careful that all the preliminaries and the whole operation should be performed with skill, but still they are disappointed—there is wrong management somewhere, but it is beyond their ken to discover it. There are some few facts on this subject, which we have learned from agricultural books and papers, and confirmed by experience, which perhaps are not so generally known as they should be.

That there is a great difference in the milk of different cows, every one of limited experience must have noticed, and that there is an equal difference in cream, and consequently in the butter made from it, is a fact equally apparent to an observer.

If a cow is driven a long distance or driven fast shortly before milking, it injures the quality of the milk, and it will not produce so much or so good cream.

If milk is disturbed after it cools and before the cream rises, it injures its quality and diminishes the quantity. Care should, therefore, be taken to strain the milk as soon as possible after it is drawn from the cow and before it cools. If milk be kept warm for any great length of time after it is strained, the cream will not rise to any degree of perfection. Therefore, the quicker the milk cools after it is in the pans, the greater quantity and better quality of cream will you obtain. Wholesome pure air is also an essential to raising cream in any degree of perfection.

Cream is lighter than milk, and the better the quality of the cream the lighter it is. Consequently, the cream that first rises to the surface, is the best. None but the richest and lightest particles of cream can rise through thick milk; therefore, such milk gives cream of a superior quality, but less in quantity than thin milk. But the milk is better as it retains a portion of the cream in it. The milk in the cow's udder is, in some degree, similar to what it is after standing some time in the pail. The richest rises to the top, hence, the first drawn is not so good, and will not produce so much or so good cream as the last, and should be set in separate pans.

In order to produce a superior quality of butter, the best cream should be obtained, and in no case suffered to stand until it is mouldy, or even until it is quite sour before it is churned. It should never be diluted with water, or made any warmer than the milk was when taken from the cow. When the process of churning is commenced, it should be steadily continued until butter is produced, which should be immediately taken from the churn and all the milk washed out that can be conveniently. If it is sufficiently hard, it is better to free it from milk entirely; but this is not always the case. It should, therefore, be set in a cool place, and worked thoroughly with the butter ladle the next day. Having entirely freed it from milk, prepare a mixture of ground alum salt, saltpetre, and refined loaf sugar, in proportions of three parts of salt to one of sugar, and work in thoroughly one and a half ounces to every pound of butter, and pack it into jars and firkins covered tight; and at the end of twelve months you will find it sweet.

From the Genesee Farmer.

THE TOAD.

There are few animals so universally disagreeable, or which are so generally considered an incarnation of every thing vile, as the toad, *bufo vulgaris* of the naturalist. Milton understood the amount of the prejudice against the toad, when he placed the arch fiend in the disguise of this reptile close to the ear of sleeping Eve, in Paradise; for we may be sure Lucifer would not have been guilty of the indiscretion of approaching her in in that form when she was waking. But though the toad seems to have been marked out for the hate and aversion of mankind, there are few reptiles whose habits are more worthy of notice, none that are more harmless, and few that render more actual service to man. It is true, neither the frog or the toad, particularly the latter, would be an agreeable inmate of the "kneeding trough," or a pleasant companion in the "bed chamber," but in the field or in the garden, they devour multitudes of insects that prey on the labors of man, while they meddle with none of the plants or fruits that require his protection or cultivation.

With the approach of cold the toad retires into the earth, and in a torpid state awaits the return of the spring. If surprised in this state by any change in the face of the earth, that could have the effect of placing him beyond the influence of the seasons, the toad, it is supposed, can remain uninjured in this state for an indefinite length of time; and in this way the discovery of frogs and toads, in deep excavations, and even in solid blocks of stone, has been attempted to be accounted for. The celebrated geologist Buckland, however, seems to doubt whether the evidence in proof of such discoveries, is such as to warrant implicit confidence in the details. We should imagine that if correctly represented, the discovery of the one at Lockport, while excavating the limestone of the mountain ridge, was as little liable to deception or doubt, as such matters usually can be; and we know of no philosophical reason, why, if a toad can lie torpid for one year, as has been proved by burying them in pots, they might not as well exist one hundred, or a thousand, if the proper temperature for ensuring torpidity was preserved.

Some writers have denied that the toad, under any circumstances, was poisonous; but this is a mistake. When in danger, or when irritated, the tubercular elevations on the backs and sides, have the power of secreting a milky fluid, as every one may readily ascertain, and every school-boy who is in the habit of pelting them with stones well knows. This fluid, given for defence, as we suppose, is decidedly poisonous, as its effects on cats, and other animals, fully prove. This is the only power of injuring it possesses; and this secretory and offensive power appears to reside in the skin, as the animal is frequently skinned and sold with the frog in the markets of European cities, for food, and eaten with impunity.

Toads after the time of breeding is over, forsake the pools of water where they assemble in the spring, and in or near which, they usually pass the winter, and scatter themselves over the land, and when once they have chosen a favorable position, if not disturbed, they rarely quit it for the seasons, and some have been known to retain possession for several years. From these retreats they emerge towards nightfall, or in the evening, and feast on snails, flies, bugs, or any living insect that falls in their way. In a garden their services are thus invaluable; and some gardeners introduce and protect them through the summer, for the aid they render in the destruction of worms, &c.

Notwithstanding his clumsy and ungainly appearance, there are few animals so quick of motion as the toad, and this is shown most distinctly in taking his insect food. It will not unfrequently, in a warm summer evening when doors are open, make its entrance into the house, where it feeds on flies that approach. Seated on its haunches, it surveys the floor with great gravity, but if an unwary fly alights within four or five inches it disappears with incredible quickness. There can be a slight motion of the toad discovered, a quick snap as of the jaws is heard, but the position of the animal is unchanged, while his prey vanishes with the velocity of light. A close examination shows, however, that there is a slight motion of the body forward, without moving the feet; and the snap is produced by the shutting of the mouth after the tongue has seized and secured the insect, though so quick is the operation performed, that the tongue is never distinctly seen. We have often seen this feat performed by placing a fly or bug, on the end of a grass stalk, and pushing it gradually towards the toad when he first makes his appearance at dusk. The lightning's flash is hardly more quick or fatal than the snap of this reptile to the insect he aims at.

To enable the toad, frog, chameleon, and some other reptiles to seize their prey, the tongue has a curious conformation; "it is of great length, its root is attached close to the *fore part* of the lower jaw, while its point, which is cloven, is turned backwards, extending into the throat, and acting like a valve in closing the air passage into the lungs. If, when this animal has approached within a certain distance of the insect it is about to seize, we watch it with attention, we are surprised to observe the insect suddenly disappear, without our being able to determine what has become of it. This arises from the frog (or toad) having darted out its tongue upon its victim with such extreme quickness, and withdrawing it with the insect adhering to it, so rapidly, that it is scarcely possible for the eye to follow its motion." (Roget's Physiology.)

A fact which was related to us a few days since by a gentleman, will furnish a curious illustration of the habits of this animal. He was mowing in a field, when he disturbed a nest of the common humblebee. As they were quite numerous, and appeared very pugnacious withal, he concluded to let them alone until they became more quiet, when he determined to visit the nest again, and appropriate their stores to himself. In the course of a few hours he repaired to the spot, when to his surprise he saw a large toad had planted himself directly before the place of egress for the bees; and he seemed so satisfied with his position that the gentleman determine dto ascertain if possible his business in that place. He soon saw that every bee that showed himself disappeared in some mysterious manner, and that a slight snap, invariably connected with their disappearance, convinced him it was in some way owing to the toad, and that in this way the animal was doing him good service. It was but a short time before every working bee was despatched, not one escaping: and then, by slightly disturbing the nest, the queen bee or drones that generally are found to the number of three or four among humblebees, were induced to venture out, and instantly share the fate of their companions. The honey fell to the share of my informant; the toad appearing perfectly satisfied with his allotment of the "spoils."

From the Rural Library.

TAME RABBITS.

Their profit—fecundity—food—and management—also, directions for building their huts.

1. These little animals are really very profitable; their food costs nothing, and their produce is extraordinary; they will breed eleven times in a year, bringing forth six or eight young; thus at the end of four years a pair of rabbits would produce nearly a *million and a half.*

2. In its wild state it finds warmth and safety by making a hole in the ground, often to a great depth, these holes or burrows branch off, forming chambers where the animal can obtain such a temperature as suits its habits and its young ones.

3. Rabbits of the domestic breed, like all other animals that are under the protection of man, are of various colors, white, brown, black, mouse color, yellow, and speckled of all colors; its native color is brown, but the white with red eyes, and the large black and white spotted, and the yellow, are the most valuable. Tame rabbits are much larger than wild ones, and their flesh very delicate and nutritive—very little inferior to chicken, particularly that of the yellow colored.

4. Rabbits are kept in all parts, and to considerable extent in some places, particularly in England, where there are two very extensive establishments, one in Berks, the other in Oxfordshire; the former feeds white rabbits on account of the superior value of their skins, which are used for hats and trimmings; the latter feeds about nine hundred in huts, or hutches, placed in a building erected and kept solely for that purpose; they make about 36 bushels of dung per week, which generally sells high, being very powerful, two loads is sufficient for an acre of land.

5. The rabbit-house should stand on a dry foundation, on a gentle slope; be well supplied with air, and also with drains and water courses, by which means all rain and moisture is rapidly carried off. Exposure to much damp, whether in or out of doors, is fatal to rabbits; they are like sheep liable to the rot.

6. In large establishments the huts are generally placed in rows one above another, gently inclining backwards, with holes in the hind part to throw off the urine; the lower ones resting upon stands about 18 inches from the ground, for the convenience of cleaning under them. Hutches for breeding rabbits must have two rooms—a feeding and a bed room, with a sliding door to confine them while cleaning. Single room huts

are sufficient for weaned rabbits or bucks, as the latter must always be kept separate; but such for the convenience of cleaning should have a false bottom, like a bird-cage.

7. The floors of hutches should be of hard wood, planed very smooth, that their water may run off, as it is considerable when they are fed on green food; and their troughs should be edged with tin or iron, as their teeth are very destructive to any substance not hard enough to resist them. The troughs should also be narrower at the top than bottom, to prevent them scratching out their food, or dunging in it. Rabbits should be fed twice or thrice a-day. A small hoe and a rough-haired brush, are the best implements for cleaning their houses. When their dung is intended for sale, no litter should be allowed; but when it is to be used on the farm or garden at home, the huts should be supplied with perfectly dry refuse, hay or straw, (not clover,) every day. Their dung, when gathered up, should be kept in a bin out of the rabbit house, as impure air is particularly to be avoided; for where confined in any number, they will not remain healthy without plenty of fresh air. A run abroad for young rabbits is beneficial; but all rabbits must be separated as soon as they are fit for breeding, else they will tear each other to pieces. They are quarrelsome and mischievous animals, and the bucks, when at liberty, destroy many of the young.

8. With respect to form and shape, the short-legged rabbits, with breadth and much flesh are the most hardy and fatten quickest; but these can only be obtained by time and careful selection. There is a large variety called the "*lop-ears*" having much bone, length and depth of body, large ears and eyes, and their flesh is high-colored, firm and more savory than the other varieties; and when cooked like the hare, which at seven months old they nearly equal in size, they make a good dish. The large white, and yellow and white species, have more delicate flesh, and cooked in the same way, much resemble the turkey in flavor. The most fancy sort are the lop-eared "smuts;" they have two, three, or four spots of color on each side the nose, and in proportion to the number and regularity of these spots, there and on its body, so is it valuable.

9. Like poultry, the best breeding rabbits are those kindled in March. The doe will breed at the age of six months; and the time of her going with young is thirty days. The buck and doe are on no account to be left together; but their *union* having been successful, the buck must be directly withdrawn, and the doe tried again in three days, and if she has *kindled* she will refuse him. Some days before bringing forth, hay is to be given to the doe, to assist in making her bed, with the fur which instinct instructs her to tear from her body for that purpose. Biting the litter is the first sign of pregnancy; at this time she will be seen sitting on her haunches tearing off the fur; and on the hay being given she will with her teeth shorten and adapt it to her purpose.

10. They generally bring forth from five to ten; and it is profitable to destroy the weak or sickly ones, if more than five, as that number of healthy full grown rabbits are worth more than ten of an opposite description, and the mother will be far less exhausted; and she will be ready for the buck again at the end of six or seven weeks, when the young may be separated from her and weaned. Much care should be taken that the doe, after she has kindled, should not be approached by the buck or any other rabbit; because if she is harassed about, being of a delicate nature, she will cast her young before her time. If the doe is weakly on her bringing forth, some warm fresh grains, a malt mash, scalded fine pollard or barley meal will warm and comfort her.

11. Due attention must also be given against sudden frost or cold, and particularly damp air; and with the best hay, corn, vegetables, and other food and attention, rabbits may be bred throughout the winter with nearly the same success as in summer. However, they are so productive that one might be satisfied with five litters during the warmest part of the year, giving the doe rest during the months of December, January, and February; as five litters, on a low calculation of five each time, would produce annually twenty-five, which is equal to one thousand from the small stock of forty does. They are seldom good breeders after the fifth year; the buck is fit for use at six months, and is in perfection from one to three years.

12. *Food.*—The art of feeding rabbits with safety and advantage, is to let the principal part of their food be dry and substantial; avoiding weeds and the refuse of vegetables, as such food is too watery and scouring, and can never be an object while the nutritious productions of the fields may be obtained in plenty, and will return a much greater profit. Though rabbits may be kept and fattened upon roots, green vegetables, and hay, yet they will pay for corn, such as oats, peas, pollard, or shorts, and buckwheat; and will always thrive well with an equal allowance of vegetables, such as carrots, potatoes, raw, baked, or steamed; clover and meadow hay, tares, lucerne, cabbage, lettuce, corn-leaves, apples, turnips, parsnips and beets, in fact what they will *not* eat; summer supplies them with a variety of food that may be gathered every where; during winter give them small branches of the green cedar, and small birch and apple brush, for them to eat the bark.

13. The better the food, the greater the weight, quality and profit, which is the case with all animals. Many fatten with grains and wheat bran, (the husk of wheat sifted from the flour,) but the rabbits' flesh being dry, a small allowance of fresh greens is desirable. They are in perfection for feeding from the fourth or fifth month; and it requires two months to make them completely fat and fleshy; but they, like sheep, may be over fattened. Castrated rabbits may be fattened to the weight of upwards of ten pounds; and it is successfully practised in Sussex, where capons are so numerously reared. The operation is performed at six weeks old.

14. In killing full grown rabbits, after the usual stroke upon the neck, the throat should be cut upwards towards the jaw with a small pointed knife, in order that the blood may be discharged, which would otherwise settle in the head or neck. Its flesh is esteemed equally digestible as that of fowls, and of course equally proper for the table of invalids; they are best when young, or middle-aged, and most in season in winter.

15 The rabbit is a caressing animal, and equally fond with the cat of its head being stroked; and not altogether destitute of courage, having been

frequently known to attack the largest cats, and to tear their hair off by the mouth full. The only proper way of holding them is by their ears.

16. *Diseases.*—With due care and regular attention, the rabbit is not liable to disease or sickness, but should any disorder attack them, it is best to kill them. If they become pot-bellied from being fed on watery food, cure: by giving good dry hay and corn, ground malt or peas, or any substantial or absorbent food. Their liver complaints are incurable, and such, if put up to fatten, must not be kept after they have attained a moderate degree of fatness, as they are liable to die suddenly. If dry substantial food is always within their reach, they will seldom require medicinal care.

From the Farmers' Cabinet.

RAISE MORE POULTRY.

Since the time that Esop wrote the history of the country maid and the milk-pail, poultry and eggs have not sold for a better price, or at a greater profit, than they have within these few years. This is believed to have grown out of the immense amount of travelling, which has been increased and promoted by the fleetness and cheapness of railroad cars and steamboats. But whatever may be the cause of it, it is our interest to sell an abundance of eggs and poultry, so long as we can get a good profit by it. I was pleased with the suggestion made by your correspondent Q., in the last number of the Cabinet, for feeding poultry with boiled potatoes, inasmuch as it is a cheap food, and may be always at hand. A farmer near Liverpool, England, keeps a large stock of poultry of various kinds in the same enclosure, with singular success. He has nearly an acre of land enclosed, with a close fence, about seven feet high. Within this enclosure are put up sheds for the different kinds of poultry, to secure them well from the rain, which is of great importance. There is a small stream of water which passes through the lot, to which they all have access, and they are regularly fed, three times a-day, with boiled potatoes, which is their only food, excepting what grass, insects, and worms, they pick up in their movements through the lot.

All young poultry require to be kept dry, and most old ones are the better for it, and it is said that young turkeys, during their tender age, are the better for having a small quantity of red pepper occasionally mixed with their food, to stimulate their digestive organs to greater activity when they gormandize too much.

The practice of cutting up chives, garlic, or onion-tops, and mixing them occasionally with the food of young poultry, is well known to most good housewives, and is thought to be very serviceable in promoting their health. K.

Pequea, Lancaster Co. Pa. June 25, 1838.

ADVICE TO FARMERS.

Judge Buel says, "It has been found that the best and most butter is obtained when the cream is about the temperature of 55 degrees—and if the temperature is over 60 degrees the quality is inferior and quantity diminished. Hence every dairy should have a thermometer."

From the Western Carolinian.

THE FARMER.

Happiness seems to have fixed her seat in rural scenes. The spacious hall, the splendid equipage, and pomp of courts, do not soothe and entertain the mind of man in any degree, like the verdant plain, the enamelled mead, the fragrant grove, melodious birds, the sports of beasts, the azure sky, and the starry heavens.

It is undoubtedly a fact, that in proportion to our population too many leave the occupation of agriculture for other employment. If this arises from its being considered that the employments of the farmer are not respectable, it is a great mistake. Every thing is honorable which is useful and virtuous. This is an employment instituted by God himself, and by him particularly owned and blest. It is that on which every thing depends. True it is laborious; but then labor brings health, is the foundation of the farmer, is the condition of independence; his little dominion is his own, his comforts are his own, and he is not at the mercy of the public whim and caprice. It is not necessarily the case, in this happy country especially, that the farmer must be a stupid, ignorant man. He is taught in his youth the first rudiment of education, and has many spare hours to read. In the heat of the summer's noon, and by the long winter evening's fire, he has much time for his books, and in this country they are placed within the reach of all.

From the Watertown (N. Y.) Standard.

IMPORTANT EXPERIMENT IN PLANTING CORN.

A few weeks since we published a communication from a correspondent, giving the results of an experiment in planting corn, by Hart Massey, esq. of this village. Mr. Massey called upon us on Saturday last to correct an important error in said communication, and invited us personally to examine said field, which we accordingly did, and now give the results of our observation.

Mr. Massey took of the seed corn with which he planted the field, a small quantity, and soaked it in a solution of sal nitre, commonly called saltpetre, and planted five rows with the seeds thus prepared. The remainder of the field, we believe, was planted by the same individual. Now for the result. The five rows planted with corn prepared with saltpetre, will yield more than twenty-five rows planted without the preparation. The five rows were untouched by the worms, while the remainder of the field suffered severely by their depredations. We should judge that not one kernel saturated by saltpetre was touched, while almost every hill in the adjoining rows suffered severely. No one who will examine the field can doubt the efficacy of the preparation. He will be astonished at the striking difference between the five rows and the remainder of the field.

Here is a simple fact, which if seasonably and generally known would have saved many thousands of dollars to the farmers of this county alone in the article of corn. It is a fact, which should be universally known, and is, in all probability, one of the greatest discoveries of modern times in the neglected science of agriculture. At all events, the experiment should be extensively tested, as the results are deemed certain, while the expense is comparatively nothing.

Mr. M. also stated the result of another experiment tried upon one of his apple-trees last spring. It is a fine, thrifty, healthy tree, about 25 or 30 years old, but has never, in any one year, produced over about two bushels of apples; while in blossom last spring, he ascended the tree and sprinkled plaster freely on the blossoms, and the result is, that it will this season bear 20 bushels of apples. Now if the plaster will prevent blast, it is a discovery of great importance. Mr. M. was led to make the experiment by reading an account of trees adjoining a meadow where plaster had been sown at the time there was a light breeze in the direction of the orchard, the trees contiguous to the meadow bearing well, while the others produced no fruit.

ON THE GREAT RAFT IN RED RIVER.

To the Editor of the Farmers' Register.

* * * * * * * *

I do not possess as accurate information about the great raft in Red river as I ought, to justify as minute a description of it as you wish; but I give the best I have, only warranting it to be substantially correct.

The raft is an obstruction of fallen trees and logs, that have entirely reached from one bank of the river to the other, and firmly fixed in its bottom and sides, and has, with intervals of unobstructed or open river, occupied a space of from 130 to 150 miles in extent. Over this space, in a thousand places, a foot passenger can cross without wetting his feet, and see the slow current below him. About one half the river has been filled with alluvion, on these logs, which has given growth to a dense mass of cotton-wood and willow trees, of various sizes, forming a shelving bank, that will never be removed by the current. The future river will be the inroads made by the engineer, and the current of the stream, on the other bank of the river. The great business of the engineer has been to enable the stream to clear itself out. When the country was first occupied by the whites, the raft was about 150 miles above Natchitoches, and about 20 or 30 miles below the bayon or outlet of Lake Bestineau. At this bayon Capt. H. Shreeve, the U. States' engineer, commenced his operations, about five years ago. The raft once formed, of course stopped all the drift-wood, and increased from 1 to 3 miles a-year, according to the number and heights of the annual freshets, and decreased below about half that space. The growth of a rich swamp being generally sappy woods, were rapid in their decay, subjected as they were, by their position, to be alternately wet and dry; and as they decayed, were loosened and carried off by the current, which made it again an open river. This accession above and secession below have perhaps been going on for ages. The unequivocal remains of the raft, in low stages of water, may be seen in numerous places several hundred miles below where it lately was, and some nearly as low as the disemboguement into the Mississippi. The original formation of the raft may probably be attributed to one of the following causes. The Red river is a stream of immense length and great depth, compared with its width, and is very crooked; its s[...] a very fine sand, with a pure vegetable deposit; [...] length exceeds 1500 miles; its depth averag[...] from 15 to 20 feet, and its width about 200 yar[...] as near as my eye-sight enabled me to judg[...] The swamp shows that the river has frequen[...] changed its channel; and this, at some distant dat[...] may have occurred on the rising of some great fres[...] et making a new channel, which has been choke[...] by the falling in of the timber from both sides, coupled with the drift-wood. Once stopped, all the other consequences are very natural. Another cause, and more probable, may be that the Mississippi, receiving its waters from points more distant and much higher up the country, raises it higher, and backs the water up all its tributaries below the Missouri from 20 to 50 miles. I have passed up and down the Red river when it was so backed up, and showed little or no current. The drift-wood must accumulate at these places in immense quantities; and you can easily suppose how probable it would be for 2 or 3 miles of drift-logs, with their roots and limbs to them, intersecting each other, all seeking to pass out at the same time, as the Mississippi should fall, would reach from side to side of the river and lodge, and the press of the upper logs would make the jam complete. I give the above as the probable causes. They are entitled to no more respect than as they may be correct deductions from the facts above-stated. The raft once removed will never form again where the river is open to its proper width. If it should be, by the back-water of the Mississippi, it will be at a point below where 50,000 bags of cotton now have to pass to market, and will be removed before it can have time to form into any material obstruction, within the upper part of the raft, where the river has no one current half its proper width, in its present state of clearing itself. Such an event is very probable, and the engineer, two years ago, communicated to the war department such probability, and a steamer has been built, to remain a year or two, till the river clears itself to its proper width.

The effects produced by the stoppage of the usual passage of so large a body of water, and that swelled to more than double the amount by the periodical annual freshets, as was to be expected, have been very great. Immense bodies of fertile lands have been overflowed, large lakes have been formed, (now navigated by steamboats,) such as Lakes Bestineau and Caddo, or Soda; and large rivers or outlets created, which, so soon as the river is compelled by man to return to its accustomed channel, and shall have worked out a depth equal to its depth above and below, will be restored very much to their former condition. I think it probable that in ten years, fine crops of cotton and corn will grow on the bottom of those lakes, now the tract of the steamboats, and fifty thousand acres of the richest land will be redeemed from nearly a perpetual overflow. The raft region, for the space of near 500 miles, presents generally two streams or outlets and inlets, as the upper bayous that create lake Bestineau on the east, and lake Caddo on the west. Where the Caddo waters, come in, just above Shreeveport, the river is large and fine, but soon expands into the Bayon Pere; and where that comes in, it again expands into the Bondieu, again coming in near Alexandria; and they each carry as much water as the Red river. The Bondieu is now the river of navigation, carrying two-thirds of the water, and threatens in a few years to throw a bar across the Red river, and make Natchitoches only accessible in high stages of water. The steamers now go to Shreeveport, 100 miles within the late raft, in stages of water that compel them to leave their freight for Natchitoches four miles above the town. Such have been the effects of the raft, and some such as I have ventured to anticipate, will be the effect of its removal. The river, both above and below the raft region, has but one stream, and that a noble one; and it has been the object of the engineer who directs the work, to make it but one through the raft.

The modes of removal have been as various as the differences in the situation of things. The object has been to do more than to enable that powerful agent, the current, to clear itself out; and so formidable have been the obstacles, and so various in their character, that it has required all the skill of the engineer, with the aid of strong natural talents, and the possession of a great share of that uncommon quality, called common sense, to overcome them. Such a man the government has found in Capt. Shreeve. One of the most usual modes of work has been to place the laborers on the raft, who saw all key logs, or such as seemed most to confine others to their places; and when so prepared for dismemberment by their previous cuts, the cables are fixed to them by iron wedges at their ends, driven into the logs, and the steam is applied, and large masses are pulled away. These logs are turned over to other boats in the rear, that cut off the stump-ends, and where the branches put out; and the logs, so deprived of roots and branches, float on the surface without the danger of tangling or holding on to each other, and are passed out by the current, in times of high water, through the Mississippi into the ocean. The snag-boat comes in the rear, removing the snags or other logs too firmly fixed for the first pull, and runs directly on the snag, and where it does not break out, it is fastened to the chain and pulled out with ease.* The power is, perhaps, the greatest now used in America, and can in a few minutes uproot the very largest trees, and drag them from their residence. The diameter of the wire of the chain is $1\frac{1}{4}$ inches, and each link weighs upwards of 15 pounds; and the power is such that the tree must come, or the chain will snap. It has been equal, so far, to remove every thing to which it has been applied. A cotton wood tree, 40 feet long, by 5 feet diameter at the but, three or four feet under the mud, has been one, if not the greatest, of the applications of its power that I have seen.

The larger portion of the logs are used to fill up all the material outlets of the main stream, and the old river, whenever a new one has been made by a cut-off. There is no danger of their being returned by high-water into the main river again, as it is the uniform operation of the master stream to fill up the mouths of all its outlets whenever the current in them is materially checked.

Another usual mode of work is to cut all the trees from islands and wearing points of the banks, and remove the wood; and the stream so aided will remove the earth.

Another mode is to cut off, occasionally, large bends in the river, whereby many miles of raft have been saved the clearing by a cut of 100 yards. When the freshet enters these cuts or canals, the sides fall in, and dissolve like sugar; and 24 hours gives you a new river. These cut-offs save labor, improve the navigation, by increasing the current, and furnish a convenient depository for drift-wood. These, with occasionally making dams across large rivers, where you could not otherwise materially check the current, constitute the principal modes of applying labor.

The operations of the first year cleared upwards of 100 miles of the raft, in consequence, as I have said before, of the logs being very much decayed, and to that distance, that is to Shreeveport, there has been for some years, and now is, an excellent steamboat navigation. The difficulties above that place have been very great indeed, and have occupied all the time since, till May last, when they were removed, so as to give passage to steamboats 250 miles above the raft to Fulton, Fort Towson,&c. About half a dozen boats have been plying regularly between New Orleans and these places since that time. A steamboat, with a few hands, will have to remain in the raft for a year or two, to prevent the creation of new obstructions from the banks falling in, while the stream is working out a sufficient passage for itself. When this is done, the river, like all others, will take care of itself, and will furnish a safe and convenient high road to market of the products of what, from all I have seen, I would say, is the finest cotton country in the United States.

A Planter.

A FIRST TRIAL OF SILK CULTURE.(*a*)

To the Editor of the Farmers' Register.

Diamond Grove P. O. Brunswick, Va.
Aug. 11, 1838.

I promised to give you an account of an experiment I made, last spring, in the culture of silk. I shall not attempt it in detail, but merely give the result. The eggs commenced hatching about the 1st of April; and having then but little confidence that the placing them on ice would retard the process, and the cocoonery I was then building not being ready for the reception of the worms, I was forced to crowd 50 or 60,000 on two shelves for a week; instead of which every day's hatching should have been kept separate and distinct. So many different ages having been mixed up together, made the labor much greater about the time of spinning.(*b*) If possible, all on a shelf should spin at the same time. I determined, however, to try an experiment of about 30,000 eggs, by putting them in a tin box, and placing them directly on the ice, which was done after many had hatched. They were kept on the ice ten days, and then taken out, and in a few days they hatched out fully as well as the first. I supposed I fed in all 90,000 worms, and not having a sufficiency

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* The snag-boat is a steamboat, the invention of Capt. Shreeve, open at the bow down to the water's edge, with two large vertical wheels on the same shaft, over which an immense chain is passed, and this lever operated on by the water wheel shaft. The snags are run into this aperture at the bow, and so made fast for the levers to act on.

of the *morus multicaulis*, or Chinese mulberry leaf, at that time, I made use, in part, of leaves from our native black mulberry.* The worms remained quite healthy, until I supposed eight-tenths had spun excellent cocoons. The leaves of the common mulberry became scarce. I had to send three miles for them; and the weather being then very warm, I found it impossible to get them to the cocoonry before they became heated and dark, which caused disease amongst the remnant fed with the native mulberry. Some died; and those that spun the cocoons were not as perfect as they should have been. Those fed with the Chinese mulberry leaf remained healthy, although the shelves were within a few feet of the diseased ones. The nursery of the Chinese mulberry being convenient, the leaves were used fresh from the tree, or placed in the cellar before they became warm, and sometimes remained two or three days in good order. I think that worms fed with the leaves of the Chinese mulberry, are not as subject to disease as those fed from our native trees. If fed with the former, they consume every part of it; but when the leaves of the latter are used, they refuse a large portion, which, if allowed to remain on the shelves, will certainly produce disease.(*c*) The labor saved in gathering the leaves of the Chinese mulberry being so considerable, I have no doubt it will supersede the use of all others. Some have calculated this saving of labor at nine-tenths, and, I think, are not far out. I have weighed 150 lbs. of cocoons, which I am now reeling. One of the hands gets half a pound of raw silk per day. The reeling is done on a reel I had built at home, after a model I purchased last summer, in Hartford, Connecticut, for five dollars; and I think they can be made for three dollars. I have no doubt they are equal to the patent reels, so much puffed at the north. I can see but little difference in the strength of the silk made from the two different kinds of mulberry; except that made with the Chinese has a lustre, which gives it a superiority. I made but one crop this season. I have no doubt that three crops can be made; and I should have attempted it, if I could have procured the eggs. The hands I had employed were double the number necessary. My object was to instruct them in the business, so as to be ready for a much larger crop, another year. One of the hands, after attending the worms two weeks, could have managed half I fed in the usual way. It is quite a mistaken notion with some, that slave labor will not answer in the culture of silk. I had some white hands employed; but I also had some blacks, who were little inferior to the best white laborers, and are now reeling excellent silk. One of the black hands, now only eight years old, I found very useful in feeding worms, and can now reel well. I have no doubt, much of the labor I bestowed was unnecessary, as the business was entirely new to all employed. The cocoonry I had built is 40 feet by 24, and 16 feet pitch, well fitted up with shelves, on the most approved northern plan. The house should be well ventilated, to admit the air freely through, or the worms will certainly become diseased. I have no doubt that a house built of logs is equal to any that can be fitted up; and the barns now used for tobacco can easily be converted into cocoonries. I have 30,000 *morus multicaulis* or Chinese mulberry trees, and a nursery that will afford from 80,000 to 100,000 cuttings this fall. Should the silk crop fail, (for which I have no fears, being so fairly tested,) I would certainly plant an orchard of the Chinese mulberry trees, for the purpose of feeding stock. I find both horses and cattle remarkably fond of the leaf, and I think we have no coarse forage possessing more nutriment. I think an acre of land planted in mulberry trees, will produce as much in weight, (the leaves being easily cured,) as our best grass meadows, in the southern and middle counties of Virginia. The trees will yield several crops of leaves in one year.

I commenced, like most others, with too great a number of worms, before I had a sufficient quantity of leaves, and but little knowledge of the business. From 5,000 to 10,000 are fully sufficient to commence with. The worms, in the 4th and 5th age, eat an incredible quantity of leaves; and if they are not fed plentifully, it prolongs the time of spinning, and, therefore, increases the labor. One of my neighbors fed but few worms, and they commenced spinning in 25 days; while mine were 40 days before a cocoon was formed.(*d*) Taking every thing into consideration, I think the crop a fair one, and am willing to try three crops next year.(*e*)

I shall have more trees than will be necessary to carry on the business next year, and am willing to dispose of part of my stock.

THOMAS HICKS.

* *Morus rubra.*—ED.

Notes, by the Editor.

(*a*) It is with much gratification that we have received, and present to our readers, this account of a first, and therefore imperfect, experiment of silk-culture in Virginia. The writer's locality is precisely that which offers the strongest inducements, and promises the highest profits, for this business; and we feel assured that he will so correct his first (and always inevitable) mistakes, as to be able to prove, practically and satisfactorily, the soundness of the position which we have long ago assumed, and again recently asserted, that whatever may be the profits of silk-culture in the northern states, they may be far surpassed in Virginia, by applying equal skill, care, and industry, to the superior advantages of our better climate, and cheaper land and labor. The interest which we feel in this subject, and the value attached to the experiment and labors of our correspondent, will induce the making some remarks and strictures on parts of his communication; which, for convenience, will be appended in the form of notes to the passages referred to.

(*b*) The keeping together worms of different times of hatching was a very great error, and must have caused loss, and injury to the worms, in all their different "ages," or times of moulting, by the difference of time in which they were commenced and ended, as well as the injury found at the time of spinning.

(*c*) The bad condition of the leaves of the native mulberry, used for the latter worms, was sufficient to account for their being less healthy food, and producing inferior silk, to the Chinese. It will require a much more careful and fair experiment than this, to establish the fact, that worms may not be kept as healthy, and e to produce as much, and perhaps as good silk, on native mulberry, as on the Chinese; though there still enough of superior advantages in the latter , in other respects.

(d) The prolongation of the time before the worms begin to spin, whether caused by scant feeding, want of warmth, or any thing else, is doubtless attended by loss in more respects than the mere additional food thereby required, and the labor of giving it. The health and vigor of the insects must suffer, and the quantity of silk finally produced by each will be less. A comparison of his cocoons which were not formed before the worms were 40 days old, with those of his neighbor, which were begun at 25 days old, would probably have shown the superiority of the latter.

(e) We fear that the attempt at three, or even two crops of cocoons in a year, will not succeed, except to the great injury and destruction of our correspondent's young mulberry trees. At least, we would advise his making, at first, but a small experiment of double or triple crops; and the second or third feedings to be confined to a certain portion of his trees, so that the degree of injury may be observed, and properly estimated.

From the Farmer and Gardener.

COB-MEAL AND COB-MILLS.

A friend and correspondent in Ohio has requested some information as to the value of cobs ground with the corn, and the cheapest and best mill for grinding them together.

That a very great saving is effected in feeding animals by grinding their food does not admit of a doubt; and the explanation of the fact, as given by Raspail and Dutrochet, is perfectly satisfactory. It is also certain that when nutritive matter is properly divided and incorporated with some substance suitable for the action and distention of the stomach, that a much less quantity will suffice, and the animal be in equally good condition.

It is on this principle that the English custom of substituting cut straw for hay in feeding with grain, a saving of one-half of the expense being made by feeding with cut straw and ground grain, over feeding with hay and unground grain, according to the old mode. Neither the straw, or the cob contain any great amount of nutriment in themselves, but they assist the digestive functions, and render the accompanying nutriment more available. The cob however has much the advantage of straw in every respect; and experience shows that those lose much who waste this important part of the corn crop.

Some interesting experiments have been recorded, in the N. E. Farmer, on the subject of fattening animals on corn and cob-meal. The Rev. Mr. Perley in describing his method of using the food says:—

"I have for several years practised having my corn and cobs ground together; breaking the cobs fine by pounding, and grinding one peck of corn with a bushel of the cobs. Meal made of this composition, I scalded, and made about as thick as common hasty pudding, or mixed about one peck of the meal with about three pecks of boiled potatoes, thickened to the consistency of pudding. There were no hogs in the neighborhood grew so fast, or were fit to kill sooner in autumn."

In the Massachusetts Agricultural Repository is a communication from Mr. Rice of Shrewsbury, in which he says:

"The very best provender I have ever used for fattening cattle, is corn and cobs, ground together. The reason I consider the cob useful is, it swells in the creature, and keeps him in good order; in no one instance since I have fed with this meal, have my cattle been out of order by being cloyed, or scouring; they are at all times regular; but when I formerly fed with clear Indian, or oats and Indian, these difficulties frequently occurred, and they would lose as much in two or three days, as they would gain in a week. The second year that I made use of this kind of provender, I thought I would try an experiment, by feeding one ox with corn and oats ground, the other with corn and cobs, having one yoke oxen so equally matched that no one who viewed them, appeared satisfied which was best. The cob is computed to make a little more than one-third, therefore I mixed the other with one-third oats, which was my former mode. I gave each ox an equal quantity at a time, except that the one which had corn and oats some days became dainty, and would not eat his allowance; while the one fed with cob-meal kept on his regular course. When taken to market and slaughtered, the oxen weighed 28 hundred and a half, the one fed on corn and oats had 162 lbs. of tallow, and weighed about half a hundred more. The one fed on cob-meal had 163 lbs. of tallow, and the butcher pronounced his meat half a dollar in the hundred better than that of the other."

In the third vol. of the Philadelphia Society for promoting Agriculture, is an excellent paper by Dr. Mease, in which the utility of grinding the cobs with the corn is clearly shown, both from analogy and actual experiment. And we believe that wherever it has been tried, or wherever the means of grinding can be had, it has been approved, and will be found of great value.

So far as we are acquainted, cobs after being broken, are ground in the common millstones with the corn. The same machinery used for grinding plaster of Paris or gypsum, has been found efficacious for grinding cob-meal; the plaster cracker reducing the cob sufficiently for the action of the stones. Mr. Buckminster, speaking of machinery for this purpose, says,—"for making cob-meal we placed in our mill a pair of large stones, cut the eye of the runner 12 inches at top, and 14 or 15 inches at bottom, and bosomed it out large, as we term it. In this manner it answers every purpose for grinding and cracking corn in the ear."

The cast iron bark mill has been used for cracking cobs to some extent, and where a mill is convenient to grind the cobs and corn after cracking, would answer a good purpose; and we can see no reason why one constructed on the same principle, and like those worked by a horse or water power, might not be constructed to reduce the cobs and corn sufficiently fine to answer instead of the ordinary process of grinding. It must be remembered, however, that the goodness of cob meal must always in a great measure be dependent on its fineness. Where it is an object to provide a mill of this kind, any farmer who has a horse-power thrashing machine, may with little expense procure ordinary millstones, and by attaching a cracker as for a plaster mill, or arranging the stones themselves as recommended by Mr. Buckminster, have a mill not only useful for grinding cobs but all the grain he intends for feeding. As the power required would be lessened as the velocity was decreased, two horses would run a pair of millstones, it is believed, with as much ease as four do the larger thrashing machines.

From the Franklin (Ky.) Farmer.)

MANAGEMENT AND DISEASES OF HOGS.

To Chilton Allan, president of the Kentucky State Agricultural Society.

I have seen in a late number of the Franklin Farmer, your circular address, calling upon the friends of improvement for essays upon a number of important subjects relating to the agricultural interests and pursuits of our state. Approving heartily the noble objects of the State Society, I read your address with great satisfaction; and I cannot but believe, that the action of the Society will bring about the most gratifying results in improving the science of agriculture, and hence the condition of the husbandman: for I cannot doubt, that every one who desires improvement himself and who would derive useful information from others will hold himself bound to contribute something to the general stock of knowledge. There are few intelligent farmers who do not know something unknown to others, and it is by an interchange of sentiment and opinion, as well as of experience and practice, that the farmers of the country will be able to see and reject the errors of their husbandry and adopt those modes instead which lead to improvement and success. In this view, I offer an humble tribute, which at least has the merit of a well meant design of benefiting others in some respects.

The commencement of our prosperity may be dated from the period when our agriculturists turned their attention to the raising of stock for export; and as the consumption and demand have increased in a ratio with the increase of population and wants of the people of the United States, the business has become a source of wealth to Kentucky. And no where has the improvement of stock been so great and so general, nor more zeal and perseverance manifested to procure the breeds of horses, asses, cattle, sheep and hogs. In enumerating these descriptions of stock, the last is not the least important in bringing wealth to the state, and should be looked to with a fostering care and attention.

Under this belief, I humbly submit to the public through you, the following observations on the management of hogs, with some remarks on some of their diseases.

In giving my views on these subjects, I deem it important to state some of the various ways of raising, feeding and fattening hogs in different sections of the country, which, according to circumstances, soil and climate, will differ; and conclude with my views as to the best mode to be adopted by the farmers of Kentucky under her peculiar circumstances. In Europe and many parts of the United States, hogs are indispensably kept in pens or sties, and as the numbers raised are comparatively small, there is no great expense attending the manner of feeding them; indeed this is the most economical, cheap and convenient method of fattening that could be adopted in any country where the number fed is small. In some of the New England States large buildings have been erected for raising and fattening hogs on an extensive scale, fed almost exclusively on vegatables produced on a few acres of land, which gives a profit of 50 per cent. more than any other way in which the products of the land could be disposed of. On this extensive scale, the business is unconnected with any other, having for its object the raising and fattening of hogs alone, for it requires the most strict attention which daily habit and the most scrutinizing observation, in time reduced to a perfect system, can give. It was ascertained to a fraction, what each hog would eat at a meal, which was measured out to him three times a day, the quantity according to age, allowing six of the same age to occupy a sty, which was regularly littered and cleaned out once a day. The amount of vegetables required per day, and the necessity of the different varieties coming on in due season, would require great attention. At the first view of the subject, we would conclude that a piggery conducted in like manner in Kentucky, would be equally profitable. But not so—there would be this difference:—The price of pork and lard in Boston is more than 50 per cent. higher than in Louisville: and the profit accruing from the superabundance of manure, which is worth from two to three dollars a load in the New England States, will amount to a large sum, which with us would be excluded from the estimate, as it will bring nothing here on sale, though useful to the land on which the hogs are fattened. In 200 hogs annually sold, these causes would produce a difference of perhaps three thousand dollars in favor of the New England piggery.

Say 200 hogs at 200 lbs. each, 40,000 lbs. pork at 10 cents in Boston,	$4,000
For their manure,	1,000
	$5,000
40,000 lbs. pork at Louisville, at 5 cents.	2,000
Leaving a difference in favor of the New England piggery,	3,000

In no way could an extensive piggery be made profitable to us but by being connected with a distillery. The expenses would then be much lessened; for it would require but a few vegetables or little meal added to the slop of the distillery to make the swill highly nutritive. They might be put to graze in the summer and swill given them occasionally and again put in the fall.

The manner of feeding and fattening hogs now generally adopted in this state, seems to me to be well calculated for our method of cultivation. Taking into consideration the products and the great number of hogs fatted for other markets, together with a great number of beef cattle annually grazed and fed, the system is complete. In winter, they are amply supplied with food from the refused corn and pudding of the cattle—two or three hogs to each head of cattle finding thus abundant sustenance. In the spring, when the cattle are no longer fed, the hogs are put on the exuberant clover field, which was sown for the double purpose of enriching the land and supplying rich food for their cattle and hogs. In due time, when the clover becomes hard, and unfit for the hogs, it is given up to the earth, and they are removed to the rye fields, there to fatten and complete another system of manuring, so admirably adapted to our lands and our wants. So soon as the rye field is consumed, the corn field is ready to receive them,* and in due time they are ready for market, leaving the fields and pastures richer than they were.

Although this arrangement is good for feeding and fattening, yet there are other important matters in relation to their raising and health, which in no wise should be neglected. Experience has taught me, that no matter how many pigs a sow has over six, they should be reduced to that number, always retaining the large and healthy ones; for I can, and will demonstrate, that six pigs will make more pork at 12 or 18 months old, than eight would of the same litter—and eight will make more than ten. Give to the six the food which you would give the eight or ten, and you will find in the result the truth of my statement proven. It is essential that pigs be kept fat while sucking, and to have them so, six is a better number than eight or ten. At weaning time or when sixty days old, the time when the sows decline in milk, particular attention should be paid to the pigs, having them regularly fed either with corn or swill, for at this juncture, they are unaccustomed to *root for themselves*, and will rapidly lose their flesh and their health, and their growth will be retarded, if left to shift for themselves. If they are kept fat during the fall, when provisions are plenty and cheap, they will keep thrifty and well through the winter, on very moderate feeding; but I prefer liberal feeding throughout. The food is by no means thrown away, as you will have more pork and not any more corn consumed in the end.

Hogs should be kept free from diseases; particularly the disease of worms, which is very pernicious and a constant attendant on poor hogs. Liberal feeding at all times, is the best preventive, *but when it is not in the crib*, brimstone, spirits of turpentine, or tar mixed with their food will remedy the evil. All hogs are more or less subject to worms; but some are so overcharged, that their intestines are literally filled with them, and unless they are extirpated, it is throwing away corn to feed them, for in this condition it is almost impossible to fatten them; they will consume twice as much as a hog will not troubled with them, as the nutritious juices are taken up by the worms, and their fetid excrement is all that is left as a miserable substitute for sustenance.

The most fatal disease of hogs is the swelled throat or quinsy. This too, is easily prevented. I have long been of the opinion that it proceeds from indigestion, caused by feeding on hard grasses or clover in their declining state; and my successful practice as a preventive for the last eight years is a strong confirmation. Yet it matters not concerning the cause, provided there is a remedy. The disease in the last stage, is highly inflammatory, but at no time infectious. It is an accumulation of matter formed between the glands of the jowl, which continues to inflame till the hog dies of suffocation. The disease may be cured before and after the matter begins to form; but as it may be more satisfactory to state my experience and knowledge on the subject, I will give an instance as coming under my observation, and conclude with my practice as a cure and preventive. In 1830, I discovered the disease among my hogs by the death of one of my fattest. As soon as possible, I had them removed from the clover field, and put in a spacious pen, where they were fed with as much corn as they would eat after it was glazed with tar and as much ashes put on as would adhere to the grains. They still continued to die till I lost to the number of fifteen. This great number dying out of eighty, caused me to doubt the efficacy of the remedy, or that the disease was too rapid for its effect. Shortly after, they were put up to fatten, which they did very readily, and I was left in doubts as to the effect of the medicine, until the day I butchered, when I found lumps of coagulated matter in the jowls of many, about the size of a hazelnut or larger, without any signs of inflammation around them. I then came to the conclusion that they would have died had it not been for the remedy applied, and that the disease of those that died had advanced too far to be cured by any remedy. Observing that hogs kept in sties never had the quinsy, I attributed it to the wholesome quality of food they ate, and on the contrary, the cause of their having it out of sties, to the pernicious qualities of hard dry grasses. Since 1830, I have invariably given my hogs, during the spring and summer months when grazing, slop or swill once a week or oftener, consisting of kitchen slop with cooked vegetables of various kinds, apples, &c., with bran or a little meal, mashed to a paste, salted and cooled off by adding a quantity of water, and occasionally brimstone or saltpetre. Since the above date, my attention has been directed to the raising and fattening of hogs on the products of a small farm, and I have never yet lost a hog by this disease, nor in my recollection by any other. My opinion is still further supported as to the cause of the swelled throat, by its being less frequent since the practice lately adopted in putting the hogs to graze when the clover is young and tender, and taking them off when it is old and tough.

Every body knows that the young and old hogs should be kept apart in winter; and yet how shamefully this important matter is neglected by many. Young and old, great and small are crowded together, day and night, mashing and smothering; and yet many will look on with heedless regard at the great destruction of their young stock, without separating them. When young and old are fed together, the old will always get more than their share, thereby the young become poor and diseased, making little or no progress in growth.

* We presume our writer does not intend to be understood, that the hogs are turned into the corn field; for though this practice may be adopted by some, the more general custom is to put them in a large pen adjoining, into which the corn is thrown. If the corn is not sufficiently ripe when the rye is consumed, old corn is fed to the hogs; and indeed, the feeders generally, we believe, prefer beginning to feed them on old corn after they are put up—introducing the new rather cautiously and gradually.—*Ed. F. Farmer.*

The breed of hogs best calculated for our general purpose is yet to be ascertained. Within a few years, great exertions have been made, at considerable expense, to procure the best breeds, but whether any of them answer our expectations, I think very doubtful. The breeds imported here, were improvements made to suit the purposes of others under different circumstances, different soil and climate, different food and management, and under a different method of disposing of the pork, and according to our present mode of farming; thus differing from the methods abroad, whence these hogs have been brought, and our surplus pork being chiefly driven to the south, I think ultimately they will not do except in the event of the successful completion of the railroad from Lexington to Charleston. Then the smaller and earlier matured hogs, the Byfields, the Berkshires, the Bedfords, &c. will be more profitable than the larger breeds. But should this all-important improvement to the west prove abortive, the hog that will be best calculated for our interests, is yet to be improved by some judicious cross from our present great variety of breeds. The fat varieties, as the Bedford, Berkshire, &c., from their early propensity to fatten, are best for family use and home consumption; but owing to their incapability to travel, they must measurably give way to the longer-legged hog, until the railroad from Lexington to Charleston is complete.

BIRD SMITH,
Member Ky. State Ag. Soc.

From the New England Farmer.

VALUE OF MANURE.—INTERESTING EXPERIMENTS IN FARMING.

James W. Thomson, M. D., Cor. Sec. Ag. Society:

Although I am not what might be called a practical farmer, not having had the time to devote to it that I could have wished, yet having done something in that line for a considerable number of years, I feel a freedom in submitting a few experiments in the raising of produce, which may be improved upon by those better calculated, have more time, and are more devoted to the business of farming than I am. But to proceed to the experiments. Having purchased a small tract of poor land, near Wilmington, Delaware, which was overrun with the daisy, (or Richardson's pink,) and wishing to eradicate that pernicious weed as early as possible, I determined to work the ground hard, by a quick rotation of crops, taking care to lime and manure in proportion. After progressing in this way for a few years, it occurred to me that it might be worth while to ascertain the amount raised, and the value per acre, by the process I had adopted. The first lot of ten acres was treated as follows. In the fall I put on twenty-six loads of barn-yard manure to the acre, spread it evenly, and ploughed it in; after which it was well harrowed,and so left until spring, when it was again twice harrowed; the last time crosswise. It was then run out as near north and south as the field would admit of, and planted in drills, as follows, the first two rows three feet apart, the third row seven feet: the next three feet, and so on, alternately through the field. The object in planting every other row seven feet apart, was that it might have all the advantage of sun and air—but not wishing to loose too much ground, by planting so wide apart, I planted a row of potatoes in each seven foot space—the produce as follows: 500 bushels corn, at 60 cents, $300; and 500 bushels potatoes, sold at 50 cents, (exclusive of small ones,) $250. The corn was cut off in the fall, and shocked in the field, and the ground sown with wheat, (except where the shocks stood,) which was sown in the spring with millet. The produce was 300 bushels wheat, at $1 10 cents, $330. Millet 4 tons, with the seed, worth $16 per ton, $64. Directly after harvest the wheat stubble was ploughed in, and part of the field sown with turnips; the other part with buckwheat, produce 200 bushels buckwheat, which was sold at 50 cents, $100; and 600 bushels turnips, fed to the cattle, say at 25 cents per bushel, $150; in all, $1,194, independent of straw, fodder, &c. The field was then manured, and laid down in wheat, and sown with grass seed. The next experiment was on an adjoining lot of ten and a half acres, manured and tilled as the first, and planted in rows five feet apart one way, and two feet the other, and not exceeding three stalks in the hill, more frequently one and two; produce eighty bushels to the acre, at 75 cents per bushel, $130. The next spring it was ploughed, and planted in potatoes, in rows six feet apart, and manured in the row. I then struck out between the rows of potatoes, and planted corn two feet apart as above —the corn had no manure—produce as follows: 500 bushels sound corn, sold at 80 cents, $400; 1,500 bushels potatoes, sold from 30 to 37½ cents, say 35 cents per bushel, $525. The seasons of 1836 and 1837 were unfavorable for corn with us, and it ripened late. Part of the above field is in with wheat, sown in the fall, with a light dressing of compost—the residue in spring wheat, without manure; both look well. In endeavoring to be as brief as possible, I am apprehensive I have not been sufficiently explicit to be clearly understood. Thy friend,

EDWARD TATNALL.

From the Farmers' Cabinet.

BURDON'S EXCELLENT OINTMENT.

Yellow rosin, the size of a hen's egg, to be melted in an earthen pot over a slow fire, to which add the same quantity of beeswax. When melted, add half a pound of hog's lard, and when that is dissolved add two ounces of honey and half a pound of common turpentine, and keep gently boiling a few minutes, stirring all the time. Take it off the fire, and when it has cooled a little, stir into it two ounces of verdigris finely powdered, then give the whole a few minutes' gentle boiling, and pour through a sieve for use. Nothing takes fire out of a burn or scald in human flesh so soon as this ointment.

I would suggest, that no store in a newly settled district ought to be without a plentiful supply of the above ointment for sale; it is equally good for cuts and bruises and putrefying sores, and might be denominated with propriety, *the universal remedy.*

JAMES PEDDER.

MONTHLY COMMERCIAL REPORT.

A drought of almost unprecedented duration, attended with excessive heat, has prevailed during the greater part of July and the first two weeks in August, and with the exception of a few recent showers, the drought still continues in this part of the country. It has prevailed far and wide—on the Atlantic coast and beyond the mountains—and the crops have suffered co-extensively. That of Indian corn, in some parts of the country, is almost a total failure; while in favorable situations, and where the drought was less severe, a fair crop will be made. Tobacco and cotton require less moisture; but without a long spell of favorable weather, they cannot attain their growth; and, from the failure of the plants early in the season, it is considered certain that the crop of tobacco will be far below an average one.

In those parts of the country where potatoes, flax, and clover are extensively cultivated, the failure of the crops will be severely felt. Our markets are not supplied with the ordinary vegetables of the season. The mills in many places are stopped, and the navigation of our rivers impeded or suspended. Some places have, during this period, been visited with violent storms, and great damage has been sustained.

The price of wheat gradually declined to $1 20 to $1 25; but has advanced recently to $1 30 and $1 35. The crops on tide-water have generally been disposed of; but those in the interior are now partially withheld from market, in consequence of an apprehended deficiency of corn. The last accounts from England exhibited little apprehension as to the result of the wheat crop there. Those from the north-western states represent the wheat crop as very abundant.

The inspections of tobacco in Virginia to 1st inst. amounted to about 39,000 hhds. Since then the supply gradually diminished, and has now nearly ceased. Prices have advanced, and may now be quoted $5 50 to $12 per 100 lbs. The export to Europe proceeds very slowly.

The receipts of cotton, since October last, are 1,804,000 bales, against 1,343,000 to the same period in 1837; and, considering this great increase, prices are well sustained; present quotation 9 to 11 cents. The accounts of the growing crop, in the south-western states, are favorable.

Indian corn has advanced, particularly in the northern markets, where 95 cents to $1 per bushel has been paid. Sales were recently made here at 80 cents.

The banks in the Atlantic states resumed specie payments on the 13th of this month; and no demands were made on them, except for inconsiderable sums required in ordinary transactions. Exchange on New York is at 1 to 1½ per cent. premium; on England 8½. X.

August 20, 1838.

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ORIGINAL COMMUNICATIONS.

THE FARMERS' REGISTER.

Vol. VI. OCTOBER 1, 1838. No. 7.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

From the New England Farmer.

MATERIALS FOR MANURE.

We have spoken of various sources and means of accumulation and manufacture in regard to manures; the barn cellar, the hog sty, the privy, the compost heap, the wash tubs, the sink; in respect to all these matters we have made suggestions, which we hope will be taken in good part by the farmers; and which we are persuaded, if properly attended to, will result in accumulations of valuable manure little dreamt of, when the foundation of the heap was laid, and the first contributions brought to it. The sailors tell us of extensive islands, holding a large population and feasting them in plenty, and reefs stretching themselves for miles in the ocean, and columns of coral rising from the very depths of the sea to its surface, and if the sea could be for a time withdrawn, and their vast height and proportions disclosed to the eye they would be seen casting into the shade even the mighty pyramids of Egypt and the proudest trophies of human art and labor; and all these were the result of the combined and unintermitted toil of very small insects, laboring constantly at these erections by the gradual deposits of minute atoms. These mighty masses show what can be effected by persevering labor, even with most humble instruments and means. The termites or ants of Africa erect large cabins, which, spread out upon extensive plains, look like a vast military encampment. We see constantly upon our own pitch-pine plains, those heaps which the common pismires accumulate; and observe that all this is the product of single atoms brought by single individuals of those minute animals, thousands of whom we destroy at a single footstep. Every part of creation illustrates the extraordinary, immense, and triumphant results of persevering labor. Many of the largest fortunes that have ever been accumulated have arisen from minute savings and deposits.

We hope our illustrations of this homely subject will not be deemed too ambitious. We should be glad to make them as striking and memorable as possible; and we care little for the source whence they are drawn, provided only we can induce the farmers to gather every thing, and to save every thing, which comes in their way, by which the means of enriching their farms may be created or extended. We reiterate the great position, that almost every farm, certainly where its products are consumed on the place, contains the means of maintaining and extending its fertility. Every traveller who visits China, reports the extraordinary condition of the Chinese cultivation; and concludes by stating that the most remarkable and particular attention is paid to the saving of manure. If gold dust, if corn itself, were sprinkled in their streets, they could not be more careful in picking it up and collecting it together, than they are in picking up and collecting whatever may go to the increase of their manure heap.

It is in this matter our farmers fail, perhaps more than in any thing else connected with our agriculture; and this is a failure most essentially affecting their interests. If we would have an improved agriculture, a revolution in our habits must take place here; and when this is effected, and all the manure is provided and prepared, which we can provide and prepare, we have accomplished comparatively half the work. The getting of manure on a farm must be as much matter of study, care, and labor as the getting of crops from that farm.

We are of opinion that on every considerable farm there should be a man employed with a cart and horse or yoke of oxen, whose sole and exclusive business it should be, excepting in some extraordinary emergency, to collect the materials for manure; and to put them in the way of being manufactured. It is not enough for the farmer to say he will do this at his leisure; this shall be the business of odd times; he will attend to this when nothing else presses upon him. It must be a specific, constant, principal object of study and labor. Remember again that every vegetable substance, and every animal substance, is capable of being converted into a manure.

Now we will look out of the window where we are sitting, and see what in hasty glance comes within our sight, which ought to be saved. There is the garden, with an abundance of weeds and decayed vegetables; collect all them, and let them go into the hogs' pen or the barn cellar. There is the pasture, where bramble bushes, sweet fern, Canada thistles, alder bushes, brakes, &c. abound. Gather them, and you will at the same time clean your pastures. There is the road lined for miles with all sorts of weeds and coarse grasses; get them. There is many a mud hole, which receives the washings of the streets, and where a great deal of valuable and rich manure has been collected; empty that. There is a large shade tree, where the cattle daily collect; and where their droppings are accumulated; collect these and them in the common heap. There is many a rich spot by the side of the roads, which without any prejudice to your neighbor or the public you can plough up; take off the mould, and carry that likewise into your manure yard. There is the refuse of the shoe shop, scraps of leather, &c., collect them and lay them on your land to be ploughed in. There is a clay pit; occasionally get a load or two of that and throw into your barn yard. It will greatly improve the composition. Then you have a wood or grove at hand; collect the leaves from that and lay them in store for littering your cattle-stalls and your sties. But you have a bog meadow; here then is an abundant supply of the materials for enriching your fields. Collect this mud; it is full of the most enriching substances. They may be spread with great advantage upon your grass lands; but they are still better placed upon your compost heap.

We have seen an excellent arrangement on the part of two or three farmers for saving manure, and especially the liquid portions. They daily spread the back part of their cow stables with mould or sand, of which both in winter and summer they keep a sufficient supply at hand under cover; and using this without covering, or covering it with litter, great amount of the most valuable manure is saved.

We have thrown out these hints, not thinking to treat the subject fully, or philosophically; but rather with a view to put other minds to considering what can and what ought to be done. In new countries, where the accumulations of vegetable matter have been gathering for centuries, and have remained on the surface untouched, there is no occasion at present for the use of any manures. The soil is already full and needs rather to be exhausted than replenished. But it is not so with our old soils. We cannot get along without manure. The *geine*, the vegetable pabulum, must be supplied. We have, as Dr. Dana says, the plates, but they require to be filled. We might sit down to a table covered with the richest porcelain or burnished and embossed gold; but if the dishes are empty, we should starve as certainly at such a table as at a naked board. Dr. Dana is likewise of an opinion, in which Professor Hitchcock concurs, that the earthy constituents of the soil are matters of comparatively little moment, provided always of course that they exist in commixture, and are sufficiently retentive of moisture. That is, to recur to the former illustration, it is of little or no comparative importance what the plates are made of, or whether the table at which we sit down be plain deal, oaken, or mahogany; the main point is the food, which is placed upon it. This appears constantly. In our disdained and hard soil, crops are occasionally produced, which vie with any thing which even the fertile alluvions of the west display. One hundred and thirty bushels of corn were raised upon an acre in Plymouth county. Forty bushels of rye, ninety-six bushels of oats, fifty-five bushels of wheat, one thousand bushels of carrots, more than nine hundred bushels of ruta baga, seven hundred bushels of potatoes, and more than four tons of hay have been raised upon an acre even in our own granite soil. The incredulous may sneer at this; that does not at all affect the facts. It neither makes, nor unmakes, nor alters them. They are established by full and incontrovertible evidence. This however has been done by liberal cultivation, liberal manuring, applied with sound judgment; at proper times and in a proper form.

The collection of this manure and its application to the soil and crop is, we admit, laborious, and requires incessant care and diligence. In this respect the new countries have immense advantages over us; and when we compare our severe and expensive cultivation, with their little expense and abundant returns, we are often half disposed to pull up our boots and put on our hat and gloves. But then we come back to the great established position, that agriculture in almost any part of New England having ordinary advantages, where conducted with skill, judgment, and frugality, affords an ample remuneration for all the toil and all the expense incurred; and when we recollect the multiplied social advantages which our community presents over every new country, and take another deep draft of its invigorating mountain breezes, we throw aside our gloves and put on our frock again, and whistle to our team to go ahead.

From the Maine Farmer.

SWINE.

Mr. Holmes:—In no part of the United States can the raising of pork be made a more profitable business than in the state of Maine. In making calculations of the profits of swine husbandry, we should take many subjects into consideration.—First of all, let us notice manure—always acknowledged to be the basis of all good husbandry. I have heard it asserted that many of the farmers of Massachusetts say that the manure a hog will make, when well supplied with materials, will pay all the expense of his keeping. If this supposition is correct, then we can raise pork as cheap as our southern or western brethren, whose swine subsist and fatten or what grows spontaneously.

Every farmer should have his hog pens and his hog yards so modeled that no manure be lost. If the hog yard is upon descending ground, it should be so contrived by digging, that none of its virtues may escape in a liquid state; and if the liquid part of the manure in the hog pen escapes through the floor, it is an unpardonable waste, unless the farmer should cart an abundance of loam and put it beneath the floor of his hog sty, to absorb those rich juices, which are annually lost, if he cannot devise a better method.

Every farmer in the state should be ambitious to obtain the very best breed of swine that can be procured. A poor breed of swine, or in fact any kind of animals, is a dead loss upon the community. Nothing is wanting but a little energy, and a union of efforts, to get rid of all unprofitable stock and substitute in its stead that which will be highly profitable.

It has been said, that in order to raise swine, it is necessary that the farmer should have a large dairy; but I do not think this absolutely necessary. A farmer who has not large quantities of milk to spare for his pigs, may give them other kinds of nutritious food; and probably they may be made to thrive well in a clover pasture, without much other food.

Now let us notice the method of management practised by Arthur Young, esq., of Great Britain, in the management of swine. It is said that in the summer of the year 1766, he pastured 64 swine on only two acres of clover ground. He assures the public that all these swine grew very fast; and also gives it as his opinion, that this use of clover is much more profitable than when converted into hay. Now why cannot a New England Yankee, by practising the same method, realize the same results—even in the state of Maine? Dr. Dean says that it is an excellent piece of husbandry to make a hog pasture of an orchard; and he tells us that an orchard may be prepared with clover as well as any other spot of ground.

I think it is bad husbandry to put apple trees upon good tillage lands. If the farmer has stony ground, that is not easily tilled, there he should plant his orchard. The grass in orchards (especially if the trees be large and stand near each other) is not so sweet and nutritious as that which grows on ground unencumbered with trees; still I think, for many reasons, swine should run in orchards. If the trees in an orchard be too large or too thick to admit of tillage, the little patches between the trees may be ploughed as often as necessary, and sowed with fresh clover seed: to sow a few oats is also a good idea. The farmer need not plough his whole orchard at once but he may plough a part every year,—by so doing he may constantly improve the soil at a very light expense.

If it be admitted that hogs should run in orchards, still I think that every farmer who would raise a considerable number of swine, should set apart at least one acre of land adjoining his orchard, for the purpose of cultivating clover for his swine.

This acre should be kept one half in tillage and the other half in clover, alternately; and as clover is a biennial plant, is best to change from grass to tillage, every second year; thus affording a constant supply of fresh clover. By so doing hogs will not be compelled to feed wholly upon grass growing in orchards. And last, not least, by pasturing land with swine, and sowing clover seed abundantly, the farmer may enrich his soil in an eminent degree.

The winter food for swine should be principally roots, which should be boiled or steam-boiled. This is winter work, and the farmer cannot be more profitably employed. If potatoes are boiled, the water should be immediately drained off. The water in which potatoes are boiled, is of a poisonous nature, and injurious to swine or cattle.

In this state I think it is bad economy to raise much corn or grain for store swine. A warm tight shelter is very necessary for the hog in this cold climate, and this animal, so epicurean and gentlemanly in his diet, must be well lodged, or he will not thrive. An abundance of litter should be furnished him, and this mode of consuming straw is more profitable than when used as fodder for cattle, even if mixed with ruta baga. I would not have it understood that farmers should consume all their straw as litter for swine, but merely that they should not be too stingy in this matter.

I will now say something in regard to the fattening of swine. He that makes the greatest amount of pork at the least expense is the best farmer. Mr. Young undertook a number of experiments to ascertain the cheapest mode of fattening swine, and it is said he gave the preference to boiled carrots.

If good pork can be made by feeding swine with carrots, I think it bad economy to consume much corn or grain for this purpose—at least till we can do away the necessity of "going to New York to mill." But the hog is very fastidious in his diet; he must be gratified with a variety or not thrive, therefore I think some kind of meal should be mixed with his food. Meal made of buckwheat, millet, oats, peas, and barley, are all good: let experiments demonstrate which kinds are best. Swine should be at all times supplied with salt, as well as neat stock. Swine under the process of fattening, should also be furnished with *sauce*, as well as other epicures; such as boiled apples or boiled pumpkins. O! pumpkins,—has any Yankee learned how profitable are boiled pumpkins for fattening swine? To give fattening swine occasionally a quantity of boiled apples or pumpkins will increase their appetites for their other food. One cart-load of pumpkins when boiled is worth two cart-loads of potatoes. How many cart-loads of pumpkins can be raised upon an acre of land properly cultivated and manured? Will farmers try the experiment?

If our farmers are true to their best interests, we can say to our southern and western friends: Whatever else we may want of you—whether it be tobacco, rice or cotton, we will not take your pork.

Rumford, July, 1838. R.

From the Penny Magazine.

NATURAL HISTORY OF THE HERRING, (CLUPEA HARENGUS.)

The herring is found in the third order in Cuvier's arrangement; and with the pilchard, sprat, shad, anchovy, and white-bait, belongs to the Clupeæ genus. It weighs about five ounces and a half. The upper part of the body is blue and green, and the lower parts of a silvery white. Owing to the gill-lids being very loose and opening wide, the herring dies almost the instant it is taken out of the water; hence, perhaps, the saying, "as dead as a herring." In twenty-four hours the gill-covers present an extravasated appearance. The lower jaw is furnished with five or six teeth; the inferior edges of the upper jaw are serrated; and on the tongue there are also small teeth. The food of the herring consists of minute animals which are found in the depths of the ocean; but they will also feed upon the young of their own species, and they may be taken with limpets and also with an artificial fly.

The herring is not found in warm regions, nor farther south than the northern coasts of France. The most interesting point connected with its natural history is the annual movement which it makes. Pennant, whose zoological labors entitle him to much respect, about the middle of the last century gave an account of their periodical migration, which has been implicitly copied by nearly every succeeding writer. He represents them as coming from their great winter rendezvous within the Arctic Circle. "They begin (he says) to appear off the Shetland Isles in April and May. These are only forerunners of the grand shoal which comes in June; and their appearance is marked by certain signs, by the numbers of birds, such as gannets and others, which follow to prey on them; but when the main body approaches, its breadth and depth are such as to alter the very appearance of the ocean. It is divided into distinct columns of five or six miles in length and three or four in breadth, and they drive the water before them with a kind of rippling; sometimes they sink for the space of ten or fifteen minutes, then rise again to the surface, and in bright weather reflect a variety of splendid colors. The first check this army meets in its march southward is from the Shetland Isles, which divide it into two parts. One wing takes to the east, the other to the western shores of Great Britian, and fill every bay and creek with their numbers. Others pass on towards Yarmonth, the great and ancient mart of herring; they then pass through the British Channel, and after that in a manner disappear. Those which take to the west, after offering themselves to the Hebrides, were the great stationary fishery is, proceed towards the north of Ireland, where they meet with a second interruption, and are obliged to make a second division. The one takes to the western side, and is scarce perceived, being soon lost in the immensity of the Atlantic; but the other, which passes into the

Irish sea, rejoices and feeds the inhabitants of most of the coasts that border on it." In a work on subjects of marine natural history, published not more than a year ago, this account is substantially repeated, and it is stated in addition that the different columns are led by herrings of more than ordinary size. Other writers have stated that the annual visitations of the herring are adjusted with the most scrupulous precision to the character of the country along which they pass, and that wherever the soil is meager and the climate severe, there they never fail to resort. This is going much farther than Mr. Pennant, who notices the caprice which the herrings exercise with regard to their haunts. The promulgation of these and similar erroneous notions is productive of mischief in various ways. The belief that a particular part of the coast was invariably haunted by the herrings, excited hopes of commercial prosperity from the fishery, and led to the formation of establishmeuts which it was afterwards found necessary to abandon, owing to the laws which direct the arrival of the fish being so completely fluctuating. Factitious views of the designs of Providence have been taken, which, being founded on error, were liable to be suddenly overthrown; whereas, within the bounds of ascertained facts, there are to be found abundant manifestations of beneficent design, the evidence of which rests upon a more secure foundation. The very uncertainty which characterizes the herrings in the choice of their haunts is attended with advantage, as it occasions attention to be directed to agriculture and to other means of subsistence than that which the ocean supplies, and thus the chances of scarcity are lessened.

So far from the arctic seas being the great resort to which the herrings retire for the winter after having deposited their spawn, it is nearly certain that they are not in the habit of leaving the seas on the shores of which they periodically appear. They leave the shore for the deep sea, and the return of warm weather agains brings them around the coasts. The herring, it may also be stated, is nearly unknown within the polar seas, and has scarcely been observed by the navigators of those regions; nor are they taken by the Greenlanders. A small variety of the herring is sometimes found, and is noticed by Sir John Franklin. The young are found at the mouth of the Thames, and on the coasts of Essex and Kent during the winter. The Dutch at one period carried on the fishery in the deep sea at all seasons. On the western coast of Scotland the fishery has sometimes terminated before that on the eastern coast has commenced. It has sometimes commenced earlier in a southern part of the coast than further north, and on the western coast of the county Cork, before any other part of the United Kingdom. These facts are all adverse to the accounts which have been given of a grand movement in military order from the arctic seas. On the east coast of Scotland the herrings often spawn at a different period from those which resort to the western coast, and at the same time their condition is quite dissimilar. Mr. Jesse, in his "Gleanings in Natural History," states that the herrings of Cardigan Bay are much superior to those taken at Swansea. Dr. Macculloch* is of opinion that this may arise from their obtaining more abundant or different food. He states that in Scotland no migration takes place even between the two coasts, and that when the herrings first appear on the western coast it is not in shoals; and instead of being taken by the net they are taken by the line. Sir Humphry Davy has remarked as follows in his "Salmonia:" "It has always appeared to me, that the two great sources of change of places of animals, was the providing of food for themselves, and resting-places and food for their young. The great supposed migrations of herrings from the poles to the temperate zone, have appeared to me to be only the approach of successive shoals from deep to shallow water, for the purpose of spawning." The presumption, therefore, is that the herring is a permanent inhabitant of our seas, and that there are different varieties of the species. Mr. Yarrell* says:—"There are three species of herrings said to visit the Baltic, and three seasons of roe and spawning. The stromling, or small spring herring, spawns when the ice begins to melt; then a large summer herring; and lastly, towards the middle of September, the autumn herring makes its appearance and deposits its spawn." The same naturalist has discovered what he believes to be a second species of British herring; it is found heavy with roe at the end of January, which it does not deposit till the middle of February. The flavor is milder than that of the common herring, but it is not so large, its length being seven inches, and its depth two.

The frequent changes of their haunts by herrings have been a fruitful source of speculation, though this fact is adverse to the accounts which gave to their migration all the regularity which would seem to belong to so well organized an army. At one time they frequent a particular part of the coast for several years, and they afterwards suddenly abandon it. The change is doubtless occasioned by circumstances which it is their nature to obey. In the time of Charles I, the Long Island, one of the western islands of Scotland, was a favorite resort of the herring, and buildings were erected for the purpose of establishing a fishery, but it was abandoned in consequence of the fish ceasing to frequent that part of the coast. Dr. Macculloch, in his work on the "Highlands and Western Isles of Scotland," has introduced some remarks which are too apt to be omitted in this place. "As vulgar philosophy (he says) is never satisfied unless it can find a cause for everything, this disappearance of the herring has been attributed to the manufacture of kelp. But kelp was not introduced for very many years after the herrings had left the Long Island, as well as many other coasts which they had frequented. It is also a popular belief that naval engagements, or even the firing of guns, cause them to change their haunts. Thus their desertion of Sweden was attributed to the battle of Copenhagen; and now, when guns are at peace, the steamboats are the "sufficient reason." The one reason is as valid as the other. It is a chance if there has been a gun fired in the Western Islands, since the days of Cromwell, and they have shifted their quarters within that period many a time. They have long left Loch Hourn, and Loch Torridon, where steamboats never yet smoked; and since the

* "The Highlands and Western Isles of Scotland," by John Macculloch, M. D., F. R. S.

* "A History of British Fishes," by William Yarrell, F. L. S.

steamboat has chosen to go to Inverary, they have also thought fit to prefer Loch Fyne, to all the western bays. But theories like this have at least the merit of antiquity. Long before the days of gunpowder, the ancient Highlanders thought that the fish deserted those coasts where blood had been shed; so that the gun hypothesis is only an old one revived, with the necessary modifications."

Assuming that the herring approaches our shores from the deep surrounding seas, and does not migrate from the polar seas alone, there are three different circumstances which may occasion its movements: 1. For the purpose of spawning. 2. In pursuit of food. 3. To escape from enemies which prey upon them.

The herring spawns towards the end of October or the beginning of November; and for the purpose of vivification it is necessary that it should be deposited in shallow water, where it may receive the heat of the sun. This instinctive movement is felt in the middle of July, and they are thus brought within the reach of man when they are in the highest perfection. They are worthless as food after having deposited their spawn, and the fishing season of course terminates. Mr. Yarrell is of opinion, from repeated examination, that the herringsile, or young herrings, do not mature any roe during their first year; and hence they are not impelled to retire to the deep sea, but haunt the coasts. The weight of spawn in the herring is 480 grains, and the number of eggs between 3,000 and 4,000. This spawn has been thrown ashore in Orkney, found around the Isle of Man and all along the western shores of Scotland, and in the western lochs. A greater degree of observation would most probably prove that it is deposited around the British coasts generally, particularly the coast of Scotland.

Fishermen have remarked that the herring was most abundant where the medusæ, and other marine animals which give the sea a luminous appearance, were to be found. The movements of herrings are doubtless frequently determined by the time and place where food is abundant. If it is not to be found in one spot it must be sought for in another; and the apparent caprice which they show in frequenting places at irregular times and irregular intervals, is determined by a provident regard to the abundance of food with which those places are supplied.

Lastly, in endeavoring to escape from whales, grampuses, sharks, and other enemies, the movements of the herring are the result of necessity; and nothing seems more unlikely than that they should, under such circumstances, display an instinctive attachment to particular places.

DESULTORY REMARKS ON THE SILK CULTURE OF THE UNITED STATES.

It has now been several years since sundry companies were chartered, in the northern states, with large capitals, (nominal or real,) for the purpose of prosecuting the culture and manufacture of silk. Many more such companies have since been formed, and have commenced operations; and, latterly, some have been established even in the lethargic south, and in the climate by far more proper and suitable for this business than that enjoyed by our industrious northern countrymen. The operations of these large joint-stock corporations are in addition to those of hundreds of individual adventurers, who have commenced, on their separate account, what is called the "silk-business." The first object of all efforts to cultivate silk, is, necessarily, to raise mulberry trees, to furnish food for the worms; and the kind planted has been principally the Chinese mulberry, or *morus multicaulis*. The facility of propagating this variety, by cuttings, is so great, its growth so rapid, the annual multiplication of plants so enormous, and the maturity of each (to the point of supposed fitness for feeding,) so early, that two years' time would suffice to raise a very large supply, from a commencement with a few hundred young trees; and, in three years, the number might be made equal to almost any demand of a single silk establishment, of no older standing. There are also powerful incentives to use these facilities, in the liberal legislative bounties offered for the production of silk, by at least six of the northern and middle states. In Maine, the bounties paid from the treasury for this object, are 5 cents a pound upon all cocoons grown, and 50 cents on each pound of silk reeled. In Vermont, a bounty of 10 cents is offered for every pound of cocoons. In Massachusetts, $2 the pound is paid, as bounty, on all silk grown, reeled, and "throwed" in the state, "which bounty alone is considered by silk-growers to be sufficient to defray all expenses attending its growing, reeling and throwing." (Mr. Adams' Report to Congress. See Far. Reg. Vol. V, p. 65,). In Connecticut, (where silk has been grown 50 or 60 years, without legislative fostering,) the treasury pays a bounty of $1 on every 100 Italian or Chinese mulberry trees of five years old, and 50 cents a pound on all silk reeled on an improved reel. All these bounties were in operation as early as 1836. We do not know the rate of bounty paid by Pennsylvania and New Jersey; but they are so high, (as stated in a previous selected article on page 355 of this Vol.) as to "have been found sufficient to pay all the expense of producing the cocoons and reeling the silk, making the whole produce clear profit."

With such facilities and such inducements for the production of silk, it is very remarkable that so little has yet been accomplished, by all, or by any, of the numerous companies and individuals who have undertaken the business. Wonderful reports are made, and published with great parade in the newspapers, of the prospects, and intended operations of almost every newly established silk company; but little, if any thing, is afterwards heard of what they have actually produced. It is not to be supposed that reports of successful operations would not be published if there were sufficient grounds on which to place them; and therefore, though the testimony is negative, it is still satisfactory to establish our inference, that but little has yet been done in producing silk; and that silk-culture on a large scale, and as a profitable branch of agriculture, is yet to be commenced in this country. Judging from the various prefatory reports of silk companies, and deceived by their confident tone, we had formed a very different opinion; and by republishing their reports in this journal, we may have, unintentionally, helped to delude the public. If the adventurers in silk-culture in the northern states have really done much in producing silk, the facts have not been made public, in any way comparable to the industry used to extend the publicity of their first expectations and intentions.

The only certain and direct evidence of the very small amount of silk yet produced, which has reached us, is in the "Statistical Tables" formed and published by order of the government of Massachusetts. From this work it appears that all the silk factories of Massachusetts (four in number,) in the year ending April 1, 1837, employed 125 hands, and produced of manufactured goods, the value of $56,150. This does not show how much raw silk was produced; but the probability is, that these factories worked up all the silk made in Massachusetts, as the larger portion of their raw material was certainly of foreign growth.

A gentleman of Virginia, who was desirous of going into the silk culture, and has since done so, last year visited the principal silk establishments in the northern states, for the purpose of gaining information as to their operations and the results. He told us that the greatest annual product of raw silk which he could hear of, at any one establishment, amounted to no more than 40 pounds. It was true that at some of them, silk manufactures were carried on; and they had been at others, which had suspended or stopped manufacturing, on account of pecuniary difficulties; but the materials for these manufactures were mostly imported from foreign countries.

The only inference which we can draw from the information before us, and the testimony above referred to, positive and negative, is, that most of the adventurers in the silk business (so called,) have considered the making of silk as a secondary, ulterior, and perhaps contingent object, and have been laboring and speculating in the culture of mulberry plants, not to feed silk-worms, but to sell to newer adventurers; and the vast profits to be derived from the making of silk, were held up to the public principally to produce greater eagerness to purchase the plants and cuttings of Chinese and other varieties of the mulberry, at the enormous and extortionate prices at which they have been sold. The article at page 355, headed "*Morus Multicaulis*" is a capital specimen of these stimulating reports. This may be a *bona fide* and disinterested statement; but certainly it has every appearance of a salesman's indirect puff—such as are at least half the publications on this subject which have appeared. There is no advertisement so effective as that which appears in the false guise of editorial approval and recommendation.

But without the advance of prices, which this writer anticipates, for plants of the *multicaulis*, those heretofore obtained are sufficiently high to make it far more profitable to sell the plants, than to keep them to feed silk-worms on, or than to pursue any other branch of agricultural industry. From every single cutting of one bud, (allowing for all necessary risk of loss and failure,) may be raised, in one year, a plant of four feet or more in height; and such plants, (of one year's growth) divested of all the side branches, have been sold regularly and readily at $25 per hundred; and the twigs, trimmed off, at $2 per hundred buds—and a single plant will sometimes produce a hundred such buds. An acre of rich land will bring more than 10,000 plants, and the crop is completed and ready for market in one season. By cutting off the whole tops, at the ground, (so as to take away every bud,) each root will, in the second summer, produce three or four times as many buds as in the first year's growth, to be again cut off and sold. Were there ever greater profits offered? And is it not perfectly natural and reasonable that these profits should be preferred to those offered by silk-culture proper, even though doubled by legislative bounties?

Thus the true, and, as we fully believe, the great profits which may be realized by rearing silk, have been lost sight of, and disregarded, to reap the greater though transitory profits of selling mulberry plants. And the combined action of the cunning salesmen and puffers, and the strong disposition of the public to be duped and cheated by every professional humbugger, has produced a *multicaulis mania*, that promises to equal any of its fore-runners in the annals of speculation and delusion. Enormous profits have thus already been made by northern nursery-men, and much of them from southern purchasers. And we are sorry to learn that the same spirit is spreading rapidly in Virginia; and that many persons are now beginning what is called the "silk-business"—but which is merely raising mulberry plants and cuttings to sell. And a profitable business this may be, to early adventurers; though a bad one for all the later ones, who do not design to put their mulberry trees to their legitimate use of feeding silkworms. It is plain enough, that even if millions of dollars should be received for plants that are not used, first or last, for any purpose except to be sold, that there will be no gain to the community; and a total loss to the buyers and producers who cannot sell. It is thus that truly valuable products, and a profitable branch of agricultural industry if properly pursued, may be converted into a humbug, and become one of the many modes of producing deception and loss to dupes, and profit to the dupe-makers.

What adds to the strangeness of the slow advance of the product of silk in the north, is the fact that there existed, for several years, two periodical journals, published at a low price, and circulated very extensively, which were devoted exclusively to giving information on, and encouraging the extension of silk culture. These were the 'Silk-Culturist' of Hartford, and the 'Silk-Worm' of Albany. Another such publication has recently been started in another state. Here is a most prodigious and imposing array of means; and the end, or result, is in comparison ludicrously small, even though it may exceed ten-fold the amount of that of which we have yet been informed.

There has been another new branch of agricultural industry proposed in this country, and (if we were to judge from printed reports,) it might be said was commenced, more than eighteen months ago. This is the making of sugar from beet-roots. The reported profits of this business in France caused a very general desire to introduce it in the northern and middle states. The statements published (many of which are to be seen in our pages,) seemed to promise sufficient remuneration to the undertakers. In addition, the legislature of Massachusetts, in the beginning of 1837, offered a bounty of three cents a pound on all sugar made in that state from beet-root, (see Farmers' Register Vol. V, page 47.) There was then growing a strong beet-root fever, which has continued since, and we have no direct testimony of its abatement at this time. But neither have we yet heard of any practical results, or profits from the business—nor indeed whether any thing has been done in it, except (according to usage,) to form joint-stock companies for carrying on the culture and manufacture. Strangely enough, since schemes of beet-root culture have been in vogue, they have been regularly connected with the schemes of silk-culture. Yet, what the two things have to do with each other, is more than we can conceive—or what they have in common, except the quality of being converted into humbugs. The joint-stock companies latterly formed for silk-culture, or proposed and announced in the newspapers, have very generally added the making of beet-root sugar to their objects, and the title of the association. This incongruous yet very general connexion has been even carried into the proceedings of the congress of the United States; and a long and detailed report has been sent forth from the Committee of Agriculture, on the cultivation of the "Mulberry and Sugar-Beet," in a pamphlet of 51 octavo pages; of which many thousands have been printed and circulated, to add to the profit of the government printer, and to help the nursery-men, whose letters are there published, to sell their mulberry plants. With so much encouragement, direct and indirect, by both state and federal government, it is truly surprising that both the silk-culture and beet-sugar-manufacture should be still unable to give evidence of life, or to make any figure, except in reports of the formation of joint-stock companies, and their intended operations.

It will, perhaps, be inferred, though very erroneously, from the general tenor of the foregoing remarks, that we have no faith in the profit of producing silk in this country, nor in the legitimate profit of rearing the Chinese mulberry as means for that end. Not so, as to either opinion. Still, because of our endeavoring to expose the delusion, and repress the misdirected zeal, and speculating spirit, which have been built upon the true and solid claims of this business to approbation, we expect nothing more than to be considered as opposing, throughout, the culture of silk as altogether unprofitable, and the Chinese mulberry as worthless; and its being raised by any one as an evidence of his being either a knave, or a dupe of knaves. It seems that moderate, qualified, and discriminating approbation of agricultural opinions and practices, is no more tolerated, by most persons, than similarly limited approval of the political men and measures that they sustain. Every man is required, whether on agricultural or political subjects, to "go the whole hog," and to approve or condemn, as entirely as does a blind or bought political partizan. Qualified and limited approval, is considered as but "damning with faint praise" We therefore do not expect to leave the impression on readers in general, that we are friendly to, and strongly in favor of, the commencement and extension of silk culture. This expected misapprehension cannot be entirely guarded against, and we shall not take much trouble to avoid it, or lessen its influence. We will merely state, that we have no private interest whatever in discouraging silk-culture; and that we have some small private interest the opposite way, inasmuch as we are preparing to come into the market with *multicaulis* trees and cuttings, as soon as we can furnish them at one-fourth of the present prices.

We certainly doubt the fitness of the climate of the northern states for profitable silk-culture; and more than doubt the fitness of that cold and inhospitable region for so tender a plant as the *morus multicaulis*. But we fully believe in the suitableness of the slave-holding states for both; and we are confident that fair trials will show very profitable results. And if the doubts and disbelief just expressed, are indeed unfounded and unsound, and New England is, in truth, well adapted for silk-culture, then, *a fortiori*, so much the more profitable must it be in Virginia, because of our warmer and longer summers. We have also other advantages (which we have several times before urged) in our far cheaper land, and cheaper slave-labor. Many slaves could be producers who now are merely consumers. We are now, as heretofore, and as also frequently expressed, anxious that the business of raising silk shall be properly commenced and pursued in Virginia; yet we have but little favor for, or confidence in, the new-born zeal for raising mulberry plants merely to sell at great profit, to other persons, who will buy them with precisely the same object. It is but a new type of that spirit which showed itself in the Merino sheep mania, which formerly prevailed, and in the far more injurious race-horse-breeding mania, which is now at an unprecedented height in Virginia.

The *morus multicaulis* is undoubtedly a most choice variety, and it offers greatly increased facilities to the young silk-culturist. Whoever is desirous of commencing the silk business, and is without mulberry trees, or enough of them, ought certainly to plant this kind in preference; because from its ease of propagation, and rapid growth, it can more speedily supply enough food for the worms. Moreover, from the larger size of the leaves, they are gathered with much less labor; and from their superior nutritive quality, a less weight will serve to feed a given number of worms. It is also *said* to produce the finest and best silk. This may be so; but it is far from being satisfactorily established. And even if so, a countervailing objection, held by some in France, is, that the fibres are weaker than silk produced from other kinds of mulberry leaves. But neither this nor any other foreign kind is indispensable. If the new beginner has enough of the native mulberry, (*morus rubra*,) though it has been pronounced, and generally admitted, to be worthless, compared to the white, and Chinese, we would advise him to proceed to raise and feed the worms, without waiting for the growth of any other kind. This kind of food is perhaps equal to any, and will be at least quite good enough for the other parts of his early management; and, in the mean time, by planting a few thousand cuttings of the *multicaulis*, of a single bud each, with careful culture, any desirable number may be raised in as few years as will be necessary for the adventurer to learn how to manage his worms, and their products. We would further urge on every farmer who has the least idea of hereafter trying the business, to plant a a few of these trees as a stock to propagate from, if needed. But we also ask him not to believe that this, or any other particular kind, (as either Brussa, Canton, &c.) is so far superior to others as to be indispensable; and we advise him not to buy them, or at least but very few of them, at the exorbitant prices which the always easily gulled public have heretofore paid, and which are now threatened to be advanced.

The northern nursery-men have as yet had the supplying of the southern demand for these plants, although at double the prices at which far better plants might have been bought in Virginia. John Carter, near Richmond, who went early (too early, as it seemed,) into this business, for want of purchasers, had to dig up and throw away thousands of young *morus multicaulis* trees, after they had grown so large that he could not spare them the ground they occupied. Subsequently, he sold the remnant to a great northern nursery-man, at less than half the price at which these (or much worse ones, if not these,) were sent back from New York, and sold in Virginia, and in some cases probably to gentlemen not far from Richmond, but who had not heard of any supply to be obtained except from northern nurseries. The farther north the plants are raised, and the more careful and more forcing their culture, the worse they are to propagate from. The northern nursery-men endeavor to remedy the defect of their climate by using the richest soil, and the most stimulating culture. The plants are pushed in growth unnaturally; and when winter stops their further vegetation, half the year's increase of wood is immature, and is so succulent and tender as to be unable to stand the winter, and unfit to raise from, even if kept through winter sheltered from frost. These immature buds, however, *will sell*; and they are fit for nothing else. A southern plant, raised without forcing culture, is worth more, to propagate from, than half a dozen from a northern nursery, of equal size. This has already been fully proved in Virginia, by those who have bought plants and cuttings from the north, as well as near home, and subjected both to the like treatment after being planted.

It was said above that in France an opinion was held that the silk produced from feeding on the *multicaulis* wanted strength. This is not the only objection there made to this kind of mulberry. It is considered to be short-lived, and that its decline and decay is as much in advance of other kinds, as its early growth and fitness for use. If this be true, it has not been suffered to be discovered, much less reported, in this country; because almost every possessor of the trees has regularly cut them up every year into cuttings to produce young plants, and very few have been permitted to grow even to be five years old. Now whether they would begin to decline so soon as is alleged, or not, if permitted to live, it is certain that few persons in this country have ever seen a plant except under three years old, and of course in a state of greater succulence and more rapid growth than to be expected in after time. This remark would apply to every kind of tree —and in a remarkable degree to the native mulberry, of which the leaves in early growth (even in the forests) are often seen four times as large as is usual on large trees. But all the interested puffers and salesmen of the *morus multicaulis* assume, and their customers seem as readily to admit, that the succulent and large-sized leaves, so remarkable in the early and *forced* growth of the trees of one and two years, are always to distinguish the mature tree. This expectation must be unfounded, judging by all analogous cases; and moreover it is very doubtful whether this feature would be desirable, even if it could be retained. The large size of leaf, so far as caused by, and indicative of, succulence in the plant, and that again caused by excessive supplies of nourishment to the plant, is certainly not desirable for its proper and sole object, that of producing silk. For it has long been known in the silk-growing parts of Europe that the leaves of mulberry trees growing on moist or very rich land, and therefore of rapid and succulent growth, are not as healthy food, and do not furnish as good silk, nor as much profit in the product, as the leaves of trees on poor and on dry land. Thence it may be safely inferred, that if the forced growth of the *multicaulis* in this country had been used to much extent to feed silkworms, instead of to sell to new adventurers, it would have been found to be liable to the objection just stated. But that objection would probably not have been promulgated, as being likely to lessen the greatest value of this kind, which is to be sold at high prices.

The first introduction of this plant from the Philippine Islands, was into France; and its superior advantages in some respects were there seen and generally made known, so as to insure to its culture a favorable consideration, and a fair trial. But though introduced in this country, from France, after it had excited attention and gained much favor in that country, the propagation has spread here so much more rapidly, that there are already ten times the number of plants here that there are in France. The cause of this remarkable difference is plainly enough seen in the different circumstances of the culture in the two countries. In France, the main object in cultivating this tree, was to feed silk-worms. Here, the almost *sole* object, has been to sell the plants, and buds, and to produce as much growth as possible for each year's harvest and sale. Besides, each culturist in France would scrutinize (perhaps too severely) the characters of the new mulberry; while here the interest of the culturists would necessarily direct the concealment of all defects, and the exaggeration of the real advantages. In this way the northern nursery-men have duped their neighbors more to their injury than their southern purchasers; for the plants *will* flourish here, and they *will not* stand the winters of New England, notwithstanding all the strong assertions of the producers to the contrary. Whatever may be the true and superior advantages of this tree, they will principally redound to the benefit of the southern states.

After the foregoing portion of these remarks was in type, we had opportunities of being better informed on two of the points mentioned above; one of which was doubtful, and the other mistaken, because not tested by observation and experience of sufficient duration. These are, the objections, made in France, to the alleged very early decline of vigor and death of the *morus multicaulis*; and the supposed lessened size of the leaves of trees of matured growth. On the side of F street, Shockoe Hill, Richmond, we have just seen trees of this kind, of which the largest are more than four inches through the body, although, judging by the eye, they are not more than 18 feet high. These were not permitted to grow *many-stalked*, as the name implies, and their nature requires; but being designed for ornament, had been trimmed, and forced to grow *single-stalked*. Though growing well and luxuriantly, and having no certain indications of the use of the knife, the want of height proportioned to the trunk seemed to show that the tops of these trees had been cut down at an early period of their growth. Another tree, in the garden of D. I. Burr, deceased, though not more than 2 to 2½ inches through the body, (this also having been trimmed to a single stem,) stands 22 feet high, as measured by our eye; and it would be 24, or more, if the upper branches were not borne down by the weight of their burden of leaves. The ages of none of these could be then learned; but the oldest are probably fully eight years old; and all appeared as thriving, and as much in a growing state as any other trees of like age, and of kinds that may live for half a century or more. The leaves, also, (to our surprise, and conviction of having made an erroneous anticipation,) were but little if any smaller than the usual size of those on younger trees. These facts alone would serve to remove the fear of a very early decay of vigor, and decline and death of the tree; and decide that the size of leaf does not diminish in the older tree, and on better matured wood, in proportion to that change in the common mulberry, and many other trees.

In addition to our own personal observation, we have just received the following better testimony from G. B. Smith, esq. of Baltimore, in answer to inquiries on these two doubtful points. "My old tree," says Mr. Smith, "was one year old when I got it, in the spring of 1828; and is now, of course, eleven years old. It has been transplanted several times; and the last time when it was eight years old. Of course, it furnishes no criterion of the state of the tree at this age. Several large stalks of mine have perished; and there are now 6 stalks, from 6 to 15 feet high. It has also been every year deprived of its branches, and sometimes of its top-wood, for cuttings. Many of its leaves now measure 15 inches in length, by 13 to 14 inches wide. Its leaves are as large now as ever they were."—"The *morus multicaulis* is a *many-stalk* tree; it is constantly sending up shoots from the crown of the roots, like the filbert and lilac; and, consequently, the older stalks die out; but whether from natural decay, or from being perished by their numerous younger brethren, I do not pretend to say. But that the tree will live eleven years, under very adverse circumstances, I know, from the fact that I now have a tree of that age. All many-stalked trees throw off their old wood occasionally, to make room for the young and more vigorous. But how this fact can be any detriment to the *morus multicaulis*, I cannot comprehend, as the roots send up half a dozen stalks, generally, for every one that decays."

This additional testimony and correction of previous error and doubt, we insert, not only readily but, gladly; for no one will receive with more welcome, or publish with more pleasure, any new, or confirmatory evidence of the valuable qualities of this tree, as offering peculiar facilities and aid to silk-culture.

From the Penny Magazine.

THE AMERICAN MANNER OF MOVING HOUSES.

In England we consider it no trifling affair to remove our household establishments, when circumstances render it necessary for us to do so; whereas our trans-atlantic brethren, the Americans, set about removing their houses (goods and chattels included,) without considering it matter of difficulty or hardship. To be sure, their buildings (I do not include those of their older towns and cities) are less substantial and solid than ours; for a frame of moderate-sized posts and scantlings, lined within and without with thin pine boards, is not quite so ponderous an affair as a building where the walls are of massive stone, nor even as one of bricks and mortar.

Before I proceed to explain the usual plan adopted for removing buildings, I will relate some circumstances connected with a frame building with which I was acquainted, and which constituted a fraction of the capital of the county in which I resided. While the town was but in its infancy, an acquaintance of mine built a "store," (shop for general merchandise, with granaries, &c., overhead,) in which he commenced the business of a general merchant. In a few years the population increased, and the town became much enlarged; and so did the business of my acquaintance, inasmuch that he found, or fancied, his original store too small for him. In this dilemma what was to be done? The difficulty was soon solved; he sold his store, to be taken off the premises, for he wanted the ground to build a larger one upon. A dress-maker was the purchaser, who removed it about eighty yards along the same street, and had it fitted up to suit her line of business; at the same time converting a portion of it into apartments to dwell in. How long she occupied it I do not precisely recollect; but, quitting that part of the country for a few years, when I returned and looked for my old acquaintance, the milliner's store, nothing like it was to be seen. I repaired to the original owner, and inquired if some calamity had befallen it, or if it were still on the move? "I guess," replied he, "that you will find it in Centre Avenue, a little below the Washington Hotel. It is now the property of

Mr. D—, my old clerk, who has converted it into a 'grocery.'" And, to be sure, there it was! and one of the greatest nuisances of the place; for Mr. D—'s grocery was the rendezvous of all the lazy, drunken vagabonds connected with the town and neighborhood. I do not remember how many years it continued the resort of the dissolute; but it was after the temperance societies had made some progress in that part of the country, that happening one day to be in the town, I observed more bustle than ordinary in the vicinity of Mr. D—'s grocery, and upon inquiring what was going on, I learned that the grocery was once more on the move; that it had been purchased by a stanch temperance man, a boot and shoemaker; and that he was removing it into the vicinity of his own dwelling-house; not only into another street, but to a distant part of it; and there I left it when I removed from that district some years afterwards—one part of it occupied by half a dozen cobblers' stalls, and the other part a well-supplied shoe and leather store.

I was once present at the removing of a large grist-mill, containing four pair of mill-stones, besides all the machinery and apparatus necessary for the purpose of carrying on the manufacture of flour for exportation. It was a stout frame-building, of the dimensions of fifty feet by forty, and four stories high. After it had been some time in operation, it was ascertained that in dry seasons the situation did not command a sufficient head of water; but as the stream had a considerable fall, it was obvious that if the mill were placed 100 yards further down, the desired fall would be obtained. To effect this the owner of the mill agreed with an old Yankee to remove it, just as it stood, to its new site, for the sum of one hundred dollars (a little over £20 sterling,) a small sum apparently for such an undertaking; for if the building or machinery sustained any damage, the person undertaking the removal was to make it good. Large frame-buildings, like the one in question, require stout timbers for their posts and beams; the principal timbers in this mill were from twelve to fifteen inches square. Besides the four bottom beams or sills which rested on the stone foundation, there were three others of a similar size mortised into the end ones, and equidistant from each other; so that there were, in fact, five transverse beams on which the lowest floor rested. The first thing to be done was the laying down of wooden ways, upon which the building was to travel upon rollers; to accomplish which, five rails of squared timber, at distances asunder exactly corresponding with the foundation-timbers of the mill, were properly placed and secured, in lines extending to where a new foundation of stone had been already prepared. After this the building was raised perpendicularly, by the means of wedges of hard timber, about eight inches, in order that eight-inch wooden rollers might be placed under the several lower beams and sills; which having been done the wedges were withdrawn, and the building then rested upon the rollers. The rollers were made of hard timber, each about five feet long, and perforated near each end with suitable holes, for the reception of hand-spikes or levers, to be used by the persons employed in the removal of the building. Under each beam were placed four rollers, so that under the whole five beams, twenty were employed. I should have remarked that it was necessary to remove the bottom floor-planking, in order that the persons employed at the rollers placed under the middle or inner beams might be enabled to work them. Two persons were appointed to each roller, one to each end; and every thing having been properly fixed, and all the forty men at their respective posts, the old Yankee captain gave the word "move," when the fabric instantly began to advance on its wooden ways. As soon as the rearmost rollers were set at liberty in the rear of the advancing building, they were straightway carried forward and placed under the extreme forepart of the beams they severally belonged to. It was found that the power of the forty men stationed at the rollers with their handspikes or levers, was amply sufficient to keep the building in motion without any extraordinary exertion being called for; and as there intervened no obstacle in the distance the mill had to travel, in about three hours it had advanced to its destined resting-place. Having safely arrived there, wedges were again employed in order to free the rollers, and to settle it gradually on its new foundation. The whole undertaking was completed without the slightest injury occurring to any part of the building or machinery; not a square of glass was broken or cracked in any of the score of windows that belonged to the various parts of it; not a pin or a nail was sprung or broken.

From the American Farmer.

HYDROPHOBIA IN SHEEP.

Springdale, Va. 18th March, 1823.

Dear Sir,

The effects of hydrophobia were singularly exhibited a few years since, on a flock of sheep belonging to the plantation of my father, in this county. As the facts were at the time perfectly novel to me, and may still be interesting to others, I have thought them not wholly unworthy of a place in your excellent paper.

In the month of February, 1810, while it was intensely cold, and a very deep snow covered the ground, the flock of sheep were confined in a small enclosure surrounding a fodder house, which served the double purpose of supplying them with food and protecting them from the inclemency of the weather. In this situation they were visited by a dog belonging to one of my neighbors, which, although there had been something rather extraordinary in his appearance and conduct, had evinced no very marked symptoms of hydrophobia. About day-light in the morning he was discovered by the negroes, in pursuit of the sheep in their inclosure; but on seeing them, and being menaced with a stick, he ran off; but instead of going immediately home he took the direction to a neighboring village, where he bit two cows, and disclosed other marks of unusual ferocity and ill-nature. These circumstances at length excited suspicion of the true nature of his malady, and on his return home, he was shot. Upon examining the sheep, it was found that 15 or 20 had been bitten, most of them so slightly, that in one instance, only, was it thought that death would probably ensue, merely from the wounds. The peculiar manner in which the animals were bitten, and the number injured, showed that the dog was actuated more by a strange and malignant propensity to mischief, than from the mere desire of food. Instead of killing them immediately, he appeared to have attacked them merely for the purpose of teasing them; and the impressions of his teeth were barely visible, on their ears and faces, and not unfrequently on their legs. In every case, however, he succeeded in bringing blood; most of the female sheep were in their last stage of pregnancy, and so trifling was the injury they sustained, that they bore their lambs as usual, without exception; and before the lapse of a fortnight, their wounds were entirely healed. About this period hydrophobia first made its appearance. Two of the flock were found sick, and unable to stand, before they were known to be affected. In a few days the disease was observed in several others, and in this manner three or four in each week, disclosed the symptoms, and six weeks had elapsed before the whole number bitten had been affected.

There was a peculiarity attending the early symptoms, which soon marked the individual destined shortly to become a victim to the dreadful malady. It first attracted attention by pursuing and tormenting its associates, by almost incessant libidinous actions. The diseased were all females, and several with lambs at their sides; yet their venereal inclinations were so powerful, that they exhibited in a most astonishing degree, the manners and actions of the other sex. In this manner did some of them, with persevering industry, tease and torment a companion, for twenty or thirty minutes, until the fugitive would find shelter by mingling with the flock—a second would then be attacked in the same manner, and have to run the same vexatious round; sometimes the fugitive would turn upon its pursuer, and by an effectual resistance obtain relief. This paroxysm would intermit occasionally, and the infected sheep, would feed peaceably with the others, if not disturbed; but upon approaching the flock, it could readily be recognized by its bold countenance, staring or glassy eyes, and an advance to make battle. In this state of the disease they would attack a man with much resolution, and beat him with their heads. In some instances I recollect seeing them advance from fifty to one hundred yards, from the flock, and attack persons so furiously, that they were obliged to defend themselves with sticks. After discovering more than common strength and vigor for a short time, an instantaneous debility appeared to come on, and their limbs refused to do their office. I have seen them, in the very act of advancing vigorously to battle, fall as suddenly, as if shot by a ball from a gun. In a few minutes their strength would return, and they would rise again to renew the combat. This I think might generally have been considered the second stage of the disease; yet in this situation their amorous propensities continued, for I have seen them fall, while pursuing other sheep of the flock. These paroxysms, or falling fits, at last became more and more frequent—the animal refused to take food, and became too feeble to follow the flock. But even in this state of excessive debility, and while apparently suffering the most excruciating pain, the inclinations which predominated throughout the disease would still manifest themselves, until a complete exhaustion would terminate the struggle. The lambs which had continued to suck during the lives of their dams, were now fed by hand, and if I recollect aright were without an exception raised. The wool was invariably saved after the death of the sheep, without any inconvenience whatever; indeed, as a proof that the blood of the infected animal cannot be injurious, unless commingled with that flowing in the veins of the living; the skins were taken from several hogs, which died of hydrophobia, the same time, and the bodies frequently eaten by the others, with entire impunity. It was a remarkable circumstance, that with the infected animals, putrefaction ensued almost immediately after death.

Very respectfully,

WILLIAM M. BARTON.

For the Farmers' Register.

WOLVES IN FAUQUIER.

Fauquier Springs, Aug. 22, 1838.

While viewing, from an eminence at the extremity of Warrenton, the extensive and beautiful prospect of fertile valley and mountain lands stretching to the Blue Ridge, Mr. ——— directed my attention to the Leathercoat mountain, which is in full view, about eight miles distant in a direct line. There was, near to, but below its summit, the appearance of a line of white huts, or some other kind of artificial structures of humble size, spread over a considerable extent of ground. He explained, however, that they were naked rocks—of which it is rare to see much of any of the mountain sides in Virginia composed, and still more rare of the fertile South-West Mountains, to which range this one belongs. I was much surprised to learn, that among these rocks, and in the dens which they formed, there were wolves still sheltered, which had been residents of the Leathercoat, and the adjoining Bull-run mountain, for the four last years. No wolves had been heard of before, during the lives of any of the present inhabitants of Fauquier, nearer than the rarely visited and scarcely accessible rocky cliffs and precipices of the Alleghany mountains, perhaps one hundred miles distant; and it is a strange and unaccountable circumstance, that this colony should have been settled so recently, so far to the eastward. The stealthy and hidden manner of their emigration is as remarkable, as the motive for it is inscrutable. The hungry band of prowlers must have passed over, in their journey, a very wide extent of fertile valleys, filled with flocks and herds, and also of higher mountains, furnishing as good places for concealment, before reaching their chosen fastness and abode, from which they have not since been driven. For a long time the actual presence of these cunning and ferocious depredators was not suspected by the people of the neighborhood, though they were killing their sheep by hundreds. The losses were ascribed to dogs; though such extensive and long-continued destruction, without discovery of the particular actors, had never been heard of previously. Before the midnight and bloody forays of the wolves were effectually checked, they had been extended as far as twenty miles from their mountain strong-hold; and they had killed, in all, more than 1000 sheep in this county. As soon, however, as the nature and the abode of the enemy were known, large hunting parties of hundreds of the neighbors, with guns and with all their dogs, scoured the mountain and its places of concealment. They formed a circle around the mountain, as practised in Europe in ancient times, for the sport of royal huntsmen; and gradually closed their ranks, and lessened the surrounded space, by advancing slowly and regularly up toward the central point of the mountain, and driving the roused and encircled wolves before them. Besides the rocks, and the usual difficult ground of steep and rocky mountain sides, there is much of the mountain covered with that strong and large evergreen shrub, or small tree, the laurel, improperly called the ivy-bush, which spreads in many cases over acres of the land together, and forming, as it always does, the most dense and impenetrable thicket. The stoutest dogs, and in numbers, were scarcely able to cope with their new and fierce enemies; and many, in attacking them, perished by the long and sharp fangs of the wolves, when driven to desperate bay. When the wolves could be seen and reached, these conflicts were usually speedily ended, by the rifles of the hunters. In different hunts of this kind, 24 wolves were killed, without all being destroyed, or the diminished remnant being induced to abandon their chosen place of refuge. However, being intimidated by the attacks on them, and their heavy losses, they have made no incursions into the neighboring farms, and committed no known depredations on the flocks, for the last two years. But some still retain their position, in spite of all the force and craft of the hunters. as resolutely and as obstinately as the Seminole Indians have done against the arms and diplomacy of General Jesup. A sufficient evidence of the still-continued presence of the wolves in these mountains, is, that a man has during this year found and killed, in their dens, eight wolf-whelps. E. R.

From the Quarterly Journal of Agriculture.

PRACTICAL EFFECTS OF DRAINING.

The system of draining introduced into Scotland some years ago, and proceeding so rapidly, must be regarded as the greatest improvement of modern times. The landlord and farmer do it jointly. Here is a safe investment for money—the expense repaid in twenty years, regular interest, and the land improved in value above one-third. Green crops are grown in great abundance after draining, where no attempt could be made before, and the farmers allow they have four crops in three years, and the draining pays on an average eight per cent. I know an instance of a wet clay soil, almost covered with rushes, being drained and improved at an expense of £15 an acre, ($65); the green crops were so productive as to repay the expense in one year, and after deducting the old rent, the improvement pays fourteen per cent. upon the outlay. The drains are from 20 to 30 inches deep, and at the distance of from 12 to 20 feet, sometimes in the furrows of the field, or across, or obliquely, as the descent may suit, and sometimes the land is laid flat. Draining, to be remunerative, must be done effectually. A field cannot be drained by putting a drain in a corner, one here and another there; by running one across the field, and another diagonally to that. It must be done completely, or not at all, for half measures are useless.

From the Franklin Farmer.

SELECTION OF SEED WHEAT.

Richmond, Ky., Aug. 6, 1838.

Many years ago, a farmer in this quarter, who cultivated the same variety of wheat and in the same manner as did his neighbors, was known to have a yield of a third more to the acre. Upon inquiry as to the cause, the unsatisfactory answer was given—"I sow barrel seed." The neighbors purchased of him their seed wheat, and the first year had a yield equal to his; but selecting their seed as formerly, the second and third crops were but little, if any better, than was raised by them previous to their purchase of seed. They again purchased, and their fourth crop was equal to the first, but their fifth and sixth crops were like their second and third. How to solve this apparent mystery, caused many a neighborhood consultation and discussion. The vender of the seed saw too inviting a prospect to make money from the sale of seed wheat to induce him to disclose the manner of its preparation, and he struggled to keep it concealed. It was ultimately discovered, however, and was as follows:

When you are ready to get out your wheat, place a barrel or box in your stack-yard, open at one end; before you pass the bundle to the treading floor, give it one or two strokes across the open end of the barrel or box, by which the best matured grains will shatter off; then winnow and use for seed.

Thus selected, it will be far superior to the seed prepared by running it through a coarse sieve; for it is known to every observant farmer, that many of the largest grains of both wheat and rye are unripe or diseased, and yet they do not shatter out as easily as those which are perfectly ripe.

W. C. G.

From the New England Farmer.

CURING CLOVER HAY.

There prevails with many farmers a strong prejudice against clover hay; and indeed in the condition in which it usually is found it is a very coarse miserable fodder, and hardly better than so much brush. Our northern clover sown on richly-manured land, and with the small quantity of seed commonly applied, makes a rough product; and, as the flowers and seeds are generally shaken off in the making, it contains little nutriment, and is scarcely fit for other purposes than litter. The southern clover is of a smaller growth; and on that account makes a much better forage. Indeed, clover hay, when well cured, is very much liked by cattle, whom we must allow to be pretty fair judges in the case of what is good for them; and no long feed, that can be given to cows, will make more or better milk. One of the best milk-men in the neighborhood of Boston speaks of it in the highest terms; and, in his mode of curing prefers it to any other hay. Clover, when mixed with other hay in market, for the reason only we believe that horses taken in at livery stables, will eat more of it than of the herds-grass, cut after it is dead ripe, and so coarse and hard that the mastication of even a small quantity is likely to employ all the time the poor tired horse has to spare from his sleep; and a rack full of it, like the show pickles and pound cake at taverns, is liable to stand by for some time and to serve many a guest. We consider clover-hay, when well saved, as some of the best hay which can be grown; highly palatable, and containing an abundant nutriment; but its value greatly depends on the mode of curing.

Some farmers have cut it in the morning, and after a warm day have carried it in the afternoon of the same day, and by a very liberal salting have saved it well. But the practice of other farmers is, we believe, a much preferable mode. We know several cases in which it has proved entirely satisfactory; and we shall proceed to describe it.—They eat it in good weather, and when it is dry. They scarcely spread or stir it at all. At night of the day on which it is cut, they put it into cocks of a good size, and there let it remain two or three days rain or shine. When well made in this way, which is easily determined by a practised hand, on a pleasant day in the morning they turn over the cocks and open them slightly, and then carry it in, giving it a very little sprinkling of salt. One great object is to avoid by much stirring the shaking off of the heads. Thus cured they regard it among the most valuable hay which they get. We have known the same plan pursued by one of the best farmers in western New York with all his hay crop. The Deerfield farmers of late years dry their hay in the sun much less than formerly, and they believe to their great benefit. In all cases however the most scrupulous care must be observed to rid the hay from all wetness of dew or rain.

From the Baltimore Farmer.

RECIPE FOR TAKING HIVES WITHOUT DESTROYING THE BEES.

Having always thought that there was great inhumanity in the old plan of *destroying* the bees, in order to take the honey, we determined to try the more humane plan practised by the French of robbing them of their sweets without depriving them of life, and we have put the plan twice into operation the present season with entire success. And as, besides the humanity of the process, it has economy to recommend it, we deem it our duty to lay the method before our readers, in the hope that we may be instrumental in saving many lives of those industrious workmen, and of securing their labors to their owners for numbers of years. The method, which is easy, is as follows:

In the dusk of the evening, when the bees are quietly lodged, place a tub near the hive, then turn the hive over with its bottom upwards into the tub, cover the hive with a clean one, which must be previously prepared by washing its inside with salt and water, and rubbing it with hickory leaves, thyme, or some other aromatic leaves or herbs. Having carefully adjusted the mouth of each hive to the other, so that no aperture remains between them take a small stick and gently beat round the sides of the full hive for about 15 minutes, in which time the bees will leave their cells in the lower hive, ascend and adhere to the upper one. Then gently lift the new hive with all its little tenants, and place it on the stand from which the other hive was taken.

This should be done about midsummer, so as to allow the bees time to provide a new stock of honey for winter's use. If care be observed no danger need be apprehended.

From the Buckeye Ploughboy.

THE FARMER.

No avocation in life is more respectable and useful than that of the farmer. The time has gone by when "contempt is cast upon the husbandman." Agriculture, as a science, is becoming more important, and more honorable. It is the noblest, for it is "the natural employment of man." The intelligent and independent farmer is ever respected; he holds an important and responsible place in society. Upon him devolve many duties; upon him rest many obligations. In him we look for examples in patriotism, virtue and intelligence. Living, not in the "hum of human cities;" where he would be continually in the whirlpool of political and other excitement, he can examine questions of a moral, religious and political nature, with a cool head, a calm mind, and an unbiassed judgment. To him we look for correct opinion, and in him we should ever find a safe counsellor, and a correct adviser.

Our farmers should cultivate their minds and their hearts, as well as their fields. They can gain as rich rewards in the mental, as they can reap profitable harvests in the natural world. Without learning a man cannot be a first rate farmer. Without intelligence he cannot discharge in proper manner, the duties of a citizen. Agriculture is a science that requires experience and study. Men must be educated to be farmers, as well as to be lawyers, or doctors. And there are thousands of young men who are in stores and offices, who should go into agricultural pursuits. It would be better for them, better for the country. And who would not rather be an independent farmer, than a small shopkeeper, or a fourth rate lawyer or doctor? Who would not rather be first in a useful employment, than to be titman in one which the world calls honorable? Let young men seek for land, rather than for situations, "in the cotton trade and sugar-line."

From the Genesee Farmer.

SWAMPS.

Swamps are generally considered the most worthless and unprofitable part of a farm, when, in nine cases out of ten, if they were properly treated by draining, trenching, and being freed from bogs and bushes, they might be converted into the most valuable and productive soil. What are termed swamps are usually low lands, receiving the water and the wash of the neighboring hills, and of course must be composed of the richest materials, and those best adapted to promote vegetation. The first object in reclaiming such places, and without which all other efforts will be unavailing, is to free them from the surplus water. To do this effectually reference must be had to the extent of the swamp, the quantity of water to be thrown off, the declination of the surface, the natural outlets of the water, and the work of draining commenced on a scale commensurate with the end to be effected. If the quantity of water to be discharged is large, or if the swamp is liable to inundations, the main drain should be open, and of a size sufficiently large and deep to allow the water to flow off freely and quickly. This, as the main work, should be performed in the first place, as it will greatly facilitate the determining of the best place for side-drains, and aid in their formation. If the water of the swamp is furnished by springs around the margin, a drain of a proper depth and capacity should be run around the outside, and connected with the main drain, and if springs rise in the level part, particular reference must always be had to these places in any plan of draining. Unless the quantity of water to be carried off is very large, all the drains except the main one may be covered, and of course will form no obstruction to cultivation.

When, by draining, the surface is once dried, the operation of freeing the surface from bushes, bogs, and coarse grasses, can be carried on at pleasure. When the ground is firm enough for the use of the plough, the surface may be turned carefully over, and the cultivated grasses, clover, herds-grass, red-top, &c. sown with oats or other spring grain, to form a new and fine turf for mowing or grazing. Where the plough cannot be used at first, the bushes and bogs can be extirpated with the hoe and grubber, and the cultivated grasses sown in their stead. Potatoes are an excellent crop for reclaimed grounds, rendering the surface fine, and putting it in good condition for seeding. Swamps so reclaimed make the most valuable meadows. There is another point of view in which the great mass of vegetable mould collected in swamps possesses a great interest for the farmer. We have, in former numbers of the Farmer, stated the great care and expense incurred in the European countries, in securing the largest possible quantity of manure, by mixing with the dung of their cattle, in their stables and farm-yards, all the refuse straw, weeds, leaves, washings of the highways, and all other vegetable and animal matter that could be collected, that the whole might be used in enriching the soil and increasing the crops. As a deposit in the farmyard, nothing is found to exceed in value a covering of earth from a swamp. The custom in Belgium and Germany, where such a resource is available, is, when the yard is cleaned of manure to cover it with fresh vegetable mould or swamp earth, to the depth of a foot. This earth absorbs the urine, the wash of the yard, the salts of the manure, that would otherwise flow off and be lost, and in the course of the season, or the year, becomes the most valuable and efficient of manures. No farmer who understands his true interests, will suffer the wash of his stables and yards to be lost, and there is no way in which it is so effectually prevented, as by furnishing vegetable mould to absorb it.

With some farmers in this country who have adopted this mode of replenishing their cattle-yards, the rule is to return to the yard a load of swamp mud for every load of manure taken from it to the field. As a top-dressing for meadows or grass lands, this earth, impregnated with salts, is unrivalled for promoting fertility. Like all finely-rotted manures, its effects are more prompt and energetic than those of common manures, but the influence is not perhaps as durable. Instead, therefore, of considering a swamp as a useless piece of ground, the farmer should look upon it as a great magazine of vegetable mould; capable, if desired, of being converted into the best of manures; or if not required for this purpose, can be made where it is, to produce the best of grasses, and make the most productive of meadow-lands.

From the Genesee Farmer.

CATTLE—DEVONSHIRE.

While it may be affirmed with great truth, that the present beautiful and superior breed of improved short horns are strictly artificial, and while some fears may be justly entertained lest the valuable qualities for which they are so distinguished, have not become so fully constitutional as to be beyond the possibility of lapse,—we here bring to the notice of the farmer, a breed of cattle, scarcely inferior in quality to the short horns, and of which no apprehensions can be entertained that the type of these distinguishing qualities are evanescent, and not durably incorporated in the constitution and race.

The north of Devon has long been celebrated for a beautiful breed of cattle, in activity of work, and aptitude to fatten unrivalled. The place where they are found in the greatest perfection, is in the vicinity of Portlock and Biddleford, along the Bristol channel in the county of Devon. From the earliest records the breed has here remained the same, or if not quite as perfect in general as at the present moment, yet altered in no essential point until the last thirty years. No persevering successful attempts to improve the general character of British cattle were made until within some fifty or sixty years; and the Devonshire farmers were so well satisfied with their herds that they were about the last to dream that their beautiful red cattle could be improved, and they did not bestir themselves in earnest until the high prices and improved forms of the Collings short horns, convinced them that in estimating their advantages they were behind the age.

The most perfect specimens of the Devonshire cattle are found among the North Devons, and it is of these we shall speak. As the breed is of the middle horns the horns should be neither too high or too low, those of the *bull* tapering to the points, not very thick at the base, and of a yellow or waxen color. The eye should be clear, bright and prominent, showing much of the white, and ought to have a circle of a variable color, but usually of a dark orange around it. The forehead should be flat, indented and small, for by the smallness of the forehead the purity of the blood is much estimated. The cheek should be small and the muzzle fine, and the nose should be of a clear yellow. The *ox* has a small head, singularly so relatively to the bulk of the animal, yet it has a striking breadth of forehead. Its neck is well adapted to the yoke or the collar; the horns are small and fine; the fore-legs are wide apart, looking like pillars to support a great weight. Angular bony projections are never found in a beast that carries much flesh and fat. A narrow-chested animal can never be useful either for working or grazing.

The skin of the Devon of the pure breed, notwithstanding his curly hair, is very mellow, fine and elastic. Graziers know there is not a more important point than this. When the skin can be easily raised from the hips it shows that there is room to set fat below. The favorite color of the Devons is a blood red. The hair in some is curled, the curls running like ripples on water, and when dark giving a mahogany appearance. If the hair is smooth it should be fine and glossy. Few of good blood have any white upon them, and the pure Devon is as uniformly red, as is the pure short horn red and white.

The comparative smallness of the Devon cow, is one of the most remarkable traits of their character. The bull is much smaller than the ox, and the cow proportionally smaller than either. This is considered somewhat of a disadvantage, as it is almost impossible to procure large and serviceable oxen, except from a *roomy* cow. Owing to their peculiar build, however, the Devon cow is more *roomy* than most other breeds of cattle of the same size, which in a great measure obviates the objection. The Devon cow is particularly distinguished for her full, round, clear eye, the gold colored circle around it, and the same color prevailing on the inside of the ear. The muzzle orange or yellow, but the rest of the face having nothing of black, or even of white about it.

The peculiar excellence of the Devonshire ox, is a quickness of action in working, which few horses exceed, and no other cattle can equal. They have also a degree of docility and goodness of temper, and stoutness and honesty of work, to which many teams of horses cannot pretend. Mr. Youatt, who is great authority on the subject of cattle, thus describes their usual mode of treatment and aptitude to fatten.

The Devon steer is taken into work at about two years old; and they work until they are four to six; they are then grazed, or kept on hay, and in ten or twelve months, and without any further trouble, they are fit for market. If the grass is good, no corn, or cake, or turnips are required for the first winter; but of course for a second winter, these must be added. The grazier likes this breed best, at five years old, and they will usually, when taken from the plough, fetch as much money as at six. Lord Somerville states, that after having been worked lightly on hill land for two years, at four years old they are brought into heavy land of the vales, and used in hard work till six; and what deserves consideration is, an ox must be thus worked to attain his largest size. If he is kept idle until he is five or six, he will invariably be stinted in his growth. Mr. Youatt adds—In their disposition to fatten, very few cattle can rival them. They do not, indeed, attain the great weight of some breeds; but in a given time acquire more flesh, and with a less consumption of food, and their flesh is beautiful in its kind. It is of that mottled, marble character so pleasing to the eye, and to the taste.

As to the value of the Devon cow for the dairy, different and somewhat conflicting opinions are entertained in England. Mr. Youatt says:

"For the dairy, the north Devon must be acknowledged to be inferior to several other breeds. The milk is good, and yields more than an average proportion of cream and butter; but it is deficient in quantity. There are those, however, and no mean judges, who deny this, and select the north Devons even for the dairy."

Perhaps one of the most valuable crosses that has yet been made. is the one described by the celebrated breeder, Mr. Bolton, in a letter to the Farmer's Magazine.

"I have known many excellent beasts bred from improved short horn bulls and long horn cows; indeed I never knew one of these bulls put to any cow where the produce was not superior to the dam, but the cross which I advocate, and with which I am best acquainted, is that with the *Devon cow.* I have uniformly remarked that a cross here was attended with a proportionate improvement in size, quality of flesh, and aptitude to fatten. In every instance they have shown themselves superior milkers, and stand to the pail till within six or eight weeks of calving; and several instances have come under my knowledge, where they have never been dry since they first calved. So highly are they prized as milkers, that a friend of mine who hires out dairies informs me that the dairymen give him nearly £2 per cow per year more for the half and three-fourth breeds, than they would for cows of any other breed."

Judging from the expressions of opinions given by cattle breeders in England, by the course of the agricultural periodicals of that country, and by the fact, that at the late Smithland cattle show open to the whole kingdom, the first prizes were taken by Devon cattle, we should imagine that since the demise of some of the most celebrated short horn breeders, such as Collings, Berry, and others, the Devons were treading close on the heels of the short horns in public estimation. The first premium was given at the late Smithfield fair, to a pure Devon, the property of Mr. Coke of Holkham, and the second to a steer only 19 months old, of the improved Devon, or the Devon crossed with the Somersetshire breed. The ox weighed when dead, 1,122 pounds; and the steer when dead, weighed 1,332 pounds. The steer was a most remarkable one, and was owned by Mr. Giblett.

The Devonshire breed of cattle have been more extensively introduced into the United States than any other breed of foreign cattle, and they form a large portion, in different grades, of the cattle of New England and the middle states. Some fine stock of this breed were sent from Mr. Coke to Mr. Patterson of Baltimore, and two oxen from this importation, raised and fattened by the Messrs. Hurlbut of Winchester, Connecticut, weighed when killed as follows:

First Ox,		*Second Ox,*	
Carcass	1438	Carcass	1528
Hide	117	Hide	115
Tallow	175	Tallow	213
	1730 lbs.		1856 lbs.

Mr. Fisher of New York, addressed a letter to Mr. Coke, giving an account of these cattle, and received the following reply from that veteran agriculturist, which we insert as showing his opinion of the Devons.

Holkham, April 21, 1831.

Sir—I am this moment favored with your kind letter, and most flattering account of the Devon oxen. It is a pleasing reflection to me, that I was the first person that introduced them into America, through my friend Mr. Patterson. I thought them at that time, and I am still more confirmed in my opinion now, that they are the most superior breed of cattle in the Island, if well selected. But I beg to be understood, when I speak of the Devonshire red cattle, it is in praise of the *North Devon cattle*, with yellow noses and indented foreheads, and yellow around their eyes, which mark their character beyond that of the South Devons, which have black noses, or intermixed with black. These I beg to be distinctly understood not to recommend as a superior breed of cattle. Be so kind as to express my acknowledgments to Mr. Hurlbut, when you see him, and to assure him that I shall be at all times most happy to show him, or any of his American friends should they come to England, every attention in my power, in the agricultural line.

THO. WM. COKE.

From the Essex Gazette.

STEAM POWER.

The invention of the steam engine, and the various ways in which this philosophical and mechanical power is brought to perform the labor of men and other animals, is among the most curious and interesting subjects to which we can possibly turn our attention. Steam has already made a greater change in the pursuits of man, in the mode of travelling, and the easing of labor, than any other discovery or invention in all the history of past time, and is doubtless destined to a much more extended use; indeed, it is highly probable, that the time is not far distant, when steam engines of all dimensions and powers, will be in common use to perform domestic labor. The same fire which warms the mechanic's shop, will set his saw, his plane and his auger in motion; and we have no doubt but that the present generation will witness steam engines, perhaps not much larger than cooking stoves, driving washing machines, sawing wood, and performing many of the more laborious services of domestic life.

But it was not our purpose, in this article, merely to speculate on possibilities; but rather to state a few facts as to the power of steam and of coal expended in the generation of steam.

By a set of accurate experiments made in 1835, at the copper mine of St. Austel, in Cornwall, it was made to appear that one bushel of coal, weighing 84 lbs. consumed in the best constructed engine, exerted a force equal to raising 125,500,000 pounds one foot high, or equal to raising 1,255,000 pounds one hundred feet high; and every pound of coal exerted a power equal to raising 667 tons one foot, or more than 6 1-2 tons one hundred feet! Each ounce of coal was found to exert a power equal to raising 42 tons one foot, or 18 pounds to the height of a mile!

The largest pyramid of Egypt weighs, by calculation, 12,760,000,000 pounds, and employed 100,000 men twenty years in building it; but the whole required to elevate the stones to their present situation could be produced by the combustion of 479 tons of coal.

The Menai bridge is about 500 feet long, a single arch suspended on chains 120 feet from the water, and weighs 4,000,000 pounds; and the whole could be lifted from the water to its present situation, by the burning of 4 bushels of coal!

The burning of an ounce of coal being sufficient to elevate 18 pounds 1 mile, it requiring but 18 pounds' draught to draw two tons on a level railroad, it follows that the combustion of an ounce of coal is sufficient to draw two tons a mile, on such a road.

From these data, without any allowance for future improvements, it is easy to perceive that the principle is capable of endless diversification, and application to almost all the labors of life, and that whenever those improvements in manufactures are made, which shall afford small machines at a reduced price, they will become as common as turning lathes or grindstones.

There can be no doubt that whenever a permanent power is wanted for any laborious employment, steam is vastly cheaper than it is to employ either men or horses; and the only reason why it is not even more profitable than it is, on railroads, is, that engines of an expense and power are used, vastly beyond the labor they have to perform, and if any engine were so placed as to find employment equal to its capacity for labor, it could do that labor for half, and perhaps for a quarter of the expense of horse power; hence the utility of *extending* railroads, and bringing on new lines of travel, as almost every road in this country is furnished with steam power equal to double the amount of labor they can find to do.

ON FEEDING WET LEAVES TO SILK-WORMS.

Mr. George Fitch, of Bridgton, made an experiment last season, on feeding silk-worms on wet leaves. A few days after they were hatched he divided the worms into two lots; one lot was fed on dry or wet leaves as they happened to be, according to the weather; and when leaves were dirty they were washed and given to the worms; this lot grew faster, and became larger, and spun a week sooner than those fed on dry leaves. It required forty threads, before doubled, from the cocoons of those fed on dry leaves, to make a thread of sewing silk of rather a large size; it took eighty threads of those fed on wet leaves to make a thread about the same size. The cocoons from wet leaves were the largest and heaviest; some of them had threads 800 yards in length. The length of the threads from the cocoons of the silk-worms fed on dry leaves was not measured.

We publish these particulars, as it has been considered necessary to have dry leaves for silk-worms, and it has been recommended to pick leaves before a storm, in order to have a supply of dry leaves on hand. A few years ago, there seemed to be, according to writers on the subject, a great deal of difficulty in managing silk-worms and manufacturing silk. Close rooms, with stoves and thermometers to regulate the temperature, and dry leaves were considered indispensable; and several years' practice, with good and *costly* instruction, and an expensive reel, in order to prepare the silk for sale in a raw state. Now, silk worms are kept in barns or sheds, without any artificial heat, and they suffer no more from cold than they do from heat. So much nicety as has been practised in regard to their feed is not necessary.—*Yankee Farmer.*

MILK FROM COWS FED ON DISTILLERY SWILL.

[An animated discussion is now going on in the 'Journal of Commerce' of New York, as to the quality of the milk which forms the principal part of the supply of that city. We copy below one of the articles of the assailants. The "Committee of Milkmen" who have answered at great length to previous pieces, present but a very unsatisfactory defence, and a very poor recommendation of the commodity in which they deal.—Ed. Far. Reg.]

From the Journal of Commerce.

MILK.

The Journal cannot confer a greater blessing on this community than by producing a thorough reformation in the milk department. It is a subject in which the health and lives of thousands are involved. I have given some attention to it from the circumstance of having the constitution of a fine boy, the delicacy of whose mother compelled her to nurse from the bottle, entirely undermined, and scarred with blotches to this day; while my other children, nursed at the breast, enjoy perfect health. Uncertain of the cause of my boy's pining and drooping, it at length occurred to me to analyze the milk, which I found to be the mere dregs of a distillery; scarce one particle of nutriment to a pint. I found a pint of warm water, a teaspoon full of flour, and 2 grains of magnesia, to contain more nutriment than a pint of swill, called milk. On discovering this great secret in the milk trade, I immediately sent to Orange county and provided a young, healthy, and country-fed cow, which I have had for four years, furnishing abundance of good and wholesome milk.

It has often occurred to me as surprising, that while we have municipal laws to regulate the quality of bread stuff, the corporation should be perfectly reckless of what we administer to the delicate stomachs of our children. There is not a more sure and certain poison than this swill milk. Besides its deleterious properties, a pint does not contain sufficient nutriment to support a child. Did you ever make an estimate of the profits of the milkmen? If not, I will do it for you; having had occasion to investigate the matter. It is based upon feeding the cows on swill merely, from the distillery, which barely keeps the cows alive. The swill is given them warm, and passes through them with the same rapidity as through the stills, and is all converted into what is called milk. They are milked three times each day, and furnish at each milking from 8 to 10 quarts.

One barrel of swill costs 6¼ cents, and will keep two cows a day, which will yield on the average 24 quarts of milk. This, at 6*d*. per quart, is 1 50 cts. Every cow fed on swill yields a net profit to the milkman, over expenses of delivery, &c., of $1 25 per head *per day*. There is no branch of business so profitable, and none so baneful to a community of children. For myself, I would sooner pay 2s. a quart for milk from grass-fed cows, than take the swill at any rate.

Yours, V.

A gentleman who was formerly a distiller mentioned to us yesterday, that it was then his custom to feed cows on the slops, and that the quantity of milk, when he put them on that feed, was immediately just about doubled, but the quality ruined. He says such milk will not make butter at all. Churning only wrought it into froth.—*Eds. Jour. Commerce.*

From the American Silk Grower.

SILK CULTURE.

From information coming to us from various sources, we are inclined to believe that a disposition to try the experiment of the cultivation of silk has received a new impetus, and is prevailing in various parts of the country, with a power from which great results may be expected. The demand for the morus multicaulis, and other valuable kinds of the mulberry, has been unprecedented. The importance of the interest begins strongly to arrest the attention; and the actual importance, in our firm persuasion, is not likely to be over-rated.

The great cause of discouragement has been the destruction of the mulberry trees, by the severity of the winter. Not only has the morus multicaulis suffered greatly, but likewise the common white mulberry; so that by the unprecedented severity of the two last winters many of the standard trees in Mansfield, Conn. of many years' growth, have perished.

An experiment, however, has been made, which, by an improved mode, (for so it must be called,) of managing the plants, avoids the danger of the winter, and obtains an early return.

The land is laid out in furrows four feet apart. In these the plants, the morus multicaulis, are laid, the roots three feet apart, the roots being covered, and the branches fastened down and covered slightly with mould until they start. After this the covering is to be increased; and throwing up shoots from every bud, they form a hedge, the leaves of which may be used as soon as grown, for the feeding of the worms. In the autumn the shoots, which will then have formed trees, are to be separated by a spade or some sharp instrument, and taken up and deposited securely from the frost. The main roots, after all the shoots are cut from them, are to remain in the ground; and to be covered by turning a furrow upon them each way. These remain for a permanent plantation. The small plants which are taken up, and the shoots which are cut from the main root, may be used for forming a new plantation the ensuing season, and so on year after year. As to the trouble of taking up the plants annually and resetting them in the spring, it is not to be complained of compared with the advantages which such management promises; and is, in a great measure, compensated by the facility with which the foliage is gathered from a low hedge, compared with the labor of collecting it from high standard trees. As the foliage for the feeds of the worms will not be so early in this way as from standard trees, it will be necessary to delay the hatching of the worms. This may easily be done by keeping the eggs in an ice-house.

From the Genesee Farmer.

GEOLOGY AND GEOGRAPHY OF NEW YORK.*

The last number of Prof. Silliman's Journal, contains an interesting account of an exploration of the region around the source of the Hudson river, and a barometrical admeasurement of the principal peaks that constitute the nucleus of that elevated range, furnished for that work by W. C. Redfield, of New York, one of the exploring party, and thence copied into the Family Magazine, a valuable miscellaneous work conducted by that gentleman on somewhat the plan of the Penny Magazine, and which deserves an extensive circulation.

It is a fact no less surprising than true, that a range or rather cluster of mountains, by far the highest and most remarkable in the state, and, with a single exception, more elevated than any others east of the Rocky Mountains, should have remained for one or two hundred years, within thirty or forty miles of one of the greatest thoroughfares on the continent, without a suspicion of their great elevation, or scarcely a knowledge of their existence. The Cattskills had long been considered the highest range in the state; but it was now discovered that a part of the upper course of the principal northern branch of the Hudson was higher than the highest peak of that range, and that the source was no less then 900 feet above the Round Top. This is one of the results of the geological survey of the state—which, in addition to the great advantages to be expected from that investigation, promises to add much to our geographical knowledge, and correct many errors into which we have fallen with regard to our own territory.

The sources of the Hudson are spread over the southern part of the wild and unknown region that occupies that part of the state embraced between the settlements on the Black River, St. Lawrence, Lake Champlain and the upper Mohawk. Several thousand square miles are here nearly destitute of any settlements, without roads, covered with dense evergreen forests, abounding in lakes, and filled with animals that delight in the unbroken solitudes of nature. From Port Henry, on Lake Champlain, an apology for a road has been opened in a west direction across this region to the Black River settlements. This road crosses the main northern branch of the Hudson, about 40 miles from the lake and a few miles below the new settlement of McIntyre, which has been created by the owners of the immense ore-beds that there cross the Hudson River, and furnish a supply for the iron works in operation and erecting at that place; and it was to this place that the course of the exploring party was first directed.

The first visit was made in 1836. The party consisted of Archibald McIntyre, Judge McMartin, David Henderson, David C. Colden, Mr. Hall, state geologist, and Mr. Redfield. Thirteen miles from the lake they crossed Schroon River, the east branch of the Hudson; nine miles from Schroon they found a Mr. Johnson on the outlet of a mountain lake, called Clear Pond, the only dwelling on the road from Schroon to the Black River. Eight miles from Johnson's they crossed the Boreas River, and some eight or nine miles farther they reached the Hudson, about 8 miles below the Iron-works of McIntyre. These are situated immediately at the base of the cluster of mountains that divided the Hudson from the Au Sable.

The party immediately entered on the exploration of these wild fastnesses, which apparently had never been trodden by human foot; but the unexpected difficulties of the country, and the limited supply of provisions compelled the party to desist, after they had ascertained that the geography, natural and physical, of the district, was deserving a fuller investigation, and that the geology of that section of the state was of a most interesting character. At a later period of the year Prof. Emmons passed through that magnificent defile, the Notch, to the north of McIntyre, and measured the height of that stupendous precipice, the Wall Face Mountain, forming the west side of the defile. Nothing could equal the dreary and savage character of the country traversed by the party; and the following extracts will show the animals that range over it unmolested. "Traces of wolves and deer were frequently seen, and we discovered also the recent tracks of a moose, *Cervus Alces, L.* We also noticed, at the inlet of Lake Sandford, the fresh and yet undried footsteps of a panther, which apparently had just crossed the inlet." * * * * "Previous to reaching the outlet of Lake Colden, we had noticed on the margin of the river, fresh tracks of the wolf and also of the deer, both apparently made at the fullest speed, and on turning a point we came upon the warm and mangled remains of a fine deer, which had fallen a sacrifice to the wolves; the latter having been driven from their savage repast by our unwelcome approach. There appeared to have been two of the aggressive party, one of which, by lying in wait, had probably intercepted the deer in his course to the lake, and they had nearly devoured their victim in a very short space of time."

The second tour of exploration took place in August, 1837, and the party consisted of Messrs. McIntyre, Henderson, Hall, (state geologist,) Professors Torrey and Emmons, Messrs. Ingham, Strong, Miller, Emmons, Jr., and Mr. Redfield. They commenced their march from the settlement of McIntyre, on the 3d of August, and after a most fatiguing route reached the source of the Hudson, on the morning of the 5th. Mr. Redfield in his narrative, says, "At 8,40 A. M. we reached the head of the stream on the summit of this elevated pass, which here forms a beautiful and open mountain meadow, with ridges of the two adjacent mountains rising at easy slopes from its sides. From this same meadow which lies within the present limits of the town of Keene, the main branch of the Hudson, and a fork of the east branch of the Au Sable commence their descending course in opposite directions, for different and far distant

*This article was written in March. It having been mislaid is the cause of its late appearance.

points of the Atlantic Ocean. The elevation of this spot proves by our observations to be more than 4,700 feet above tide-water being more than 900 feet above the highest point of the Cattskill mountains, which have so long been considered the highest in the state. The course of the Au Sable to Lake Champlain, does not exceed 40 miles, yet its descent is 4,610 feet! This, according to our present knowledge, is more than twice the descent of the Mississippi proper, from its source to the ocean."

The highest peak of the mountains lies S. W. from the source of the Hudson one and a quarter miles; and the party reached the most elevated point about 10 o'clock. After clearing the zone of dwarf pines and spruces which surround the mountain, they found the open rocky surface covered only with mosses, lichens, and small alpine plants; and a clear view in every direction. On some small deposits of water in the rock, ice was found at noon, one-half an inch thick. "Around lay scattered in irregular profusion, mountain masses of various magnitudes and elevations, like a vast sea of broken and pointed billows. In the distance lay the great valley or plain of the St. Lawrence, the glittering surface of Lake Champlain, and the extensive mountain range of Vermont." Through a depression of the latter range the party discovered another, and more distant range, but whether the part seen was the White Mountains of New Hampshire, or the Franconia Mountains near the head of the Merrimack, they could not determine. The barometrical observations, on this peak showed an elevation of 5,457 feet, exceeding the height of the Whiteface Mountain by 600 feet, and the highest point of the Cattskill by 1,650 feet.

The party afterwards visited two or three other of the elevated points in this cluster of mountains, none of which equalled, in height, the one already noticed. Two of these points they named McIntyre and McMartin, and the name of Marcy has been bestowed on the high peak, a merited compliment to our worthy governor. The geological character of this nucleus of mountains is singular, as it is entirely different from that of the country or the mountains around it, and the peculiar rock which constitutes these elevated masses is not found in any other place within the United States. It consists of "dark-colored and sometimes opalescent feldspar, accompanied towards the exterior part of the formation with green angite, or pyroxene, but in the central portions the feldspar alone constitutes almost the only ingredient of the rocks. It is apparently destitute of mica, quartz, and hornblende, and also of any traces of stratified gneiss." * * "The nearest locality at present known of a similar rock, is about 200 miles north of Quebec, on the N. E. border of lake St. John, from whence it extends to the Labrador coast." It is from this coast that its name of *labradorite*, or Labrador feldspar, is derived.

The localities of this kind of rock derive more importance in a geological point of view than they would otherwise have, from the fact that the boulders so thickly scattered over the Oneida country, and more or less over the whole of the lake slope of western New York, are mostly of this kind of rock, and hence can be traced directly as it were to their original location. "The most eastern of these transported boulders, known to exist, is one of about one hundred tons weight at Coxsackie on the Hudson, one hundred and fifty miles south of the labradorite formations, and three hundred feet above the river." We have seen them of several tons weight reposing on the argillaceous range that runs through western N. York, and at elevations of from five to ten hundred feet above the Erie Canal. Prof. Hitchcock, in his valuable geological survey of Massachusetts, traces the boulders that occupy so much of that state, to their original beds, and finds the most conclusive proof that the current that deposited these masses of stone in their present location, must have flowed from the west of north; and the manner in which these labradorite boulders are distributed, not less clearly shows, when their present position and origin are considered, the action of currents powerful and extensive from the north-east. Mixed with these labradorite masses of feldspar, we have seen some few blocks of opalescent or flesh-colored feldspar, and some beautiful specimens that were a pearly white, needing but decomposition to form the valuable earth called kavlin, and used when pure in the manufacture of the finest porcelain. It may be remarked that these latter varieties of feldspar have less the appearance of rolled masses than the dark colored, or labradorite boulders, their angles being acute and apparently of recent fracture, when compared with the heavy blocks of the labradorite. From the researches of the state board of geologists, we anticipate much valuable information on all subjects connected with the geological formations of this state; particularly the position of the various strata, the localities, proofs of currents, superposition, &c.

To show the rank to which these newly discovered mountains are entitled, we have thought it might not be unacceptable to give a summary of the highest mountains yet known east of the Mississippi; we say yet known, because it is not impossible that in the tract of country we have described, mountains of equal, or even greater height, may not exist; and because the citizens in the vicinity of the Black Mountain, in North Carolina, are putting forward its claims to be considered the highest mountain in the United States. No accurate measurement of that range has, however, yet been made, so far as we know, and experience shows that the eye in estimating, or the feet in climbing heights, are not always to be depended upon. Those given are the result of barometrical observations conducted with great care by scientific men, and in most cases, repeated admeasurements have verified the correctness. We commence with some of those determined by Mr. Redfield and his scientific party.

Lake Champlain above tide-water,	90 feet.
West Moriah, Schroon River,	1,117
Johnson's, at Clear Pond.	2,000
Boreas River bridge,	2,026
Hudson River bridge,	1,810
McIntyre,	1,889
Lake Henderson outlet,	1,936
Lake Colden outlet,	2,851
Hudson River, above the Dyke Falls,	3,356
do. in the High Valley,	3,711
Source of the main branch,	4,747
Summit of Mount McIntyre,	5,183
do. Mount Marcy, or the High Peak of Essex,	5,467

The party estimated that there were not less than ten peaks within a short distance that would reach 5,000 feet; "and beside these there were not less than a dozen or twenty others that appear to exceed the highest elevation of the Cattskill group." Thus it appears that this cluster probably furnishes more peaks above 5,000 feet in height, than all the rest of the United States; though Mount Washington still deservedly wears the palm. We collect from various authentic sources the measurements of the following mountains in the United States.

Monadnock,		3,450
High Peak of the Cattskills,		3,718
Round Top do.		3,804
Mansfield Mountain, Vt.		4,279
Munroe,	White Mountain group.	4,356
Franklin,		4,711
Madison,		4,806
Jefferson,		5,058
Adams,		5,328
Washington,		6,237

Mr. Redfield remarks, "Owing perhaps to the lime and soda, which are constituents of the labradoritic rock, and its somewhat easy decomposition when exposed to the atmosphere, the soil of this region is quite favorable to the growth of the forests, as well as the purposes of agriculture." This opinion, so far as regards the soil, may be correct, yet it is evident that the vicinity of high mountains in such a northern latitude, must have a direct tendency, by reducing the temperature, to prevent the operations of agriculture to any considerable extent. Air cooled below the freezing point in August on the tops of mountains, easily finds its way to the valleys and plains below, producing early frosts, destructive to fruits and vegetables. Our impression is, that it is in the mineral riches of this region, and not in agriculture, that the true source of profit resides. Sprinkled with lakes, covered with the densest forests, abounding in the finest streams and water-falls, and possessing inexhaustible supplies of the most valuable iron ore, nothing seems wanting to make this mountain district the Wales of the United States, and from its furnaces and forges send forth the iron, for which millions are now annually sent abroad.

AGRICULTURE OF TUSCANY.

Extract from Simond's Tableau.

[Translated for the American Farmer, by a friend in South Carolina.]

XI. Sec.—*On the Assolemens.*—The assolement, or regular rotation of crops, forms one of the most interesting parts of the agriculture of Tuscany ; this rotation continues either during three years, and then the ground is planted five times; or four years, when it is planted seven times without ever being left in fallow. The three years' course is as follows : 1st. Wheat followed by lupines in the autumn. 2d. Wheat followed in autumn by turnips, or any other forage crop. 3d. Indian corn, millet or sagine, (holcus sorgum, Linn.) The four years' course consists of—1st. Wheat succeeded by French beans (haricots) intermixed with Indian corn. 2d. Wheat with lupines in autumn. 3d. Wheat with forage in autumn. 4th. Indian corn followed by millet or sagine.

XIV. Sec.—On turning in lupines as a manure. As soon as the wheat harvest is finished, the ridges into which the land had been previously thrown are divided into two parts, and a small harrow which is called by the inhabitants *spianuccio*, is drawn over each second ridge while the other remains untouched until the whole field is passed over. The lupine, lupinus albus, (Linn.) which is sown on the fields thus prepared, is a leguminous annual plant, which grows to the height of two or three feet, and requires no support; on the contrary, although its stalk puts forth a great number of branches, each is hard, strong, and of a very woody fibre; the flowers, which are of the size, form, and nearly of the color of those of the bean, are gathered together in large clusters at the end of each branch—and the long pods which succeed them contains the lupines, resembling large peas flattened. The lupines are planted in the month of August or September, on such of the ridges as have been harrowed, and are covered in with the hoe. The ordinary moisture of the plane is sufficient to make them germinate and grow; they are, however, commonly refreshed by seasonable rains which assist their vegetation. The lupine is generally well grown by the month of October, which is the seed time for wheat, for which it is intended to prepare the land. When it has grown to the height of 15 inches, it is ploughed in, and left to rot in the land, possessing more than any other plant yet known, the property of fertilizing by the decomposition of its leaves. The same operation of the plough, which buried the lupine, prepares the ridge for the seeding of the corn, which is then covered with a hoe; this operation of burning the lupine to fertilize the earth, is what is called by the Italians the soverciü or rovescü; it shows great knowledge of the best principles of agriculture, and succeeds wonderfully in fertilizing the earth. The peasants sow sometimes different plants for the same purpose, among others, they sow beans, but none rot so thoroughly or so fast as the lupine, nor possess the power of fertilizing in so high a degree. When it is heated in an oven or large kettle, so as to destroy its vegetation, it becomes the most powerful of all manures; it is said that three or four pounds of these lupines, buried at the foot of an olive tree, or a fruit tree that is decaying, will restore it to all its health and vigor. Careful gardeners use it, but always in very small quantities, to manure their orange trees, instead of horse manure—and produce from it surprising effects.

XV. Sec.—*Haricots, or French beans.*—Sometimes instead of lupines which enrich the earth, such farmers as have an abundance of manure, sow after the first year, French beans, which impoverish it. They are intermixed with some grains of Indian corn to support them, instead of sticks and branches. The kind of beans which bears the drought best, and is alone proper to be planted after the harvest, is marked with an eye about the germ, from which it is called faggiuole dall occhio. When these are planted, the course of cropping continues four years, because it is not until the year following that in which the beans are planted, that the farmer can sow the lupine for fertilizing the earth, by burying which, is conceived by all to be absolutely necessary.

Second year.—Forages.—After wheat harvest of the second year, the land is turned up afresh, in the months of July and August, and the forage crop is planted in September. The two kinds of forage crops most in use, are a mixture of lupines, flax, turnips, and the annual trefoil, or lupinella; it may appear strange to observe flax ranked among the forage crops, but its grain is very abundant, and easily gathered, the plant endures the winter extremely well, grows quickly, and furnishes an abundance of leaves, of which the cattle are fond. As the lupin grows much faster than the flax or the turnip, it is pulled up towards the end of autumn. When it is well grown, and after being washed, it is given to the cattle that are fond of it—notwithstanding its bitterness. The flax and the turnips, which are choked by its growth, prosper as soon as it is taken away; during the winter, these last are drawn as they are wanted. The flax is mowed in the spring, and towards the middle or end of May, all has disappeared. Among the turnips that are planted, not one half ripen, being relied upon, more for their leaves, than for their roots, in the nourishment of cattle. There are many varieties in Lucca; those that are cultivated are large and long, and of a yellow skin, such as the turnips which are called English turnips. In the planes of Pescia, they are large, flat, and colored red and rose, the produce of the seed removed from one place to another, does not resemble the plant from which the seed was taken.

In Parma and Milan, more turnips are planted than in Tuscany; in the two provinces, with the exception of the rice-fields, the assolement is for two years, and consists of wheat, turnips, and Indian corn; or if it is prolonged to three years, it is in order to plant beans or turnips, twice in the course of the third year, for the purpose of burying them in the nature of the severcio. The prodigious quantity of turnips, which covers these rich provinces, must have been very agreeable to Arthur Young, when he travelled over them. The lupinella, or annual trefoil, (trifolium incarnatum, Linnæi,) is one of the most beautiful plants, which is cultivated as a forage crop; its beautiful carnation oblong flowers, the deep color of its foliage, and the vigor of its vegetation, make it the ornament of the fields; it is planted in September, and mowed between the middle of April, and the middle of May, sometimes it is intermixed with lupines, which are taken up in autumn, its forage is more abundant than that of the flax, but it is mowed only once.

Third year.—Indian corn.—After the forage crop is gathered in, the ground is completely turned up with the spade; this work is commenced about the middle of April and is continued during the month of May; the preparation of the ground with the spade always precedes the planting of Indian corn, which constitutes the crop for the third year. It is planted during the three months of April, May and June, although it is sometimes planted as late as July, on moist spots, but there it is of a particular variety, which grows more quickly but produces less, and is called sessantino, because it ripens in sixty days. Indian corn planted in the plane, about the end of April, suffers little from drought, provided it has rain about the beginning of July, which most commonly happens. The corn is planted on large ridges with hoes, and although it is scattered with a great deal of economy, more is nevertheless put in, than is suffered to remain—this is done to provide against the attacks of insects, which often destroy it, as soon as it begins to sprout—when it is out of harm's way, the superfluous plants are taken out, and each plant is removed from the other about 10 or 11 inches on the rows, but each row is distant about 20 inches or two feet—it is moulded up twice during its growth; while it is growing it furnishes an abundant and excellent forage, of which the cattle are very fond. The Indian corn is a great resource to the people, and furnishes an excellent aliment. Mixed with wheat in bread, it gives the bread a reddish-yellow appearance, but does not injure the taste. The peasantry live chiefly on Indian corn, either in the shape of *farinata*, or *pollenta*. To make *farinata*, the meal is thrown into a kettle or porridge pot, containing boiling water, and seasoned with butter, oil, or broth, (couillon,) and salt; it is then stirred for five or six minutes, when the fire is withdrawn. It is served up as a soup, or thick couilli; the pollenta is made like the farinata, but without grease, and is more thick, so that in withdrawing it from the fire, it should be of a solid consistency; it is then cut with a thread, and placed on a gridiron over burning coals for some minutes. These two modes of using the Indian meal, have the advantage of rendering very little bread necessary; for this substance, without having too much taste, has nevertheless enough to render it palatable, without any other accompanying food. It is probable that it would be more nourishing, if it was better cooked, for the laboring people complain, that it fills them without strengthening them, while on the other hand, Count Rumford remarks that Indian corn, *well-prepared*, is the most wholesome and nourishing of all grains.

From the American Farmer.

PUMPKIN SEED OIL.

To the President of the Hampshire, Franklin and Hampden Agricultural Society.

Dear sir—As a member of your society, I deem it to be my duty to communicate to you the result of an experiment that I have made on pumpkin seeds, in the linseed oil mill.

A number of my neighbors furnished me this year with seeds, which, together with my own, made about nine bushels, and on making the experiment, I found that they produced about six gallons of oil, and probably when the experiment is tried upon a large scale, they will produce more. I tried the oil on the screw of the oil press, and find that it answers an equal purpose, to prevent friction, as sweet oil, and of course, it will be good to use on the axeltrees of carriages that are made of iron, either alone, or mixed with tar, to prevent friction. I have also tried it in the lamp, and find it to be as inflammable as lamp oil, and without the offensive smell of that oil; and the light emitted from it is of a greenish-yellow tinge, and is easier to the eyes, and, especially, when reflected from white paper, than the weak glimmering light of a candle, and of course the light is easier to read or write by, and especially to weak eyes.

I have been informed by gentlemen of medical skill, that the seeds of pumpkins have so great a tendency to promote urine in animals, as to render them unfavorable to their health; and a neighbor of mine informed me that his geese becamed so relaxed as to be unable to go, by eating pumpkin seeds. *These* circumstances induced me this season to cut open my pumpkins, and take out the seeds before I gave them to my cattle, and I found by the experiment last fall, and the beginning of winter, that my horned cattle, sheep and swine derived the greatest benefit, with the least expense to myself, of any thing that ever I tried in the agricultural line. And from the little experience that I have had as a farmer, I am induced to think, that there is no one article that is cultivated, from which so much advantage can be obtained, by so little labor, as from the cultivation and right use of the pumpkin. It is probable that the oil of pumpkin seeds may be made a complete substitute for tallow; and when it is once introduced into use, it will probably be worth at least $1 50 per gallon. Children can with the greatest ease take out the seeds when the pumpkin is cut open, with a spoon or their hands, and spread them on a floor where they will soon dry; and it is proper that they should be preserved clean, and without being suffered to mould. In the United States, where there is such an unbounded region of land, and labor above the price of produce, the main object of the farmer ought not to be the obtaining of the greatest quantity of produce, from the best piece of land, as in many places in old countries which are so crowded with population as almost to be in a state of starvation, and labor of no consequence; but the obtaining of the greatest quantity from the least labor and expense, taken together. I have no idea that fields appropriated exclusively to pumpkins would be profitable like those of corn and pumpkins planted together; for if they be planted too thick they are no inconsiderable damage to each other. There ought not probably to be more than one pumpkin suffered to grow to twenty hills of corn, otherwise they are apt to choke the growth of the corn, and not produce so many or so good pumpkins either. It costs scarce any more labor to raise corn and pumpkins in the same field than it does to cultivate it exclusively for corn, and perhaps the crop is worth a third more. On the whole, I am inclined to think that this subject is worth your notice. I am yours, &c., respectfully,

JOSIAH WHITE.

Northampton, March, 17, 1820.

From the American Farmer of 1824.

REMARKS AND INQUIRIES ON THE EFFECTS OF MARL AS MANURE.

Mr. Editor.—I find marl is becoming to be a subject of great inquiry, and is very generally growing upon the attention of the agricultural world. There is nothing which merits attention more, for in every instance where it has been applied it has been considered the most successful of all manures. There was a writer in your paper (Mr. Ruffin) who gave us one of the most correct accounts of the operation of marl on lands that I have ever seen; and further views from the same pen would still lay the agricultural interest under greater obligations to him. What Mr. Ruffin there asserts of marl correcting the acid quality in lands has been found to be true by all who have used it; and besides, he might add, that it is a great cleanser of lands, which manures are generally not—it certainly destroys all the noxious growth which puts up in acid lands, oftentimes to the great injury of the crop; and to the sheep sorrel it is certain destruction.

All the marl I have seen in Maryland is shell marl, which lies in large beds or strata, and has been generally found near the margin of the banks of rivers or creeks—this, I presume, is because it has cost less labor to find it there than elsewhere; but I have no doubt that the same strata can be found in the interior, if it was diligently searched for. They are generally from three to six feet under the surface, and present considerable variety in appearance. Some are composed of common oyster shells alone, which are very different from what are called shell banks—others are composed of what are commonly called clam shells—others of clam shells, muscle shells, and a great variety of scollop shells—others of shells so decomposed that it is difficult to class them, and these last are often intermixed and discolored with a sort of furruginous substance—others again present you shells completely broken down to lime, intermixed with sand, which of itself makes a pretty strong cement; and indeed the varieties are not only numerous and singular, but often very beautiful. The comparative effects of these different kinds of marl have not been ascertained, as they are generally different on different farms, but all agree who have used them, that the first year's product in wheat is increased to more than half as much more, but that the second crop, from one marling, is oftener more than double than less than double—this is easily accounted for upon the supposition that the marl does not become so well incorporated with the earth upon the first as upon the second tillage—but if the marl was strewed on fallow land, and two extra harrowings were given it after strewing, there can be little doubt but the incorporation would take place, and the product be improved. I find my marl acts better upon wheat succeeding my corn, than upon naked fallow, where the marl was spread on both the same year; and I account for this result, so different from what is experienced from all other manures, from the frequent harrowings I give my corn during its cultivation; for I cultivate corn principally with the harrow, as being the cheapest, most expeditious, and best implement; and my lands are stiff soils.

None but those who have been eye witnesses to the effects of marl can believe them—they are truly wonderful—old worn out clay soils, that were literally good for nothing, have been regenerated by marl alone, and present the appearance of our best and natively rich lands—and there seems to be no end to the improvement—under one marling the product increases at each cultivation, and a second marling is followed by results proportionable to the first. Such is the conviction here, as to the effects of marl, and the conviction arises from practical experience, that the discovery of a marl bank is supposed to double the value of the farm.

My principal object in making you this communication, is to endeavor to elicit Mr. Ruffin out upon this subject, whose experience, observation, and reasoning are far more satisfactory and useful than any thing I have ever met with.

AGRESTIS.

From the American Farmer of Feb. 27, 1824.

ANSWER TO THE FOREGOING.

Prince George, March 12th, 1824.

Having been some time from home, I did not until to-day, see the call on me in the American Farmer of February 27th, and the private note from you on the same subject. I feel highly gratified, that your correspondent, "Agrestis," has experience of the correctness of my opinions concerning the action and value of marl; and I am not only willing, but consider it my duty, to furnish any information in my power to give, which may be required on account of the imperfections of my former statement. I do not wish, however, to fatigue your readers, by repeating what has already been stated; and as the request of Agrestis for information, is *general*, I shall confine my remarks to the particular subjects suggested by his account, of the effects of marl noticed by him in Maryland.

Since my former communication on this subject, (contained in your 3d vol.) I have marled more than 250 acres, or about 400 in all—and my longer experience has more strongly confirmed my opinion of the value of this manure, as well as the truth of the theory of its action. But I have never obtained any results so profitable as those mentioned by Agrestis, "that old worn out clay soils, that were literally good for nothing, have been regenerated by marl alone, and present the appearance of our best and natively good lands." I still believe that the use of calcareous manures, will not be found very profitable, except on lands *not grazed*, or which are in some other way furnished with vegetable matter. On acid soils, (not grazed,) I expect a dressing of 500 bushels of marl to the acre, to increase the first crop from 50 to 100 per cent.; and under peculiar circumstances, have attained nearly 200 per cent. increase; but as all such land was very poor, even this great improvement leaves it much inferior to natural rich soils. Neither have I found that "a second marling is followed by results proportionable to the first," nor will its *mode of operation* justify such expectations. In every thing else stated by Agrestis, his experience of the effects of marl, agrees entirely with mine. The improvement is evidently progressive, and I believe, will continue to increase, until the soil is brought to its maximum of productiveness, or until the new accumulation of vegetable matter, and of acidity, cause a necessity for a second dressing of marl, which *then* will operate in the same way, and with as much profit, as the first application.

The cleansing effect of marl is also evident. The plants which are most abundant on acid soils, will thrive on no other kind; and therefore, are destroyed at once, when the soil is made calcareous. But your correspondent will not find this clean state of marled land to be permanent. One set of pests has been removed, only to allow another to succeed. *Wire-grass** is more benefited by marl, than any other plant that I know of; and the increase of this troublesome and indestructible grass, is the only injurious effect of marling, that I have yet experienced. Perhaps *blue-grass* may be considered in the same way, as I find it now on many parts of my land, where it never had been seen until within the last two years. This grass is scarcely ever seen in this part of the country, and there is not any where enough to be troublesome, except on the best neutral soils, which I suppose to have been originally marled by natural means.

Your's, &c.
EDM. RUFFIN.

[The two foregoing letters were published more than 14 years ago; and we had forgotten their existence until they were lately met with accidentally. Marling (or, properly, the application of fossil shells,) was then a novel mode of improvement in this country, and which had then been tried by but very few persons. It is, sometimes, both interesting and useful to revert to early opinions and practices, after the lapse of time may have served to test their value. It will be seen from the answer, above, that the writer even then, as since, and up to the present time, tried to abate the too exalted opinions of the *enriching operation* and *general beneficial action* of calcareous manure, no less than to establish its true action and value, and direct attention to its proper mode of application. The writer has now had practical experience of the effect of marl of more than thrice the length of time which had been gained before the foregoing answer; and yet there is but one opinion there expressed which he would now qualify, or limit, or deem it necessary to explain, to prevent its leading to error and loss. In speaking of the benefit expected of 500 bushels of marl, it should then have been stated, as meant, of the very moderate strength of the beds he had mostly used, which generally varied between 30 to 40 per cent. of carbonate of lime—generally about 38 per cent. Also—he had not then ascertained, that even of this poor marl, 500 bushels was too heavy an application for poor and worn land, and that much less marl to the acre is safer, cheaper, and much more productive of net profit. The summer of 1824 first showed the evil of the too heavy previous dressings; and the facts, and the corrected views of the writer, on this head, have been since published at length.—ED. FAR. REG.]

GREASE FOR WHEEL-AXLES.

"What is the best *grease* for wheels?" said one *whip* to another the other day. "*Tar*," said the other. "*Tar!* I despise tar, and grease *won't stay there.* Now had they put the question to our *grave selves*, we could have told them of a valua-

* The "wire-grass" of lower Virginia, is the "couch" or "twitch-grass" of England.—ED. FAR. REGISTER.

ble material to diminish friction, not only in carriage-wheel boxes, but in all machinery whatever. The composition, we believe, was first used in the iron-works on the Boston mill-dam, and consists of *soapstone*, finely pulverised, and mixed with grease or soft tallow. It is an excellent application—a real *anti-frictionist.*—Maine Farmer.

From the Newbern Spectator.

LETTER FROM THE SECRETARY OF WAR

In relation to the survey from the Southern Debouche of the Dismal Swamp Canal to Winyaw Bay.

May 28, 1838. Referred to the Committee on Roads and Canals. June 27, 1838.—Ordered to be printed.

Department of War, May 26, 1838.

Sir: With the accompanying report of the officer in charge of the topographical engineers, is respectfully submitted the report of the survey from the southern debouche of the Dismal Swamp canal to Winyaw Bay, in South Carolina, called for by a resolution of the House of Representatives of the 9th ultimo.

Very respectfully,
Your most obedient servant,
J. R. Poinsett.

Hon. James K. Polk,
Speaker of the House of Representatives.

Bureau of Topographical Engineers,
Washington, May 24th, 1838.

Sir: I have the honor to submit a copy of the report of "the engineer charged with making the survey from the southern debouche of the Dismal Swamp canal to Winyaw Bay, in South Carolina, with a view to determine the practicability of opening an inland communication for steam navigation from the Chesapeake bay to Charleston," called for by a resolution of the House of Representatives of the 9th of April.

Very respectfully, sir,
Your obedient servant,
J. J. Abert, *Lt. Col. Top. Eng.*

S. Cooper, Esq. *Acting Secretary of War.*

Washington City, May, 21, 1838.

Sir: I have the honor to report that, on the receipt of your orders of the 28th March, 1837, assigning me to the surveys near the coast of North Carolina, I proceeded to organize the requisite means for carrying them into execution. Some delay was necessarily occasioned by the scarcity of competent assistant engineers, and the necessity I was under of seeking them amongst such of the civil engineers not in the employment of the Government, as chanced at the time to be disengaged from other service. I succeeded, however, in forming two parties.

The act of Congress passed the 3d of March, 1837, required the survey to be made from the southern debouche of the Dismal Swamp canal, down the Pasquotank river to Elizabeth, thence to Croatan sound, Pamlico, and other sounds, near the coast of North Carolina, and thence by the most practicable route to Winyaw bay, in South Carolina, with a view to determine the practicability of opening an inland communication for steam navigation from the Chesapeake bay to Charleston, South Carolina. The reconnoissance of part of the line had been reserved by my original orders for another officer. Subsequently, however, the reconnoissance, as well as the survey of the whole of it, was assigned to me. No examination of the ground, however, was required before the parties began to operate in the field. The frequent professional tours of duty which I had formerly occasion to make near the coast of North Carolina, with the surveys already executed there for military purposes by officers of the corps of topographical engineers, viz: by Majors Abert and Kearney, and by Captain Bache, enabled me at once to draw up the requisite instructions to the chiefs of parties, and to assign to them the limits of their operations for the surveys requiring the earliest attention; and the time usually consumed in the preliminary examinations was whereby saved. One of the parties was directed to survey Joyce's creek and Pasquotank river, from the canal to Albemarle sound, very carefully, wherever especially there should be found a less depth than eight feet of water, and wherever any obstruction to the free navigation of the creek or river should present itself. A general examination of Albemarle sound was likewise required in the direction of Croatan sound, for the purpose of verifying the existence of a sufficient depth of water for the passage of steam vessels. This work having been completed, Core sound and the passage through the marshes were carefully surveyed, to ascertain whether any change affecting the navigation had taken place since the period of the surveys made there by Captain Bache. It was intended, also, that the same party should connect, at least by a chain of triangles, the work of Pasquotank river with that of Croatan sound, and the Roanoke marshes with Harbor Island bar—the limit of the surveys entrusted to the other party of engineers employed upon the sounds; and it was intended, also, to have taken soundings upon Long shoal, Bluff shoal, and other parts of Pamlico sound; but the advanced season, and a desire to preserve the health of the party for the prosecution of the surveys to be undertaken during the autumn of that year, joined to other circumstances, not necessary to be here stated, made it expedient, in my opinion, to postpone this part of the work to a suitable occasion. In consequence of this, the party was enabled to make the survey of that part of the line from Beaufort harbor to Swansborough and Bogue inlet before the sickly season had begun.

The other party of engineers surveyed with great care, and very skilfully, under the immediate direction of the intelligent and experienced assistant who had it in charge, the whole of Core sound; so that nothing further remains to be done there, to enable us to form the project and estimate the cost of its improvement in the greatest detail, unless it be at some suitable season during the prevalence of the storms which characterize the spring and autumn; for example, to make such observations as will enable us to ascertain the direction, velocity, and effect of the currents, which may possibly prevail there when the winds blow for a long time from the same quarter. On the termination of the survey of Core sound, I instructed the engineer in charge of the party there, to take rapidly some lines of soundings on the bar of Old Topsail inlet, the entrance to Beaufort harbor, for the purpose of ascertaining the correctness of an opinion advanced by the pilots, that since my survey of 1822 the depth of water on the bar had materially increased.

These operations being effected, and the sickly season at hand, the engineers were withdrawn from the field to plot their work, and arrange the facts which they had collected, preparatory to their resuming the surveys proposed to be made farther inland during the latter part of the fall and the beginning of the winter. We had, in a comparatively short time, collected much information; our work had extended itself to a distance of about 220 miles; and, taking into consideration the surveys heretofore made under the direction of the officers of the corps whom I have named, with the observations, the result of various professional visits to the coast, we are enabled to take general views of the character and extent of the improvements of which the sounds, at least as far westward as Cape Fear river, are susceptible; they enable us to form opinions on the question of their probable permanency; the advantages to result to the commerce of the country; and, for a great part of the distance, we have the means of estimating their probable cost. Especially is this the case with respect to the line from the Dismal Swamp canal to Swansborough. To the westward of that place, the very close reconnoissance which, in the year 1822, I made of the sounds lying towards Cape Fear river, enables us to appreciate their value with reference as well to commerce as to military defence.

The memorandum which I had the honor to submit to your consideration as the basis of a reply to the letter of the honorable C. Shepard and other members of congress from North Carolina, will have made you acquainted with my opinion upon the question of the improvement of Core sound, the value of such improvement to the coasting trade and to foreign commerce, and it will have shown the connexion of that sound with the navigable waters of the state and with the waters of Chesapeake bay. A copy of that memorandum is herewith transmitted, and I have to ask your attention to it in connexion with this report.

The practicability and importance of a navigable communication inland, between the Chesapeake bay and Beaufort harbor, viz.: by Elizabeth river, the Dismal Swamp canal, Pasquotank river, and Albemarle, Croatan, Pamlico, and Core sounds, are unquestionable. It would be out of place in this preliminary report to enter into a minute description of the sounds and rivers embraced by the surveys of the past season; nevertheless, we may state that west of Beaufort, the sounds, generally, are much narrower, and with a greater number of shoals than are those I have enumerated. Bogue sound, though broad, is very shallow. Those lying between it and Cape Fear river are, for the most part, full of marshes, through which we find the passage to be by narrow and tortuous creeks, with extremely shallow bars, wherever the tides meet in their passage from the numerous small inlets with which the line of coast is indented. The only barriers between these sounds, generally, and the ocean, are low and narrow sand-banks; over which, in many places, the waves are swept by the hurricanes; the sands are carried by the sea and the wind into the sounds; shoals are formed, and become the bases of salt marshes; the accumulation of matter over their whole area and in their channels is thus progressive. The communication between them is sometimes closed by the silt carried forward by the tides and by the encroachment of the marshes, and it becomes necessary to open small canals for the passage of lighters and canoes at high tide. To this description, which is very extensively applicable to the sounds west of Bogue, there are exceptions, which it is unnecessary for our present purpose to enumerate, unless it be required in the case of the portion of the sound lying near New river, to which I have referred in the memorandum already alluded to.

It is apparent from these facts, I think, that the question of the practicability and cost of opening a channel for steamboats west of Beaufort, or certainly of Swansborough, yields, in point of importance to the consideration of the practicability and expense of defending it against the inroads of the sea and the encroachments of the sands. The exposure, too, of this part of the route to the enterprises of an enemy, during periods when it would be most required for the security and accommodation of trade, became so apparent from the facts developed during our examination, that it was deemed advisable to inquire whether a route might not be found farther inland by which to connect the sounds and navigable waters east of Beaufort with some branch of Cape Fear river. Subsequent inquiry, supported by our previous knowledge of the country, led to the opinion that probably a canal might be constructed of the requisite capacity, and with a sufficient supply of water, from Neuse river to the north-east branch of Cape Fear river. The facts and reasoning upon which this opinion rested were verbally communicated to you; and as they received the sanction of your favorable opinion, one of the parties of engineers was instructed to make such surveys and examinations of the country, near the presumed line of communication, as would enable us to arrive at more accurate and distinct ideas of the adaptation of the ground to the project. On resuming the field operations, therefore, I organized a party for that purpose, in the stead of the one which had surveyed Pasquotank river and the sounds east of Harbor island, which had been broken up by circumstances unconnected with the service. This I placed under charge of an experienced and intelligent principal assistant, who had already served under my orders, and who performed the duty entirely to my satisfaction.

The survey commenced at a point on the north-east branch of Cape Fear river, 47 miles above Wilmington, and 5 miles below the head of navigation—8 feet water. The point of beginning was within a few yards of the mouth of Hollyshelter creek; thence it was traced nearly parallel with that creek, crossing in its course Shaking creek and several of the minor streams which issue from Hollyshelter swamp. It crossed Hollyshelter creek at Onten or Little lake, and thence followed the course of Big Sandy run to a location, the source of some of the tributaries of Cape Fear river on the one hand, and of New river on the other; thence it pursued nearly a direct route to Ward's landing, on the south-west branch of New river—length 25 miles 1,639 yards.

Thence the line coincided with the navigable waters of New river and its branches—the south-west and north-east—for a distance of 10 miles 616 yards, viz.: to Ball's landing; hence, it was traced by the way of Ethridge's mill to the head of Grant's creek, and with that creek to Whitock river, at Lee's landing, a distance of 9 miles and 1,683 yards; thence one mile and 100 yards with the river to Haywood's landing. From Haywood's the line passed through E. Jones's plantation, and along the north bank of Hunter's creek, by the southern shores of Big lake and Ellis's lake; thence down Spaight's canal and Slocum's creek to Rial's landing—20 miles and 1,012 yards. Rial's landing is one mile above the forks of Slocum's creek. From the forks to Neuse river, four miles. Slocum's creek is a broad navigable stream; it joins the Neuse 17 miles below Newbern.

The entire length of the line surveyed by the party is 67 miles and 1,429 yards, including the river and lake navigation; exclusive of these, 53 miles and 22 yards. The highest point in the experimental line between the north-east branch of Cape Fear and New rivers, was $41\frac{1}{2}$ feet above the surface water of the river at the point of beginning; but this may be materially reduced by following the course of Haw's run. Between New river and Whitock river the highest point was 43 feet, and between Whitock river and Slocum's creek it coincided with the lakes—Big lake being 38 feet, and Ellis's lake $33\frac{3}{4}$ feet. These lakes were surveyed for the purpose of ascertaining approximately their capacity as reservoirs for the supply of the summit and lockage of the canal; and we are warranted in assuming that a sufficiency of water may be found for these objects upon the summit-level.

The survey now described between Cape Fear river and Slocum's creek serves only to manifest the practicability of uniting the Cape Fear with the Neuse. Other surveys are required preliminary to the definitive election and location of the line of canal. These would probably be traced (one of them at least) between the north-east branch of Cape Fear and Trent rivers; and another, departing from Muster landing on the north-east, would follow the course of Haw's run to Shepard's mill, thence to Onslow Court-house, Moss's landing on the western prong of the north-east branch of New river, thence to Lee's landing on Whitock river, thence to Big lake, Ellis's lake, and Spaight's canal, to Rye landing on Slocum's creek. This line would be about $56\frac{1}{4}$ miles long. Its summit-level would coincide with one or other of the lakes, or, being separated from them, it would be placed in a plane sufficiently low to enable us to command for the supply of the canal as much of their water as might be deemed requisite. The summit-level would cross the navigable streams at points the least prejudicial, and it might be prolonged to any desirable extent between the points of termination of the canal.

Surveys should be made also to ascertain the practicability, the best means, and the cost of uniting the main trunk of the canal with the harbor of Beaufort by a branch traced in that direction. Its connexion with navigation on Whitock river and Neuse river would be directly effected by means solely of locks constructed at the point of passage of those rivers.

To the north-eastward of Neuse river it may become advisable to make other surveys, that we may have the means of presenting to Congress a view of all the routes by which a navigable communication might be established between Albemarle sound and the Neuse. In examining the relative merits of these, and their several claims to attention, the professional views which would most probably influence the mind of the engineer in his selection might not possibly be those to which the legislature would be disposed to attribute the greatest force. There are other reasons which may render it expedient not only to carry the surveys between the Neuse and Albemarle sounds farther inland, and which may even require us to examine more minutely than we yet have done the two great sounds, Pamlico and Albemarle. The result of such examinations might possibly even affect seriously the character for stability of a portion of the route by the sounds. How far the causes which have operated to close the inlets formerly existing in front of the sounds may have tended also to affect the depth of the sounds themselves, or whether they have had any influence, deserves to be investigated. If we compare the chart of Lawson with that of Cole and Price, we are led to believe that the depth of water off the shoals, at least, is much less than it was in Lawson's time, Nevertheless the soundings given in one or the other of these charts may be erroneous. It is desirable, I should think, to have this question settled before the adoption of any particular project involving great expense in its execution. A careful comparison of the present depth of water in all the navigable parts of the sounds I am now speaking of, with the depths noted by Lawson, Price, &c. will enable us to determine whether or not the depth is lessening in them, and if so, the periodical rate of diminution may also be ascertained. The solution of this question might possibly influence the location of the north-eastern debouche of the Cape Fear and Neuse division of canal; and however desirable it might otherwise be presumed to be to carry that as low down the Neuse as practicable, we might find it expedient, under the influence of the facts to be developed by the hydrographic survey, to carry it in the direction of Newbern, Washington, and Plymouth.

The line of canal, $56\frac{1}{4}$ miles in length, between the Neuse and Cape Fear rivers, which has been described, would suffice to open an inland communication for steamboats from the southern debouche of the Dismal Swamp canal to Wilmington, N. C., and to the ocean.

The proposed route, via the sounds and Slocum's creek, would lie parallel to the coast, and, crossing the principal navigable streams of the State of North Carolina, would be found to possess all the advantages of a general line of communication for the trade of those rivers; the rivers themselves not having usually such outlets as would enable the produce of the interior to find an exit by the way of the ocean to other parts.

The same observation will equally apply to the other divisions of the work, viz.: that of the Brunswick and Red-bluff division, as also that from Winyaw bay to Charleston.

It is obvious that such a line of improvement, especially when considered with reference to its direct connexion with some of the best harbors on the coast, is of general interest, being equally advantageous to the commerce and defence of the country.

Of the surveys made under the authority of the act of Congress of the 3d of March, 1837, there remain to be described those only which lie to the westward of Cape Fear river, between the Green swamp and the ocean. The surveys which I had formerly made near Waccamaw lake and the Green swamp, led to the opinion that if a navigable communication between the Cape Fear and Waccamaw rivers were at all practicable upon any line remote from the narrow sounds which border upon the sea, it must be traced between the ocean and the Green swamp, and that in all likelihood it should rely upon the water yielded by that swamp, and upon such as might be collected nearer the sea for the supply of the summit-level and lockage of the canal. With this view of the subject, and to test its correctness, the party of engineers which had been employed during the early part of the summer upon Core sound was, at the proper season, directed to make upon the ground I have just described, such surveys and observations as time and the means at our disposal would permit. Accordingly that party ran a guide-line of levels and a line with the compass from the Red bluff on Waccamaw river to Brunswick on the Cape Fear, 16 miles below Wilmington, and extended its observations into the swamps as far as the inundations would permit—for at that time the rains had set in.

The distance from the Red bluff to Brunswick, and consequently the length of canal, if it were constructed upon that line, would be about $56\frac{1}{2}$ miles. The examinations which the party was able to make with reference to the means of supplying the summit-level with water were necessarily very limited; nevertheless, such as they were, they were far from discouraging the expectations of success which had been created by the surveys formerly made farther inland. Whenever the necessary appropriations are made to enable us to resume the surveys, a close and extensive survey and examination of the Green swamp, and of the country lying between it and the sea, will be undertaken. When these will have been completed, and not till then, can we be authorized to form any decisive opinion upon the question, not of the sufficiency of the quantity of water yielded by the neighboring swamps and lakes, but of the practicability of conducting it to the summit-level of a canal to unite the Cape Fear with the Waccamaw. In the mean time, the probability that it is practicable is so strong, in my opinion, as to justify the department in prosecuting the inquiry.

Near Red bluff there is a shoal in Waccamaw river, at the head of tide; it is about 200 yards over, with a depth of but $1\frac{1}{2}$ foot at the lowest stages of the water. The canal would debouche below this; hence to Winyaw bay and out to sea, the only obstruction to the navigation of the river by steamboats lies five miles below Conwaysborough, at Cox's shoal, where, at the lowest water, there is a depth of six feet; the length of the obstruction does not exceed 150 yards. With this exception, there is in the Waccamaw river, below the proposed termination of the canal, at all times a depth of not less than eight feet of water, with a bold navigation, the river making good reaches, except at the "Wild Horse," about seven miles below the Red bluff, where for a mile and a half it is very rapid and crooked; and again about a mile below Conwaysborough, where the river, for about 200 yards, is also rapid and crooked, although deep.

Between Winyaw bay and Charleston we have done nothing, except to reconnoitre the country, for the purpose of becoming acquainted with the general character of the ground, and with the routes which may require to be surveyed.

From Winyaw Bay there is a passage to sea, over Georgetown bar, with a depth of $7\frac{1}{2}$ feet at low water. This bar lies far out at sea, the channel is very crooked and difficult of navigation, and the depth of water is represented to be decreasing. A project to connect Winyaw bay with North Pedee, by a canal, has been undertaken and partly executed. It is probable that the steamboat line might follow this route to the Pedee, thence to Charleston. Two lines at least ought to be surveyed; the one lying near the seaboard would avail itself of the chain of natural navigation now used occasionally by the smaller craft proceeding to and from Charleston, wherever such natural navigation might be found advantageously in the line of improvement; the other route, lying farther inland, might depart from Pedee, and following the best ground, which will probably be found upon a very direct course, to deep water on Wando river, a branch of Cooper river, on which is Charleston. The length of canal from Winyaw bay to Charleston would not probably exceed 45 miles. The ground it would occupy is but a few feet above the tide, and it would not, it is believed, require in any place a greater depth of cutting to tide-water than eight feet. It would therefore be a thorough cut, and would require none other than guard and regular locks.

I annex a schedule of maps, charts, and profiles of the surveys already executed under your orders of the 28th March, 1837. I purpose making a general map also to exhibit at one view the surveys which have been done by the department near the coast of North and South Carolina. The details of the plans for improving the sounds so far as we have the materials for so doing, as well as the calculations of the cost of the improvements, will be undertaken now, or at the conclusion of all the surveys, to accompany the final report, as may be required by your orders.

Very respectfully, I have the honor to be, sir, your obedient servant.

James Kearney,
Lieut. Col. Topographical Engineers.

Lt. Col. J. J. Abert,
Com. Top. Engs. U. S. Army.

Schedule.

Chart of Pasquotank river,	5	sheets.
Croatan sound,	1	
Core sound,	2	
Details on the bars,	8	
Bogue sound,	1	
Reconnoissance west of Bogue, made formerly for defence of seaboard,	1	
Map and profiles of country between Neuse and Cape Fear rivers,	3	

Map and profiles between Cape Fear and Waccamaw rivers, 3

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24 sheets.

As stated in the letter addressed to the secretary of war by Messrs. Shepard, Stanly, and other members of Congress from North Carolina, I think most favorably of the importance of Core sound to that state, and to the United States, and am clearly of opinion that its channel ought to be improved, and to an extent beyond that contemplated by the act to which those gentlemen refer in their letter of the 24th of February.

The coast between Beaufort, North Carolina and the Chesapeake bay, for a length of two hundred and twenty or two hundred and thirty miles, is nearly, and in a few years, will be quite destitute of inlets capable of admitting even the smaller class of coasters. The closing of those which formerly existed, (and there have been at least as many as ten of them,) has been steadily progressive. In my opinion, (and it has been long and deliberately formed, and frequently expressed,) the maintenance of a direct navigable communication between either Albemarle or Pamlico sounds and the ocean is impracticable. I purpose in my final report, to attempt the demonstration of this proposition; and I think I will be able to show that Ocracoke, the only inlet now capable of admitting the passage of coasters, will probably also close in a few years. This inlet, which formerly had thirteen feet in low water upon its bar, was last summer reduced to a depth of 6½ feet at ordinary high tides, notwithstanding the efforts of the government to resist the encroachment of the sand upon it. By the storms of August, September, and October last, these efforts were paralyzed, and the hope of improving the inlet was abandoned.

Assuming the impracticability of re-opening and maintaining a communication between Albemarle and Pamlico sounds, at any point upon the coast between Cape Henry and Cape Lookout, we have only left for the trade of those sounds, and of Chowan, Roanoke, Tar, Neuse and other rivers, their tributaries, an opening to the north by the Dismal Swamp canal, and to the south by Beaufort harbor, at Old Topsail inlet. Between Pamlico sound and Beaufort, as stated by these gentlemen, intervenes Core sound, which is between 38 and 39 miles long, and in which are several shoals, some of them having little more than four feet of water upon them at times of very low tide

Beaufort, since the settlement of the country, has never had less than 15 or 16 feet on the bar of its inlet at high tides. It has now, perhaps, 23 feet at high tides. Certainly it has *nearly* that depth, and there are few bars to the southward of it with more; at low water it has 18 feet. A navigable communication for coasting vessels would, therefore, open for the trade of a large part of North Carolina; at least one of the best, and taking the depth of water at low tides, the character of the bar, and the safety of the coast near it, perhaps the best Atlantic harbor south of the Chesapeake bay.

Several routes have been proposed, some of them have been surveyed, and one of them has been attempted, by which to connect the trade of the sounds herein mentioned with Beaufort. It does yet not appear that any one of them combines as many advantages as that by Core sound, or that, if they were effected, the improvement of this sound should therefore be neglected.

The act of Congress to which reference has been made, proposes a depth of 7 feet at low water, and a breadth of 50 yards for the dimensions of the improved channel. The depth is, perhaps, as great as could be attained within the limits of any appropriation of money which could be reasonably expected to be obtained. The breadth is, however, insufficient for all the objects of the improvement. Two hundred yards would be required for a beating channel, and that breadth would also be necessary to enable vessels to continue their way during night as well as day.

The surveys of last year are in a state to enable me to frame a project for the improvement of the sound, and to estimate the cost of it. I have refrained from doing this, and had reserved it until all the surveys proposed by the act of the 3d of March last were completed, with the intention of presenting the whole of the subject of an inland communication south of the Chesapeake bay to the department at one view, not conceiving that I was authorized to report upon detached portions of the subject. I have, however, considered the question of the improvement of Core sound sufficiently to enable me to say, generally, that for a channel of the depth and breadth mentioned by Mr. Shepard, the cost would be somewhat about \$80,000; and for the one I have proposed about \$300,000 exclusive of any jettees or other works which might possibly be found necessary to protect the sides of the channel from abrasion, or to prevent the channel itself from shifting; but the probability of which I do not, with my present knowledge of the composition of the bed of the sound, by any means anticipate, if the larger plan were adopted.

We are not dependent upon mere speculation for our opinion of the importance of this harbor; it was made manifest by the war of 1812, '13, and '14, during which it became the depot of prizes for many of our cruisers, whence, by lighters, their cargoes were forwarded through the sounds, and by the Dismal Swamp canal, to the northern cities. Tobacco and other produce was sent by that route from Petersburg to foreign markets, whenever the Chesapeake bay was occupied by the enemy. The following extracts from the books of the treasury department will show the importance of Beaufort harbor to commerce at that period, and its contrast with the usual transactions of the port:

Years.	Gross revenue.	Tonnage.
1810	\$522	929
1811	2,681	909
1812	18,116	1,022
1813	105,214	1,041
1814	74,774	1,466
1815	4,809	1,538
1816	2,358	1,344

At the period we are now speaking of, the inland communication was embarrassed, not only by the extreme shoalness of Core sound, which still continues, but the Dismal Swamp canal had then but a depth of 18 to 20 inches, and a breadth of about 18 feet at the surface, and it was otherwise in so defective a state that the passage through it was sometimes altogether interrupted; the canal is now, or is proposed to be, — feet broad, by 6 to 7 feet deep. It is to be borne in mind, also, that Ocracoke had then about 4 to 6 feet in its channels over the shoals in the bay, and that there existed a navigable communication between Currituck sound and the ocean.

I subjoin the following statement to enable you to form some estimate of the value of the inland trade connected with the sounds which lie between Beaufort and the Chesapeake.

Amount of certain articles transported through the Dismal Swamp canal during the years 1833, 1834, 1835, and 1836.

Quarter casks wine	639
Barrels spirits	13,707
Barrels pork	5,540
Barrels flour	30,232
Barrels fish	24,522
Barrels tar	59,421
Hogsheads sugar	890
Hogsheads molasses	1,601
Bushels salt	150,905
Bushels corn	563,535
Bushels wheat and flaxseed	31,004
Bales cotton	24,091
Cubic feet scantling, plank, & lumber	960,672
Staves	23,450,211
Shingles,	100,154,475
Cords wood	8,495
Sundries, dollars	17,800

It should be remarked, that during the year 1835 the navigation of the canal was obstructed for ten weeks, and in 1836 it was totally suspended for seventy days.

The accompanying statement, prepared for me by the collector at Ocracoke, shows that 1,149 vessels, averaging 100 tons, passed through that inlet during the year ending October 1, 1836; of which 893 were bound coastwise, and 256 to foreign ports. In these last the expense of lighterage at Ocracoke was estimated at $100 per vessel.

It is known that, because of the difficulty of getting directly to sea from the northern ports of North Carolina, much produce finds its way to market indirectly through the three commercial cities of Virginia, I have not yet taken measures for estimating how much was the value of the foreign or other goods which enter the state through those cities.

I am of opinion that the improvement of the sounds of North Carolina, as a general channel of communication for the coasting trade, should not extend to the westward of Beaufort. These sounds are very shallow, and beyond Swansborough they are generally filled with marshes, through which wind narrow tortuous creeks, in which we find occasional shoals, incapable of floating at low tide a whale-boat with her crew on board. Besides which, some of them are very narrow, and the sand-banks which separate them from the sea are so low that they are equally exposed to the inroads of the elements or of the enemy.

It is along this line of coast that we find New river inlet, as well as Bogue, the inlet of Whitock river, on which Swansborough is situated.

The remarks which the gentlemen have made respecting New river are undoubtedly very sound, if their views are limited to the existing connexion of that river with the interior, and they measurably apply also to Whitock river. Should, however, a navigable canal be made, uniting the waters of Neuse river with the north-east branch of Cape Fear river (and my surveys of the past season have satisfied me of its practicability) then the importance, not only of New river and Whitock, but of Beaufort also, may be greatly enhanced by establishing a connexion between them and the canal—a connexion which their position in relation to it would invite, and one also which might be formed at an expense much below the value of the improvement to the coasting trade, and to the general commerce of the country, especially in time of war.

Memorandum of distances roughly estimated in statute miles.

	Statute miles.
Norfolk to Bogue point, Beaufort harbor *via* the Dismal Swamp canal and Core sounds,	206
Norfolk, *via* Core sound and Beaufort, to the main bar of Cape Fear river,	350
Norfolk to Wilmington, Dismal Swamp canal, Albemarle, Croatan, and Pamlico sound, Neuse river, Slocum's creek, and experimental line of canal surveyed last year ($57\frac{1}{2}$ miles) to north-east branch of Cape Fear river, and thence to Wilmington,	103
Norfolk, *via* Chesapeake bay and the ocean to Beaufort harbor, about	260
Wilmington to main bar Cape Fear river.	

An error appears to have been fallen into respecting the authority under which the surveys were made; that authority is altogether distinct from that for executing the work. But it was necessary that a survey should be made, and a plan of improvement be adopted, before the work was undertaken. It so happened that the appropriation for the special work on Core sound was made before the appropriation and authority for the general survey and plans for an inland communication between the Chesapeake and Charleston. The two duties were assigned to separate branches of the service; the execution of the work on Core sound, in the first instance, to the engineers of fortifications, as was likewise the special survey and improvement of New river; after which, and before the engineers charged with thesp ecial improvement had commenced operations in the field, came the authority and means for making the general survey &c., the execution of which was given in charge to the topographical engineers.

It would seem that New river (viz.: the obstructions to its navigation,) has been surveyed under the authority granted for its improvement; but that Core sound has not been, and that the work of improvement has not been commenced at either place, but that preparations have been made towards it, and that the work of Core sound halts for lack of a survey and plans.

Both Core sound and New river fall within the line of operations of the officer charged with investigating the general question of an inland coastwise communication to Charleston; and the sound has been surveyed, and the work has been for some time past in a state of preparation, to enable him to form a general plan of improvement, and to estimate the cost of executing it, at least so far as the excavation of the channel is concerned.

The plan of improvement which he would recommend exceeds greatly in extent and expense, as has been already intimated, the improvement contemplated by the act of the 24th Congress. It is connected with a general system for the accommodation of the coasting trade of the Union in peace and its protection during war. It has been questioned by the officer in charge of this duty, whether, on the one hand, his plans should be narrowed down to the limited object which the legislature was apparently contemplating at the time of the passage of the act of 1824; or, on the other hand whether he would be warranted in proposing his plan, or whether the department would undertake its execution without legislative sanction—a project so far exceeding in dimensions and cost the one which the act referred to had indicated.

Again, it was believed that the general interior coastwise navigation should abandon the sounds, and be carried inland, at least from the waters of the Neuse to those of Cape Fear river, although apparently the legislature deemed that it might follow the line of sounds upon the coast from Pamlico to the vicinity of the new inlet of Cape Fear. At the same time the engineer was persuaded that Beaufort harbor was so important to commerce, that it deserved to be made the principal inlet to the great sounds of North Carolina, and that Core sound should be improved so as to form an important branch of the general inland communication.

Upon so serious a subject it was to be questioned whether the department would be warranted in compromitting the legislature. It is yet a question for the department how far the selection of either of these routes for immediate execution may compromit the ultimate execution of the other.

The officer charged with the execution of the surveys asks the orders of the department to authorize his reporting on any detached portions of the work.

Should it be deemed expedient to open the channel of Core sound at as early a day as practicable, in anticipation of the destruction of Ocracoke inlet, or to provide against the contingency of war, an increased appropriation ought to be asked for so as to make the fund available for the current year amount to forty or sixty thousand dollars.

Very respectfully, &c.

JAMES KEARNEY,
Lt. Col. Top. Engs.

Lieut. Col. J. J. ABERT,
Chief Top. Bureau.

From the American Silk-Grower.

IMPORTANT TO SILK-GROWERS.

It gives us much pleasure to communicate to our patrons and the silk-growing public, the result of some experiments that we have made in the cultivation of the Chinese mulberry, considered by us of the first consequence. We have heretofore recommended, and now earnestly repeat the advice then given, that permanent plantations of mulberries should be managed according to the directions given in the leading article of our first number, viz.; to sever the trees near the ground late in the fall, and feed the worms with the foliage which will spring from the stumps and roots left in the ground the next season. We have cultivated the tree in this way, and can assure our subscribers, that it is attended with great conveniences and advantages, as it increases the quantity of leaves, and facilitates their gathering. We have about 1000 roots which have been cultivated in this manner, and they have prospered equal to our wishes, and more than fulfilled every expectation. The shoots are now five and six feet in height, bearing numerous large leaves, and the whole ground is nearly covered with their rich vegetation. Six, eight, and ten sprouts generally proceed from one stump, which will rise ten feet in height in one summer. By the middle of June the leaves will be large and sufficiently abundant to feed worms to advantage, and one man may, by passing along the rows with a sharp knife, cut off the sprouts near the earth, throw them into a cart, and thus collect food enough to supply a million of worms. In another month, there will be leaves sufficient to feed another crop of worms, thus doubling the profits of the business at a trifling increase of expenditure. We are not theorising, but stating what we have proved by our own experiments. The large profits to be derived from the silk culture, which have been promulgated by the press will be fully realized. This mode of culture almost demolishes the whole expense of collecting leaves, and increases the food for the worms 500 per cent. above what can be obtained from the cultivation of the white mulberry. But few of the American people have engaged in silk operations, and of these few, probably not one half of them have known any thing of it until the five last years. But small as their number is, they have effected greater improvements in the business than all the silk-growers of Europe have achieved in a century, and if we do not supply England with raw silk within 20 years, cheaper than she can obtain it elsewhere, it will be because there will be no country called America—no people denominated Yankees.

From the Mining Journal.

SMOKE-BURNER.

The following is a short description of Messrs. Chanter and Gray's smoke-burner, which has been publicly exhibited at their premises, in Earl street, Blackfriars, and inspected by their Royal Highnesses the Dukes of Sussex and Cambridge; the former attended by several Fellows of the Royal Society. It has also been inspected by many engineers and gentlemen interested in the progress of science, all of whom agreed in admitting the object of consuming the smoke to be fully accomplished. It will, therefore, really be a great neglect on the part of the Legislature, if manufactories and gas-works are longer suffered to darken the atmosphere of the metropolis with coal smoke. As to the parties interested in locomotive engines, they must decide for themselves; but if the estimate be correct, that they can obtain from coal a heat greater than they now obtain from coke, and at less than half the expense, it may readily be supposed that they will soon avail themselves of this patent.

Description of the smoke-burner.—It would be impossible to describe fully the nature of this invention within the limits of a prospectus, but it may be briefly stated that its principle essentially consists in so arranging the form of the furnace and position of the bars that the fuel is regularly advanced by gravitation upon inclined fire bars, without the aid of machinery, or any apparatus besides the simple instruments in common use for the management of furnaces; the carbon and various inflammable gases are set free in the process of combustion, and being more charged with the oxigen of the atmosphere and heat of the fire, proceed through and over the fire, which increasing in heat to its termination, gradually subjects the less combustible gases to perfect combustion. Saving in fuel is thus effected; for, in the present furnaces, these are not only passed off unconsumed, but, by preventing the ignition of more combustible materials, necessarily waste a large portion of the burning fuel. Thus the primary effect, in the operation of the patent furnace, may be stated to be that of obtaining, at the termination of the furnace, that intense degree of heat indispensable to the entire combustion of the various substances emitted from the burning fuel. It is needless to add, that this produces extraordinary economy of fuel. This invention is exhibited in the specification in 12 different forms, showing its application to every description of furnace. The details are somewhat varied; but the most important part of the principle, namely, the absolute combustion of the vapour is thus effected in all of them.

From the Richmond Enquirer.

BRIDGE ACROSS JAMES RIVER ON THE RICHMOND AND PETERSBURG RAILROAD.

The cars have for some weeks past been enabled to come from Petersburg to Manchester; but not to the depot in this city, in consequence of the bridge over the James river not being completed. It is, however, very nearly finished—and it is said, that the cars will be able to cross it on Saturday (to-morrow) or Monday—when the distance from Petersburg to Richmond, 22½ miles, will be run in about 1½ hour. It is impossible to speak of this splendid bridge, in terms that are calculated to do justice to our feelings. We walked over it yesterday morning—and struck as we had been, at a distance, by this imposing edifice, our astonishment and delight were augmented by a more familiar observation of the magnitude of the work and the beauty of the execution. It forms not only an ornament to our city, but it does honor to Virginia—there is no edifice like it in all America. It is 2,857½ feet long, from the abutment on the Manchester side to the one on the Richmond side. The terraced bank on the Manchester side, which connects it with the heights, is 650 feet more. The bridge is 61 feet above the low water mark of the river, and 22 feet wide—with a double rail on the top of it. It stands on 18 immense piers of granite, which was fortunately so convenient to the architect—and over the piers, is a chain of double lattice work, 17½ feet from outside to outside, and sixteen feet high, resting on the piers. These sides are formed of plank, 3 by 12 inches, crossing each other about 3 feet apart, and forming diamond shaped openings. At each intersection, they are firmly pinned with oak pins two inches in diameter. These sides are secured from the weather by closely weather boarding. Upon these the flooring rests, which is 22½ feet wide. This floor is made to raise in a curve from the outer edges of the floor to its centre, in order to cast off the water. The whole is coated with pitch and sand, making it both fire and water proof. A hand-railing is placed upon the outer edges of the floor for the whole length. The whole bridge is well braced, horizontally and transversely.

Many questions have been asked—What precautions are taken against the effects of wind, of fire and decay? The first is effectually guarded against by the mass of rock-work carried up and fitted closely between the sides of the bridge, at the top of the piers. This work is composed of stone weighing upwards of a ton and a half each, closely notched into each other, and joined with iron bands. The lateral bracing will also effectually aid in preventing the effect from wind or other forces. In addition to the security against fire by covering the floor with a composition, there will be 480 buckets hung upon the hand-railing of the passage immediately under the floor of the bridge, and kept constantly filled from the city water-works. A guard will constantly be kept to pass over the bridge before and after the passage of the trains.

The main timber will be as little subject to decay as those of an ordinary frame house, the water being excluded by the flooring acting as a roof, and the weather-boarding of the sides.

The two tracks upon the flooring will have guard-rails parallel, and raised somewhat higher than the ordinary rails, to prevent the Locomotive engine or cars from being thrown out of the tracks.

The whole cost of this bridge will be about $115,000.

The whole road and the bridge are under the auspices and superintendence of Moncure Robinson esq., a native, Virginia born, engineer. Its rock work was executed by Messrs. Benj. Green and Merrill, and the wooden work by Mr. Nisbett.

We defy any one to view this noble and stupendous bridge, without admiration. It makes one's head dizzy to look down to the river below. Around are those beautiful islets, which add such a charm to the river landscape—and above and below are picturesque views of the city, of the public buildings, and the most prominent of them, the capitol of the metropolis of the state, which will tempt the citizen to make it his favorite promenade.

This railroad, thus on the point of accomplishment, constitutes a new link in that immense railroad, which is destined to run from the Highlands of Maine to the Gulf of Mexico. It immediately connects the railroad to Fredericksburg, with the Petersburg and Roanoke road. When any one asks with a sneer, "what has Virginia done for internal improvement?" we say, "if at nothing else, look at these three railroads; and look at our noble bridge."

From the Genesee Farmer.

BREEDING OF BEARS.

The *Journal des Haras*, a French publication, in describing the breeding of cattle, horses, sheep, &c., in Russia and Poland, thus describes a source of profit but little known to the American farmer. "Some of these extensive establishments are provided with a third space, or court, enclosed by walls, and with little buildings protected by iron bars. This is destined to be a menagerie for bears of the rarest and most beautiful colors, and yielding the choicest furs. This speculation is a very profitable one. A cub of six months old with black hair pointed with silver white, yields a very light skin and fur, and which will obtain a considerable price, especially if there are others of the same variegated color and fineness sufficient to make a pelisse. A garment of this kind will sometimes be sold for $2,500 to $4,500. The skins of the old bears are employed for the carpets or linings of carriages, or the most supple of them form the clothing of the coachmen."

For the Farmers' Register.

PROCEEDINGS OF THE AGRICULTURAL SOCIETY OF NOTTOWAY AND AMELIA.

Published by request of the Society.

At a meeting of sundry citizens of Nottoway and Amelia, at Jetersville, on Saturday the 18th of August, 1838, for the purpose of promoting the improvement of agriculture in both counties,

The meeting was organized by calling Dr. James Jones, of Nottoway, to the chair, and Sharpe Carter, of the same county, was appointed secretary.

After the meeting was called to order, Mr. E. G. Boothe, of Nottoway, delivered a very handsome and excellent address, congratulating the farmers upon the increasing zeal and interest taken by them, in the improvement of their professional art, showing the value and importance of the object aimed at, the causes of the present neglected and depressed condition of agriculture, the obstacles that lie in the way of improvement, and how those obstacles and causes may be removed, to wit: By the association of farmers in every county, to consult about their own interest, which will increase their zeal, and enlighten their minds, and induce that public sentiment in favor of their profession, so essential a pre-requisite to future progress, or the obtaining of legislative aid.

After the address, it was moved by Mr. Thomas E. Jeter, of Amelia, that all persons desiring to form a united agricultural society, for Nottoway and Amelia, come forward and subscribe their names;

Thereupon, most of those present gave in their signatures.

On motion of the same, it was unanimously resolved, that a committee of seven be appointed to draft a constitution and laws for the government of this society, and Dr. Philip T. Southall, John T. Jeter, Thos. E. Jeter, and Dr. Wm. J. Cheatham, of Amelia; Col. Travis H. Epes, E. G. Boothe and S. Carter, of Nottoway, were appointed that committee.

The meeting then adjourned to meet again in the evening.

In the evening of the same day, the society met again, according to adjournment, when the committee reported the following constitution and laws, which were read and adopted by the meeting.

Article 1st. This society shall be styled "The Union Agricultural Society of Nottoway and Amelia."

Art. 2d. The object of this society shall be the improvement of agriculture, and all the arts and animals tributary to, and necessarily connected with it.

Art. 3d. Its officers shall be, a president, vice-president, recording secretary, treasurer and corresponding secretary.

Art. 4th. The president shall exercise the usual duties of his office, and enforce the rules of the Society. In his absence the vice-president shall do the same.

Art. 5th. The secretary shall keep the books and papers of the society and a record of all its proceedings.

Art. 6th. The treasurer shall collect all subscriptions, and make regular reports to the society.

Art. 7th. The corresponding secretary shall write and receive all letters pertaining to the objects of the society, keep them regularly filed, and report to each annual meeting, whatever, connected with those letters, may be important or interesting to the society.

Art. 8th. For the purpose of defraying the expenses of the society, premiums, books, agricultural instruments, &c., each member shall annually contribute not less than two dollars.

Art. 9th. Application for admission into the society, shall be made by some regular member; and the vote of two-thirds of the members present against the admission of any one shall prevent it.

Art. 10th. The president, at the opening of each meeting, shall deliver an address, or procure some other member to do it, on some subject connected with the society, or its objects; and shall appoint suitable persons, who are not competitors for the premiums, whose duties shall be to examine all animals and articles offered for premiums, and report the proper amount of premium to which each may be entitled, considering the finances of the society.

Art. 11th. No animal or article shall be entitled to a premium, unless it exhibit qualities above mediocrity.

Art. 12th. No person shall be a competitor for a premium, unless a regular member of the society.

Art. 13th. All animals or articles exhibited for premiums, shall be owned by persons living in Amelia and Nottoway, or who cultivate land therein.

Art. 14th. No animal or article shall be twice exhibited for a premium without the unanimous consent of the judges.

Art. 15th. The members shall subscribe the foregoing constitution and laws.

Art. 16th. No article of this constitution shall be altered or amended, and no new article appended thereto, except at an annual meeting, and by a vote of two-thirds of the members present.

The following is a list of animals and articles that may be exhibited for premiums, at the society's annual meeting and exhibition, which will take place for the first time, at Jetersville, in Amelia, on the second Thursday of October, 1839.

Animals.

1st. For the best stallion, considering blood, form, size and action.

2d. For the best brood mare, considering the same.

3d. The next best, regardless of blood.
4th. The bes colt under 3 years, considering blood, form and size.
5th. The next best, regardless of blood.
6th. For the best mule under 3 years.
7th. For the next best.
8th. The best jack.
9th. The next best.
10th. The best thorough bred bull, over 1 year.
11th. The next best, not thorough bred.
12th. The best calf under 1 year old.
13th. The best cow over 2 years.
14th. The next best.
15th. The best pair of oxen.
16th. The next best.
17th. The best ram, considering fleece.
18th. The next best.
19th. The best ewe.
20th. The next best.
21st. The heaviest hog under 12 months.
22d. The next best.

Articles.

1st. For the best double-turning plough.
2d. The best single do.
3d. The best large wagon.
4th. The best two-horse do.
5th. The best ox cart.
6th. The best tumbrel do.
7th. The best corn sheller.
8th. The best tanned side sole leather.
9th. The best tanned side of upper leather.
10th. The best pair of boots.
11th. The best pair of shoes.
12th. The best saddle.
13th. The best set of wagon gear.
14th. The best piece of winter negro cloth, over 20 yards.
15th. The best summer do.
16th. The best pair yarn stockings.
17th. The next best cotton do.
18th. The best piece of winter homespun, 10 yards.
19th. The best domestic carpeting, over 10 yds.
20th. The best pair of domesiic blankets.
21st. The best pound of sewing silk.
22d. The best acre of corn.
23d. The best acre of wheat.

Each article to be raised or manufactured by the exhibiter, or some member of his family.

On motion of Mr. Thomas E. Jeter, it was resolved, that four persons in each county be appointed to endeavor to induce all those favorable to the objects of the society, to join it; and the following individuals were appointed.

Nottoway.	*Amelia.*
E. G. Booth,	Dr. Wm. J. Cheatham,
S. Carter,	John T. Jeter,
Col. T. H. Epes,	Dr. Philip T. Southall,
Wm. R. Mills,	Peter Burton.

On motion of Mr. E. G. Booth, it was resolved, that the secretary furnish an account of the proceedings of this meeting for publication in the Farmers' Register.

The following officers were then unanimously elected for the year 1839. Col. Thos. W. Webster, president, E. G. Booth, vice-president, S. Carter, recording secretary, Col. T. H. Epes, corresponding secretary, Thos. E. Jeter, treasurer.

The meeting then adjourned.

JAMES JONES, *President.*

S. CARTER, *Secretary.*

LARGE LEAVES OF THE NATIVE MULBERRY (MORUS RUBRA.)

At page 275, some remarks were made on the usual delusive manner of comparing the size of the leaves of the Chinese mulberry with other kinds. We there stated that the leaves of the young native mulberry *(morus rubra)* were sometimes found of very large sizes, though the same trees, in their more mature state, would bring leaves of but ordinary size. The correctness of the sizes there stated rested upon memory only; and lest there should be some error, we have since sought an opportunity to test the facts by other and careful measurements. This opportunity was afforded a few days ago, in finding a young shoot with very large leaves, on Coggin's Point farm. It grows on one of the steep hill-sides which inclose a deep and narrow ravine. The land is covered with its original forest growth, and the young mulberry tree is over-shadowed by the neighboring large trees. The soil is not very rich, but is highly calcareous, being in fact the out-cropping of a bed of weak sandy marl. If cleared and cultivated, this part of the ground, while in its best condition, might bring five barrels of corn to the acre. It is evident that these were not the most favorable circumstances to produce the most rapid and luxuriant growth of a young tree so situated; and that if it had been on the richest soil, well cultivated, and not affected by the shade or growth of neighboring and larger trees—or, in other words, if it had been nursed as carefully as the Chinese mulberry usually is—that the growth would have been ranker, and probably the leaves would have been larger than the actual sizes, which will be stated below, and of which the actual specimens are preserved, of the four largest leaves measured.

No. 1, was 14¼ inches long, measuring from the junction with the stem, to the upper point of the leaf, and 9⅞ inches wide. Measuring by the longest straight line, which was on one side of the stem, the length was 14⅝ inches.

No. 2—	Length from stem,	12⅛ inches
	Length by longest straight line,	12⅝
	Width,	9½
No. 3—	Length, (longest straight line)	13⅜
	Width,	9⅜
No. 4—	Length, (from stem)	13½
	Width,	9¼

None of these leaves were lobed, (or cut out,) but were compact in form, and regularly rounded in general outline, except that the apex, or extreme upper point, of each was very narrow, and was from an inch to an inch and a-half long.

Of some of the leaves of each of the plants grown from seeds of the *morus multicaulis*, (described page 316,) we have made *fac-simile* representatives, by inking carefully the leaf, and taking the impression under the printing press. Of these copies the sizes of some of the largest are as follow:

Seven lobed leaves from different plants, measured—

Length	8¼ inches,	Width,	7¼ inches
"	8⅜ "	"	7¾ "
"	8¼ "	"	7⅛ "

Length	$8\frac{1}{4}$ inches,	Width,	$6\frac{1}{2}$ inches
"	$8\frac{3}{8}$ "	"	$7\frac{1}{2}$ "
"	$8\frac{1}{4}$ "	"	$8\frac{1}{4}$ "
"	$9\frac{1}{8}$ "	"	$8\frac{1}{8}$ "

Four leaves not lobed, measured—

Length	$6\frac{1}{2}$ inches,	Width,	$5\frac{3}{4}$ inches
"	$7\frac{1}{8}$ "	"	$5\frac{1}{2}$ "
"	$7\frac{3}{8}$ "	"	$6\frac{1}{2}$ "
"	$7\frac{1}{4}$ "	"	$6\frac{1}{4}$ "

The length of each was fixed by a straight line from the point of the leaf, to the junction of the leaf and the stem. The longest line, would have been to the shoulder of the leaf, and would have exceeded the central lines by from half an inch to nearly an inch. These leaves will compare well in size with any of the new varieties (except the *multicaulis*,) which have been so much puffed in nursery-men's late advertisements. Any one of these seedlings would serve, with good puffing and good luck, in skilful hands, as a stock in trade from which to sell some thousands of dollars worth of cuttings. Each one is the only individual of a new variety—its qualities totally unknown, and therefore may be announced as whatever the seller pleases—and there is no knowing how much profit may be made of its product, before it is sufficiently tried by purchasers to be known, and properly appreciated. If any one in the humbug line wishes to avail of such a chance, we will sell him our seedlings for $20 a-piece, and ask no questions. Along side of the row of seedlings, and at about three feet distance, is a row of young *multicaulis* trees, which have been treated precisely in the same manner. An impression of one of the largest leaves of these was taken, for comparison, which measures $10\frac{3}{4}$ by $9\frac{1}{4}$ inches.

From the (British) Farmers' Magazine.

DEEP PLOUGHING—TREADING IN SEED.—EATABLE PRIZE ANIMALS.

On Mr. Barker's health being given from the chair, this gentleman returned thanks, stated the great improvement in ploughing, which had resulted from the distribution of premiums, at ploughing matches, and which had amounted to £40, and after referring to other local improvements, he proceeded to say—

"I will detail to you an experiment, which I made last year in deep ploughing. I felt at first inclined to try the press, but some said try the drill, some the broadcast, and at last I selected the drill, and had the seed trodden in by my Lord Lordsdale's horses, when they were at exercise, and afterwards had a flock of 400 or 500 sheep driven over it. The produce of this land averaged seven quarters (56 bushels) and one peck an acre throughout 22 acres—(the total product amounting to £402 3s. 9d. = to $1,785, or $81 the acre,) and from two bushels and one peck of seed per acre sown; and I wish you would try the experiment of treading in the wheat, or fixing it firmly in the ground, which I am sure will lead to a similar result. As regards the exhibition of animals, I think we are still wrong in principle, and in endeavoring to produce so much fat. If we paid greater attention to the increase of *eatable flesh*, I am certain a great improvement might be effected, especially in the quality of Leicestershire sheep and pigs. When our prize animals are killed, what do we find? Why perhaps five or six inches of fat to one of lean. I intended, another year, to offer a premium for that animal which, when dead, shall show the most *lean*, and I hope that some one will offer a similar pig premium. I must beg you to take my hints about fat and lean into consideration, and see whether we cannot produce a greater quantity of *eatable meat*, than we have hitherto done."

From the Genesee Farmer.

SHEEP WORM.

There is a fly that deposits its eggs in the nostrils of sheep, usually in August and September, where it hatches, and then makes its way up into the head and often causes death. The frequent application of tar to the noses of sheep, is considered the best preventive. Put tar on boards and strew on salt, and the sheep will smear their noses with tar in eating the salt. The following method is recommended by some sheep master. Take a small log, dress it a little upon the upper side, bore holes into it with a large auger at short intervals, about two or three inches deep, fill these holes with salt, and with a brush apply tar as often as once a week around the holes, and give the sheep daily access to the salt. A small quantity of tar frequently given to sheep is considered conducive to their health. Alexander Reed, esq. of Washington county, Penn., observes, "we have long been satisfied that the use of tar as a medicine or condiment for sheep has not been duly appreciated. The cough and foul nose, I am disposed to think, are both produced from the same disease. When we notice them we lose no time in removing them from the flock, *and make a free use of tar*. It rarely fails to effect a cure in a few days, unless the animal is old or unsound."

ON THE SUGAR AND COTTON REGIONS OF THE UNITED STATES.

To the Editor of the Farmers' Register.

Alabama, August 16th, 1838.

I propose (as an inquiry of some interest) to give some general views of the most suitable regions for the profitable culture of cotton and sugar, and, incidentally, of corn and potatoes, wheat and the small grains. The sugar region may be considered from towards the equator to latitude 31°. The cotton from 31° to 35°. Corn, wheat, and the grasses, from 33° to 40° and beyond. A correct comparison of the profits of each, in their most suitable situations, will approximate them much closer than on a superficial view might be thought. I shall commence with the cotton region, as that with which I am best acquainted; and be more full on it, as my own opinions are at variance with what I believe the general opinion. That opinion is, that cotton will not be a productive crop below 31°, whenever it shall be the general crop of the country, and that beyond 35°, the climate is too cold for it. Suitableness of soil and judiciousness of cultivation combined, may make some exceptions; but it will be found generally correct. Light and free soils, in Virginia and North Carolina, above 35°, may make it occasionally the interest of the proprietor to cultivate cotton; but he must connect with it something else for market: for he cannot make one half as much cotton as an equally judicious planter, on an equally fertile plantation, under the best location as to climate. But why should this be so? Why, because the stalks will not produce so much; but the principal reason is, that the early frost does not as with us merely kill the leaves and tender limbs, and check production, but it kills the plant entirely, and all its sap, and sours it, and the wool dies, and loses its elasticity, and dries, and becomes very much lighter. It is difficult to say what is the loss in weight, and I have no means of correctly ascertaining. I feel very certain, however, that the loss is more than one-fifth, and, I believe, more probably one-fourth, where it remains in the field the usual time necessary in a good crop. When the stalk is dead entirely, the wool loses its vegetable oil, its weight, and its elasticity, and the trash adheres to it, so that it picks clean with difficulty. We know this so well here, that on the rusted parts of our fields, where the stalk is dead and dry, and all the leaves gone, notwithstanding a fine show of wool, it is passed over unpicked, where the crop is a large one; and the laborers seldom get half weights when they do pick it, though their baskets are nearly as full. It is usual to weigh in the cotton as it is gathered; and if we get one pound of clean ginned cotton to every five, we do well; and we know that dried seed cotton will give one pound for every three. Some allowance is to be made for the wet from the morning dews; but still much arises from the drying of the oil out of the cotton fibre. It dries much faster, of course, in the field exposed separately to the sun. When it has been long so exposed that all the oil is gone, the cotton becomes blue; and it is equally so where the cotton pod stands too high on the stalk to be affected by stains from the earth.

Another reason—we begin earlier to pick, and can continue to pick later in the year. We commence about the 20th of August, and in 35° they commence about the 10th of September; and that difference of time, when the cotton is heavy, and the days are long, is good for 400 to 500 pounds of clean cotton, or one bag to each laborer. We can and do pick more where the climate perfects the pods, if these fully open and eject the whole, or yield it to the slightest touch of the picker. Crops vary from 1500 pounds to 4000 pounds of clean cotton to each laborer; and I suppose them to range in 35° from 1000 to 1500 pounds. To speak of averages, I would say, in 35° the crop should be 1000 pounds, in 33° and thereabouts, 2000 pounds, both under reasonably fair circumstances. 3000 pounds and upwards have been but very rarely gathered without much additional assistance. I do not consider it difficult to grow that quantity on a really fine plantation; but I think it impossible to pick it with the same persons only that made it. I have seen 40 acres of unpicked cotton ploughed up in March, that would have given 1200 pounds or 1500 pounds of seed-cotton each acre; and the gathering, with much assistance, did not reach 3000 pounds to the hand. I therefore am incredulous as to these great gathered crops.

So much for the unsuitableness over 35°. Now let us inquire into the reasons why it should be so under 31°. I have supposed, that in northern latitudes plants depend more on the soil, and in the southern more on the climate. In the former, there is a general tendency to bear fruit; in the latter, wood and foliage: and that latitude is best where their mutual action best suits. Below 31°, the fruit-bearing tendency is overcome too much by wood and foliage. You must have a reasonable size of stalk, to have abundance of fruit; and the fruit-bearing tendency must not be too little. Another reason may be, that without a winter severe enough to destroy the larvæ of insects, you are more liable to their depredations. I do not know that I make myself understood; my reasons are but speculations, and are not very satisfactory to myself, and will probably be less so to you. In the warm climate of the West Indies, cotton was much more grown than it now is. Of South America we know too little to seek for examples either way. Formerly it was very much and profitably cultivated on the seaboard of South Carolina and Georgia; it is at this time very little cultivated. It has been rather a poor product in Florida, and is each year getting more so. It runs too much to weed, and the ravages of insects have increased. I shall adduce two strong facts from this and the adjoining state of Louisiana, and which first led me to this opinion. In 1819, a large and very fertile body of lands on the Escambia, just above the West Florida line, above and near latitude 31°, was settled by several of our very best farmers, and their crops, for several years, were large and remunerating. The general cultivation of that neighborhood, and its continuance, have occasioned the plant not to yield so well, though still exuberant in its growth; and it has introduced insects, that have preyed so much on their cotton, that almost every one of those planters has left that neighborhood and gone higher up into the country. The crops above 31° in this state, are less productive, and more injured by worms, than formerly.

The second is, that cotton, below 31°, is no where now cultivated to any extent. The fertile banks of the Mississippi, from the Balize to 100 miles above New Orleans, has but very few plantations where cotton makes any portion of the crop. It is a fact, to the notoriety of which I appeal, that it is considered there unsuitable for cotton. A more fertile soil, or better fixed plantations, or better cultivators on them are to be found no where. On the same river, from about Natchez, in, and upwards, it is a superb cotton country.

It is said Texas is a fine cotton country. This is rather an expression of an opinion of what it will be, than what it is. It has not had time to establish its exemption from what has been the fault of all the countries under a similar climate—that its cotton will grow too much to wood and foliage, and that it will be depredated upon, too much, by worms and insects. I allude to the seaboard of Texas. It is the true sugar region, (and the indigo country, for the same reasons,) and that in time, will be its staple product, so soon as the security of the government and the inconveniences of a new population, and a new country, shall overcome the prudence and caution of the more wealthy planters elsewhere. My paper and your patience are both about to give out, and I must be brief on the other topic, and exclude the last altogether. The sugar region, I consider below 31°, where the climate is very hot; the cut cane acidulates, heats and rots, and, therefore, you must haul as you grind. In Louisiana, on the approach of frost, you may cut a three weeks' supply, and will make sugar without rot, and without acidulation. In the United States, there is properly no sugar country; the plantations on the seaboard, beyond and on the Mississippi, to the parallel of New Orleans, can only, and can scarcely be called such. The crop is a hazardous one, and the sugar interest is a debt; it is a forced crop, and the mode of cultivation of the best planters shows it. They push the early growth, and drain well to keep from the cold occasioned by the transpiration water, through and under their levees, the river being then generally higher than the surface of their cane fields. Cane planted in October, is better than in the spring. The cane requires a strong soil and a long season, to give the maturity, and that degree of richness or saccharum to the juice, that makes the sugar. New land and late canes give equally large stalks; but the saccharum is not there, and sometimes so deficient, that it will only make molasses. Where, above New Orleans, sugar is successfully made, as in the La Fourche, the Terre Bonne, &c., there the soil is very free, and hastens the maturity. As I have said before, the true sugar country is Texas; and when society and security, and health and good government, shall have overcome the caution of the more wealthy, it will be a splendid country, and the future El Dorado.

A PLANTER.

From the Edinburgh New Philosophical Journal.

ON THE FROZEN SOIL OF SIBERIA.

By Professor Baer of St. Petersburgh.

It has long since been ascertained, says M. Baer, that over a great extent of country, the soil of Siberia is never entirely free from ice; during the summer, the surface of the ground is, to a greater or less depth, thawed; but at some distance from the surface, a bottom of perpetual ice is met with. Gmelin, the elder, in his travels in Siberia, states that shortly after the foundation of the town Yakutzk (in latitude 62½° north; longitude 130° east nearly,) at the end of the seventeenth century, the soil of that place was found to be frozen at a depth of 91 feet, and that the people were compelled to give up the design of sinking a well. Many other facts of this description were collected by travellers about the middle of the last century; but these facts seem not to have been generally credited; and even in 1825, Leopold Von Buch, a philosopher, whose opinion is of the greatest weight in all questions connected with the physical condition of the globe, rejected these statements as entirely erroneous; yet they have been corroborated in our days by the travels of Erman and Humboldt. Until very lately, nothing was known respecting the thickness of the frozen surface; but within these few years a merchant of the name of Schargin, having attempted to sink a well at Yakutzk, was about to abandon the project in despair of obtaining water, when Admiral Wrangel persuaded him to continue his operations till he had perforated the whole stratum of ice. This he did, and kept a complete journal of his work. The well, or pit, of M. Schargin had been sunk to the depth of 382 feet, and at that distance from the surface, the soil was very loose, and the temperature of the earth ½° Reaumur, (31° Fahr.,) but nearer the surface it had been much lower, and had increased as follows: Reaumur, 6° at some feet below the surface; 5° at 77 feet; 4° at 119 feet; 2° at 217 feet; 1½° at 305 feet; ½° at 350; ½° at 382 feet. As the soil had already become loose at 350 feet, and as the aperture of the well was eight feet square, and the work carried on partly during winter, when, of course, the column of cold air must have rushed into the pit and chilled the temperature, it is probable that the spot at which the thermometer marked the freezing point, was at the depth of 350 feet. This immense thickness of ground ice would prove that Siberia must have been for a long period in the same physical condition as it is at present. In the actual state of our information on this subject, it is impossible to determine how widely this layer of ground-ice is spread under the surface of Siberia; yet we know enough to say that it extends over an immense tract of country. Humboldt found the soil frozen at a depth of six feet at Bosgolowsk, near the Ural, in 60° north latitude. Near Beresow, Erman found the temperature of the earth at a depth of 23 feet, still+1°.6, (35½° F.,) but in 1821 a dead body was disinterred, which had been buried 92 years before; the earth around it was frozen, the and body did not show any signs of decomposition. It has long been known that at Obdorsk, in north latitude 68°, the ground is always frozen. Near Tobolsk, no ice is found in the soil, but as we proceed to the eastward, the ground-ice advances farther north. It is to be hoped that measurements of the temperature will shortly be made at different depths at Yakutzk, and by methods which M. Schargin was unable to employ; also it is desirable to institute an inquiry as to the depth at which the ice annually disappears near the surface, and collect information on the depth of ground-ice generally in Siberia. It would also be highly gratifying to me, and extremely interesting to science in general, if the Geographical Society of London, would collect information respecting the extent of the layer of ground-ice in North America, the thickness which it attains, and how much of it disappears by the summer heat, in those countries over which the factories of the Hudson's Bay Company are disseminated. At the termination of the reading of this paper, an animated discussion took place on the frozen soil of Siberia, in which the members stated their views on the subject. It appears to be generally considered, that the experiment at Yakutzk had not been made with sufficient care, to authorize the belief that the frost penetrates to so great a depth as 350 feet below the surface of the globe; also that the statements of M. Arago and Von Buch, and others in our own country, on the increase of temperature in proportion to the distance from the surface, were fully borne out by the observation of M. Schargin; and almost exactly in the same ratio as hitherto found. Captain Back stated, that in his many years' experience in the cold regions of North America, even in the height of an arctic summer, he had never found the ground thawed more than four feet below the surface; but that experiments on the subject were much to be desired.

From the Farmers' Cabinet.

MILCH COWS.

The attention of farmers is invited to the consideration of the character and condition of our milch cows.

How much ought a cow to yield to be worth her keeping? What is the average time that our cows are in milk? Is there much if any waste of fodder among us by keeping cattle that yield little or no return of profit? Questions like these, and there are many such, ought to be put and answered: it may turn out that our dairy stock is extremely low in character, and its management wasteful.

If something like an average quality of milch cows could be settled to afford a standard, and it should be understood that no good farmer would keep an animal for milk that fell below it, all the cows in the country would soon come up to the standard and go beyond it.

A milch cow of *medium* quality, in this state, will give, it is supposed, 12 quarts of milk per day for two months after calving, and 7 quarts per day on grass for the next 4 months, and 4 quarts per day for the following 2 months, and perhaps two quarts 1 month longer. Altogether 1500 quarts, in a year.

It takes 9 quarts of milk to make a pound of butter, and 4 quarts to yield a pound of cheese. The skim milk and dairy whey may be valued at $3 a cow per annum.

Now a cow that gives 1500 quarts of milk in a year, produces 166 pounds of butter, worth 16 cents per pound, $26 55
Skim milk say 3 44

$29 99

Or 1500 quarts of milk will give at four quarts to the pound of cheese, 374 pounds, which at 8 cents per pound will be $30 20
Whey, say 3 00

$33 00

Nothing is said of the worth of the calf, as all the milk the cow gives is credited. A milch cow's keeping one year cannot be short of $25 in the interior.

Suppose a farmer to resolve that he would keep no cow that did not hold out a good milker, 9 months in the year—and that did not give 16 quarts of milk per day for two months after calving, and 12 quarts per day the next four months, and six quarts per day the next three months, and two quarts per day the month following. Such a cow would yield per annum 3000 quarts of milk.

Here it may be remarked, that with the addition of five dollars per annum to the cost of food estimated for a cow, the net profit would probably be four-fold.

Is it not practicable to have throughout the country, as common dairy stock, animals as good as the last described?

This question is submitted to farmers for consideration. The probability is, that in taking some pains to get stock as good, they would get even better.

If the various modes of obtaining this object were resorted to at once with zeal throughout the country, there would be a prodigious improvement in a very short time. No young animal of promising appearance for milk would go to the butcher. More care would be taken of young stock. More young stock would be retained to insure a better selection for milch cows. Farmers would think more of the advantages of employing bulls of the improved breed. Heifers would be milked with great care and very thoroughly, to get them into the habit of holding out longer as milkers. If they once dry early, no care and keeping will afterwards correct this fault. Heifers with the first calf will be fed well, and with some additional care, the last three months they are in milk, to make them hold out.

The profit of a milch cow is not generally understood. Milk is not only the most nutritious, but the cheapest article of food. The food necessary for a cow in full milk, does not exceed in price, one-third of what is necessary in feeding for the butcher.

These few remarks are hastily made to draw out farmers on this subject. There is a great deal to be said upon it, and a great many facts to the purpose, which should come to light.

MEMORANDA OF LIMING. PROPOSED LEGISLATIVE PREMIUM.

To the Editor of the Farmers' Register.

Charles-city County, August 15, 1838.

In my memorandum book I find the following sentences, which, if they will be of any use to those who are using calcareous manure, or beginning to do so, they are very welcome to them.

I commenced the use of lime in the year 1823 at Weyanoke; put on at the rate of half a bushel of burned shells to every 18 feet square; do not think I ever had any increase of the corn crop the first year; have observed it always looked greener. Never failed in a crop of clover on limed land, no matter how poor, or how much galled or gullied. The most benefit ever received from liming, was on a broom-straw old field; first burned (the straw) then limed before ploughing, at the usual rate. Suffered to grow up again in broom-straw; ploughed in the spring and suffered to remain till the fall; fallowed and put in wheat; (a poor worn-out reddish soil, rather sandy;) it produced 15 bushels of wheat; a fine crop of clover succeeded—then wheat (lost by rust)—corn, a fine crop, about $6\frac{1}{2}$ barrels; (wheat entirely destroyed by the previous winter;) clover, a fine crop; wheat, 26 bushels to the acre; now in corn of an unusual large growth, much affected by the present drought, but will, I venture to say, produce between 5 and 6 barrels of corn; a good season would produce over ten; has never been manured; plastered once in the spring, the year after it was limed. Have been in the habit every year of mixing lime with manure, always with increased benefit. For the last four years have used marl in that way. I believe one hundred bushels of marl, such as is got from Cabin Point, or Coggin's Point, will do as much permanent good as 300 put on alone; it ensures a great growth of clover, and I think the sooner the vegetable matter is applied after the application of the calcareous matter, the greater, quicker, and the more permanent the advantage to be derived.

On an acre of land, in a field I have limed of 150 acres, I put one peck of lime or burned shells to the 18 feet square; on an adjoining acre I put one bushel to the same area, marked with cypress shingles; have never been able to discover any difference. The field has been in corn twice, in wheat twice, oats once, and clover twice since. I have showed it to a number of gentlemen. I have limed different pieces of land, twice for four years in succession, putting on the same quantity as at first; have never seen any advantage resulting to the crops. I think the use of lime has lessened our liability to autumnal diseases. On all crops lime is beneficial the second year; oats and peas, I think, it improves the first year. One hundred bushels of marl with the quantity of manure necessary for turnips, on one and a half acre, will produce twice as many as the same land with the manure only; the marl to be well incorporated with the manure, and mixed some 4 or 6 months previous. This mixture is the finest manure for celery; renders it sweet and very tender, increases the growth one-third.

I have put lime on the surface, harrowing it in only, ploughed it in with small ploughs, with four-horse ploughs, and at all seasons of the year; have never discovered any material difference; concluded it was only necessary to use it, no matter how, where, or when, and the tide-water region of the Old Dominion will rise, phœnix-like, with increased health, and wealth. Already has our assessor, Mr. William Tyler, affixed nearly one-third on the value of my land since the last assessment; and I assure you he is a judge in those matters, being one of our most intelligent and successful farmers, and one who has been intimately acquainted with my lands his whole life. As this is an instance of advantage to the state, and there are twenty such other cases in this county, would it not be advisable that the legislature should offer a premium equal at least to the increase of the amount of taxation for calcareous improvement of every ten, twenty, or one hundred acres? In twenty years, I would lay a wager, no farmer in the marl and lime regions of Virginia, would have a note in any bank, or any other note which he would not be able to liquidate at maturity. And it would do more to lessen the necessity of banks than any other law they could pass, for the very reason that farmers would have no necessity for them; and being able to be always punctual in their payments to merchants, it would lessen very much their (the merchants') demands on the banks.

JOHN MINGE.

From the Farmers' Cabinet.

DESTRUCTIVE INSECTS.

Not only thorns and thistles, but hosts of noxious insects have been inflicted on degenerate man. My attention has been chiefly directed against the latter evil.

The character of some of these insects will be described in treating of my warfare against them.

The Peach Insect.—The first in my series, is probably of American origin, as in no system of entomology can I find a description of the insect which has proved so destructive to our peach trees. I have to rely on my own observation for its history and description. It was probably unobserved by us prior to the present century.

In the autumn of 1800, I first saw the fatal malady in the peach trees about Philadelphia; the next year it had reached Burlington, and thence continued its march northward about twelve or fifteen miles a-year. In 1807, in a choice collection of fruit of my own, every tree had the premonitory symptoms of the yellows: a few miles north escaped that year. Having made a careful dissection by splitting and barking several trees, I could discover no cause, but ravages of the worms between the bark and wood. Collecting a number of the worms, I confined them in glass and hatched from them the perfect insect; moth or miller, small in comparison with the worm; white or light gray, with dark spots, wings convolute, like the section of a crow-quill split longitudinally. This phaleua or moth lays its eggs on the leaves of the peach tree; when hatched, the larva or maggot subsists itself first on the leaf, until it has acquired sufficient size and energy to migrate to a more suitable and permanent home for winter: this is between the bark and wood of the tree near the ground. Here it enlarges its domicil; a sickly state of the tree follows, and if they congregate in sufficient numbers to circumvent the tree, certain death is the consequence, by intercepting the communication between the root and body of the tree.

The larva of the peach insect is herbivorous, and in this state of existence subsists on the tender lining of the bark; living in a cleanly manner, it deposits all filth outside the door, by the dark powder appearance of which its abode may be detected. In its chrysaloid state, its appearance is smooth and glassy. It frequently happens when seeking these worms, a chrysalis very different is found; this is the sirex or tailed wasp, the natural enemy of the peach worm, the sirex is a restless, fidgety insect, resembling the wasp; its young, like that of the other wasps and hornets, is carnivorous. It may be observed about the neighborhood of the peach worm's habitation, at the door of which it lays its eggs; the product, a worm, creeps into the bowels of the peach-worm, feeds on its carcass, and occupies its coat. Its chrysalis, unlike that of the peach-worm, is rough and filthy, caused by the sweat and writhing of the victim of its rapacity.

I have been thus particular in noticing the sirex, because, being a usurper of the abode of its foster parent, it has been falsely accused of being the mother of mischief, instead of a friendly ally, which should be patronized. Among others, the Sussex New Jersey Register, had, about six years ago, a belligerent article against this supposed enemy.

Knowing that, even in a moderate degree, *heat* proves fatal to the cut-worm, I was led to try its effect on the peach-worm; having placed several in the hollow of my hand, I found that water not uncomfortable to my skin, killed them. I thence commenced applying boiling water from a watering pot, (without the nose,) pouring it around the tree, about 18 inches above the ground in sufficient quantity to heat the bark; the quantity was varied according to the thickness of the bark and size of the tree; this proved completely successful for several years, and as long as it was continued.

The time for using the heat, was the last of summer, and again the middle of the autumn, lest some might have escaped or more recently arrived.

The Cut-worm.—This is the offspring of the *phulana devastator;* wings horizontal; white with small dark spots; under wings orange; conceals itself from the sun during the day; lays its eggs near the root of grasses. These worms are of a bluish color, and they travel only in the night; they cut off young cabbages, beans and corn; the latter injured but not destroyed by them.

To shun its depredations in gardens, be careful to plant at a distance from any grass plot or lawn. I have lost an entire crop of late-planted beans by them, by planting near a grass plot. Frequent superficial hoing, in the middle of the day, by exposing to the sun, proves fatal to many of them.

Turnip fly, is another familiar enemy. I have witnessed many a crop of cabbages and cauliflower plants, also melons and cucumbers, destroyed by these minute insects. To obviate this, on the first mentioned small seeds being sown, I have wetted the ground to the depth of an inch or more with boiling hot water, thus destroying the flies and their eggs, and at the same time expediting the germination of the seed. For melons and cucumbers I sow and rake radish or turnip seed, on and around each hill; the flies are attracted by these, their more favorite food, from the melons, &c. Against the striped bug, another destroyer of melons, a brood of young chickens is a sufficient protection for a whole garden.

I do not persume to think the above the only or best means of abating the evils we suffer from insects; my object is rather to elicit from others the result of their observation and experience; the subject, in my view, is important. Has any one, more fortunate than myself, discovered the insect, for insect it most probably is, that produces the deforming warts and threatened destruction of our plum trees?

A knowledge of the agent might lead to the means of counteracting the influence. May we not hope that some means may be discovered for palliating the impending evils from the wheat insect, by fire or smoke of some offensive kind, as of horns or hoofs of animals, made in the evening, at a particular stage of the opening ear. Many remedies and some of much practical utility have been suggested against the Hessian fly. We ought not to submit to nor look lightly on these pests.—Ants, insignificant as they appear in our view, have been suffered to multiply to such an extent on the island of Granada, that a premium of £2,000 sterling has been offered from the public treasury, for the best plan of their destruction. Poison and fires are employed.

Let us exert our energies against the whole race of these *destructive insects;* let us devote a few hours each year to this warfare, and although we may not gather laurels, we shall assuredly reap a rich bounty. SENEX.

Kinderhook, March, 1836.

BULLETING AS A SUBSTITUTE FOR SPAYING.

[At page 285 of this volume we republished an article in recommendation of "bulleting" as a substitute for spaying. The following extracts, from another and more recent source, serve, the one to contradict, and the other to leave questionable, the utility of the substitute before proposed. But in addition to this ground of value of the letter of Mr. Smith, it deserves republication, with marked commendation, as exhibiting the rare merit in a writer of coming forward, voluntarily and readily, to confess that he had been in error in a previous communication, and that under that error, he had been aiding to deceive, when he meant to instruct his brother farmers. Many, in due time, have discovered that they had previously published erroneous opinions; but few have enough moral courage and sense of duty to make the proper atonement.—ED. FAR. REG.]

From the Franklin Farmer.

Midway, Woodford Co., Ky., Aug. 15, 1838.

Dear Sir—The object of writing communications for the public should be to diffuse useful information, and they should, therefore, only convey *facts.* Errors which are likely to have an evil tendency, should be corrected. False theories and half-tried experiments, though frequently promulged from the purest motives, often do great injury; and yet to hold the secret possession of facts, hoarded up for the purpose of selfish emolument, without regard for the good of others, is mean and selfish in the extreme. Taking the position, that it is the duty of every one, to do as little harm and as much good as possible, I hasten to correct, and thereby counteract the evil effect that might be produced in consequence of a recommendation which I made, of bulleting sows instead of spaying them, under the signature of "Woodford Farmer." Although Mr. Davis was successful, in his first operations, others have been unsuccessful, and I have undoubted authority to state that bulleting *will not answer* as a substitute for spaying, which, in justice to myself, as the author of that recommendation, and for the public good, I hereby make known the facts as communicated to me.

BIRD SMITH.

Remark.—We have known bulleting to succeed well. It would be an inquiry well worthy of attention, to ascertain the circumstances under which bulleting, as a substitute for spaying, both succeeds and fails.—*Ed. Fr. Farmer.*

From the Franklin Farmer.

RENEWING OLD HANDSAWS.

I am in possession of an improvement which, if you think worth communicating to the mechanics and farmers, is at your service. In the year 1813, in Harrison county, Ky., I had a very fine handsaw, which some of my apprentices rendered unfit for use. She had what is termed by mechanics, a spring or broken back, or joint in her, and was thrown by. I tried several experiments to remove the spring and at last fell on the following plan:—I took a blacksmith's hand-hammer with a smooth face and laid the saw on a smooth anvil, and hammered it lengthwise where the spring or joint seemed to be. I hammered it in the centre of the width, which removed the joint, and she was straight and stiff as ever, and was no more liable to have a spring or joint than any new saw, and performed as well as usual. If the hammer and anvil are smooth, no one will ever observe that it has been done. I have straightened a great number of useless saws thus and made them good as new, and have communicated this method of doing it, to many of my brother mechanics in Kentucky and other states. And now, as a mechanic and farmer, have thought for several years of having this information published to the world, for there are thousands of handsaws thrown aside as useless, for want of a knowledge how to restore them to usefulness.

J. H. WENTWORTH,
Millwright of Kentucky.

From the New Hampshire Silk-Grower.

PROFIT OF DEAR LIME USED AS MANURE.

Mr. Cooke—You requested me to be more particular in relation to my experiment with lime in growing wheat.

The cost of lime in this vicinity is from four dollars to four dollars and a half per cask. I obtained mine by going to Weathersfield with my own team for it. It costs from a dollar and a half to two dollars per cask at the kiln, with the cask. or fifty cents less without.

My mode of applying it in compost was as follows:—Having a quantity of meadow mud, chip manure, &c., on hand, I put a layer of that three or four inches thick, then a layer of unslacked lime, of perhaps an inch in thickness, then another layer of compost, and so on alternately until my lime was all worked up. It remained in this situation a week or two, until the lime was completely slaked by the moisture of the compost, when it was shoveled over and thoroughly mixed. It was then applied to the land; ploughed in and well mixed with the soil by harrowing.

How much of the crop should be attributed to the lime, I know not, but am of opinion that enough to pay the extra expense was obtained in consequence of using it—so that if it benefits the land hereafter, it will be net gain. I am decidedly of opinion that it is better to apply it in compost than any other way. I tried various experiments with slaked lime as a top-dressing, without any apparent effect.

I have used lime but one season, and that an unpropitious one; perhaps further experiments will modify my present opinion of its utility, as well as of the best mode of applying it. In that case you may expect to hear from me again.

J. K. SMITH.

Dublin, January 1st, 1838.

SEEDLING CANTON MULBERRY TREES.

To the Editor of the Farmers' Register.

Georgetown, D. C. Sept. 1st, 1838.

I send you above, an impression from a leaf of a new variety of mulberry; it is not so large as the leaf of the *morus multicaulis;* but I think thicker and softer, and will prove, I have no doubt, a valuable acquisition. I procured last winter, through the department of state, a pound of this seed, from the consul of the United States, at Canton, China—represented by him to be the mulberry most esteemed in that country, for feeding silk-worms. I had not much confidence in it, as I had heard and seen so many statements, that good kinds of mulberries could not be propagated from seed, or that they did not follow their kind. That doctrine may be true generally; but this plant is an exception, as they are all alike, as far as I can judge—though some are very tall and thrifty, and others, where they stand very thick in the seed beds, are low and delicate. The leaf of which an impression is annexed, is from a plant about three feet high; and there are thousands in the beds as good.

They have in Northampton, Massachusetts, a variety they call the Canton mulberry, more esteemed there than even the *multicaulis.* I know not whether mine be the same; but it certainly bears a larger leaf than any mulberry I have ever seen except the *multicaulis*, and much resembles this latter in so many particulars that I think it is probably the original tree from which the *multicaulis*, by artificial means, has been produced. These seedlings have withstood the heat and drought of this scorching summer, better than any thing else in the garden. I would sell a few thousand of them. Very respectfully, your obed't. servt.

J. MASON, Jr.

[The impression of the leaf is 6⅜ by 5⅜ inches, and not lobed. We have never seen any of the Canton mulberry trees of Northampton; neither that of Dr. Stebbins (described by him at page 257 of Farmers' Register,) nor Mr. Whitmarsh's famous "Chinese mulberry" seedling; and if it were otherwise, the identity or difference could not be pronounced upon, merely by comparison with the picture sent. But the description given by Mr. Mason, seems to agree very well with that of the Canton, as given by others. The reason why the latter is preferred in Massachusetts, is not because of its superior value, but because it is more fit to withstand the rigorous climate of that region. It will scarcely be preferred in any place where the *multicaulis* will grow well and safely. Though we have no faith, in general, in the seeds of any mulberry bringing with certainty the same variety as the parent tree, we admit that Mr. Mason has good ground (in the similar appearance of all the plants,) for considering that his kind is an exception to this rule. He is mistaken in supposing that the leaves of his kind are the largest of any except the *multicaulis.* This will be evident to him on referring to a piece in a previous part of this number, (at page 417,) in which the sizes of leaves of the native mulberry, and also of sundry seedlings, are stated.—ED. FAR. REG.]

From the Franklin Farmer.

HOES.

Many of our most thrifty farmers of the east grind their hoes, and take a file to their fields with them to sharpen them when dull, with as much regularity as they take a whetstone with them to the meadow. Those who have never used a ground hoe would be astonished at the comparative ease and expedition with which he can prosecute his work with that useful little implement.

SILK CULTURE AND MULBERRY SPECULATION.

The editorial article on this subject which appears in this number, (page 389) was in type (except the closing postscript,) before the reception of the communication of Thomas Hicks, esq., which was published in the preceding number (page 378); and the first-named article was expected to have been presented, in the proper order of time, before the latter. Our absence caused the omission—and the consequent awkwardness of appearance of our notes to Mr. Hicks' letter, which were written to follow, though in fact they preceded the publication of the older article.

It has happened upon several occasions, in this work, that a communication exhibiting errors and mistakes of the writer, has served to bring forth correct and full information on the subject, from others better informed. We hope, and have now reason to expect, that such will be the fruit of our remarks on what may be termed (in more than one sense) the *mystery* of silk-culture in this country. We have been seeking, by other means, as well as by the publication of the article referred to, (and its still earlier communication in the proof sheet,) to obtain information on this interesting subject; and we are promised, and hope to receive, in part, before the appearance of this number, from two very intelligent and well-informed correspondents, interesting and valuable information on different branches of this subject.

In the time which has elapsed since the printing of the article referred to, we have heard of circumstances which, if of earlier occurrence, would have varied the details, and some of the inferences, though they serve to confirm the correctness of the general views there presented. The demand for plants of the Chinese mulberry has indeed so greatly increased at the north, that every plant and cutting now in Virginia, may be sold this year to northern purchasers at the highest prices. To our previous views and recommendations, therefore, we would add the advice to all who have plants to spare, not to sell any to speculators lower than at the highest prices; to raise as many plants as possible in 1839, from the stock retained, and to be prepared then to supply the whole country, at greatly reduced prices, and yet at greater profits than the highest prices at present would give. Every single bud planted next spring, and well taken care of, will produce from 10 to 70 buds—say not less than 30 on an average; and therefore at a half-cent, or even a quarter-cent the bud, the stock of 1839 will yield a much greater sum than the present growing stock at 2 cents the bud, or 25 or 30 cents the rooted plant. But whether the sales are made this year at the present high price, or next year at much lower, it is gratifying that the course of trade is so completely turned, and that northern purchasers are now coming to the south for supplies, and that this year more money will thus be paid to Virginia, than all that the northern nurserymen have before got from us for their immature and defective plants, with which this state was stocked.

It is not merely the rage of speculation, stimulated by legislative bounties, that has caused this great demand at the north. There is a real and great scarcity of *morus multicaulis*, caused by the immense loss of cuttings by the wet and cold weather of last winter and early spring, and the drought of summer.

The following communication to the Petersburg Intelligencer shows that our late correspondent, Mr. Hicks, of Brunswick, has already been well paid (and it was by northern purchases,) for his enterprise. Agents of sundry large dealers and speculators have already gone through lower Virginia, and have engaged (and, we fear, generally at half the price they were willing to pay,) all the plants of the *morus multicaulis* they could find for sale.

Lawrenceville, Aug. 28th, 1833.

"I think the public ought to know that Mr. Thomas Hicks, of this county, the year before last, and last year, laid out $245 in Chinese mulberry trees; and this fall will have for sale 30,000 trees. Two days ago he sold 20,000 to some gentlemen in Pennsylvania, at 25 cents a tree—the residue he reserves to sell in this vicinity; having realized the handsome sum of $7,500, from so inconsiderable an outlay, in so short a time. Mr. Hicks expects to have, by fall twelve months, 150,000 trees more for sale, and in all probability will get nearly or quite as much per tree. He has also commenced, the past season, making silk, and has succeeded beyond his expectations, demonstrating that our country is congenial to the production of that beautiful and valuable article. Mr. H. deserves the thanks, and has the congratulations, of the community, for his enterprise and success in introducing a new source of revenue and profit to the country."

Having written to Mr. Hicks to know whether this statement was entirely correct, he has stated in reply that the writer had made some mistakes, which he corrects, as follows:—"The outlay for my plants was $345 instead of $245; and the time allotted me to raise the trees is one year more than I have been employed. I never saw a Chinese mulberry tree until last year, (summer of 1837.) I think it probable I may be able to plant 200,000 cuttings next spring, instead of 150,000. The balance of the letter is all correct."—"If I had not sold the 20,000 trees, they would now bring me $1000 more than I am to receive."—This letter is dated September 8th, which was 12 days only after the sale had been made.

Since the 20th of August, the agents of at least five different and distant *multicaulis* dealers have visited this place, for the purpose of purchasing the plants which are in and near Petersburg. Most of these agents have come since the first of these lines were written. So rapid and violent has been the rise of the *multicaulis* speculation, that our monthly publication can give but a faint idea of its progress. For the last month, almost daily reports would have been necessary to show the state of the trade and the extent of the demand. Considering that the northern states are the original seat, and still the principal scene, of this speculation—the great void which still is to fill, throughout both the north and the south, for actual as well as speculative demand—the difficulty with which young *multicaulis* plants are raised in the north, and the far greater vigor in growing and after-value of those raised in Virginia—it will not be more strange than the present state of things, if very high prices should continue to be maintained through another year. But all prudent holders and planters here ought so to act as to be prepared to meet a great reduction of price. The few persons who are so fortunate as to have many growing plants, of course, will do right to make the most of the present demand for their surplus stock. But with a view to all interests, it will be better to plant next spring than to sell *abroad* now; as 8 cents. or even 6 cents the tree, in 1839, will pay a far better profit, than to sell the stock grown in 1838 for four times those prices—which may now be readily obtained. Much money must be brought into Virginia from other states by the mania for this trade; and so far and to effect a general spreading of the *multicaulis*, which this mania certainly will, it will produce much benefit to public interests. But when the violent fever shall have subsided, it is to be feared that as great a reaction (or non-action) will follow the unnatural excitement; and that the proper business and regular and good profits of silk-culture will be scorned and neglected.

From the (British) Quarterly Journal of Agriculture.

THE CULTURE OF RHUBARB.

My notice of this exquisite vegetable shall be comprised in a few lines; but these, I trust, will avail to extend its culture more and more; for any thing more productive, salubrious, profitable, and expressly suitable to the purposes of the cottager, can scarcely be found in the entire list of vegetable productions. A few years only have elapsed since the rhubartic hybrid, *green* rhubarb, was cultivated for tarts; and held in very slight estimation: but since the introduction of the larger (giant) varieties, the demand has increased with surprising rapidity. Of the two sorts which I earnestly recommended, one is called, if I mistake not, *Radford's scarlet Goliah ;* and the other is a small *red* variety which is crimson throughout when boiled or baked. These will supply the table from April to August, and suffice for every purpose.

Culture.—Let the ground be prepared precisely as for asparagus beds. Select clean offsets, with two or three bold eyes: the first week in March is a very suitable season. The eyes or buds of the Goliah will be of a deep, rich red, hence its name : the leaves, however, and stalks are green, though of different hues, and the latter are spotted and streaked with red. In the smaller pink variety the red tint prevails throughout.

The plants of the great Goliah should be set firmly in the soil, five feet apart, or five feet one way and four feet another : the smaller kind may be set three feet asunder, plant from plant, giving a free watering to each to settle the soil among the roots. Dry weather, an open condition of the ground, and a temperate unfrosty state of the air, should be preferred. When the growth becomes established, the ground must be kept free from weeds ; and if dry weather supervene, water ought to be freely given round the roots, two or three times, with intervals of four or five days.

Not a leaf or stalk ought to be touched during the first year : and in autumn, when the leaves are all decayed, they should be laid in little trenches formed along the centre of the spaces, between the rows, sprinkled with a handful or two of salt, and covered with the earth that had been dug out. Thus the plant will itself furnish a portion of the manure that will be annually required. As winter approaches, a coating of well decomposed stable manure or leaves, or a mixture of both, two or three inches deep, should be laid round each plant, to the extent of two feet ; and in the open weather of February and March, the whole bed must be forked over.

As a proof of the excessive productiveness of the *scarlet Goliah*, I need only mention, that, in the 2d week of March, 1831, twelve plants were set in ground prepared for asparagus. In June, the leaves met and the whole plot was covered. In 1832, the plants yielded profusely, many leaves measured above a yard and a half over the surface, the foot stalks being an inch and a half broad, and from two to three feet long. The outside leaves were, as required for use, stripped off by an oblique pull, not cut ; the family was amply supplied till July and August, and yet the plants increased; the neighbors also were furnished with *leaves*, throughout the summer, and with *offset plants* in the succeeding spring. During the two past seasons the root stocks increased to such a size, that when it became needful to remove some, it required a barrow to contain the weighty mass that was raised, after great labor, from the soil. If any one try the experiment in a favorable soil, and with any thing like judicious management, he will scarcely fail to discover that the growth and production of the plant will exceed every demand that can be justly made upon it.

From the Farmers' Cabinet.

ROOT CULTURE.

No crop is so important to the farmer as roots, and yet they are seldom appreciated, either as a means of enriching the soil or of supporting stock. The produce of an acre of roots with the hay that may be cut off the ground previous to sowing the crops, will feed six or seven cows during the winter season, which, with a reasonable allowance of litter, will make thirty cart loads of manure. To try this experiment, we sowed an acre of ruta baga turnips, last season, in the following manner. The ground had been laid in clover the previous season, which we mowed the 20th of June, and yielded two tons of the first quality hay. We then ploughed it down immediately and spread upon it sixty bushels of lime. In a few days we harrowed it and spread over it 30 loads of compost, which had been collected through the winter, and turned twice ; the consistency and cost of which were as follows :

2	loads of bone dust, say 50 bushels at 30 cts. . .	$15 00
2	do. ground oyster shells, 50 bushels at 10 cts. . .	5 00
2	do. leached ashes, 50 bush. 8 cts.	4 00
2	do. glue-makers' offal, .	4 00
4	do. well rotted stable manure, at $1 50, ...	6 00
18	do. shovellings from under fences and old houses, 75 cts. .	13 00
60	do. lime at 18 cts. . .	10 80
90	bushels. Total for manure	$58 30

To ploughing the ground, . . .	1 50
do. harrowing several times,	1 50
do. sowing the seed, . .	75
do. half bushel seed, . .	1 50
do. 20 days' work clearing, thinning and hoing three times through the summer, 62½ cts. . . .	12 40
do. 6 days' gathering, drawing and covering, ...	4 50
do. interest on the value of an acre of land, . . .	3 00
Cost of the crop, ...	$83 55

There were over 850 bushels of turnips at 56 lbs. to the bushel, and 4 tons of tops.—Several cart loads of the turnips were sold in the market at 16 cts. per bushel, but the principal part of these was consumed upon the farm in feeding milch cows. The hay was sold for $20 per ton, which, after allowing $6 for expenses of moving, making and taking to market, leaves for 2 tons,

	$34 00
By 850 bushels of turnips, at 16 c.	136 00
do. 4 tons tops at $2 per ton,	8 00
Total value for the produce,	$178 00
From which deduct the expense,	83 55
Leaves the net proceeds,	$94 45

The ground last spring was in a fine condition, one half of which we put in with the mangel wurtzel beet, the other part with the parsnip. The crop was put in with very little manure—the beets look in a very flourishing condition, but the parsnips are poor, they did not come up in time to make a crop.

We have this season about 4 acres of the ruta baga, but planted in a different manner; the particulars of which I will reserve for future.

A COMMUNICATION.

Wilmington, Del., 8 *mo.* 20, 1836.

From the Genesee Farmer.

SQUASHES TURNING TO PUMPKINS.

Mr. Buckingham, the able editor of the Boston Courier, appears to appreciate the importance of the agricultural interest to the prosperity of the country, and devotes a column or two of his journal weekly to the dissemination of information on this topic. Besides evincing much skill in his selections, he gives some original papers of value. In a late number of his paper is a communication signed 'Ruricola,' who requests an explanation of the fact that squashes do sometimes change to pumpkins, or rather that squash seeds will when planted produce pumpkins. Ruricola selected his squash himself, took out the seeds, and planted them; they grew freely, and when he was expecting a feast of this excellent viand, he found they had been metamorphosed into pumpkins. Ruricola asks if this is any thing new under the sun? and requests Mr. Buckingham to explain "this singular freak of nature."

Mr. Buckingham in reply makes in part the following remarks:—"We would observe, however, that it is not an unvarying law of the vegetable kingdom, that like ever does, and ever will produce the like. It is a well known fact, that the seed of apples, pears, peaches, and other fruits, seldom, (perhaps not once in a hundred times,) produce fruit like that of the parent tree. But perhaps our correspondent will say that these are not parallel cases, and to make them so, we should cite one in which the seed of an apple should produce a pear, or that of the peach a plum. We will not attempt to remove this difficulty. It is beyond the reach of our knowledge. And we submit it to those whose better experience, and deeper research into the mysterious laws of vegetation qualify them to unravel and explain the same."

Without any pretension to 'better experience' or 'deeper research' than Ruricola or Mr. Buckingham, we think the matter can be explained very easily; and we give what we conceive such explanation, the more readily, as the transmutation of squashes into pumpkins, a well known fact, has by many been considered a proof that wheat could be changed to chess, an event which we think never has been, and probably never will be, proved.

To make the matter plain we may remark that botanists divide all plants into species, and these into varieties. Of the species we may give as examples the cucumber, *(cucumis,)* and the squash, *(cucurbitis.)* Of the first there are several varieties, as is known to every gardener, and that these varieties will intermix by the seed is also well understood. The squash is another species of plant, with numerous varieties also, among which we may enumerate the *lagenaria*, or gourd; the *ovifera*, or egg squash; the *verrucosa*, or club squash; the *citrullus*, or water-melon; and the *pepo*, or pumpkin. The musk-melon belongs to the *cucumis*, or family of cucumbers.

Now it is well known to the naturalist that while *varieties* will intermix by their seeds, a result caused by the impregnation being performed by pollen from another variety of the same species, *species* never do this; but that while all the varieties of the squash, if planted in the vicinity of each other, are liable to have their seeds affected in this way, so that no certainty can be placed on their producing plants precisely like the parent, there is no danger of change in the cucumber or musk-melon from being planted in the vicinity of any variety of the squash. In the varieties of the squash, therefore, great care is necessary to keep the kinds distinct, or prevent, in the way assigned, their intermixing with and degenerating each other. The probability is, that the squash from which Ruricola took his seed was impregnated by pollen from the flowers of pumpkins in the vicinity, and hence the fruit was of course a hybrid, or one in which the pumpkin nearly or entirely predominated. To preserve seed like the parent plant, in the squash or cucumber species, it is found best to save the fruit that grows nearest the root; as in this case the male and female flowers, or those that produce fruit and those that do not, are brought into immediate contact, and the impregnation more likely to be performed with pollen from the same plant, than with that from abroad. Thus we see that the changing of squashes to pumpkins, or vice versa, belongs to the natural order of events, and is nothing new under the sun.

The same rules that regulate the impregnation and production of the cucumis and cucurbitis, will apply to the plants *triticum* and *bromus*, or wheat and chess. Experience shows that an endless variety of shades can be produced by sowing different varieties of wheat in the same field, or so that the pollen can intermix freely with the different flowers, the product however as we believe being some variety of wheat, and never chess or any of its varieties. We have never met with any evidence that the musk-melon has changed to the water-melon, or the cocoanut squash to the cucumber, though frequently planted in the vicinity of each other; the changes are confined to the varieties, and rarely or never reach the species. The remark, therefore, of Mr. Buckingham, that in the vegetable kingdom like does not always produce like, is correct if restricted to varieties, but incorrect if extended to species.

From the New England Farmer.

THE QUEEN BEE.

Having read some of the various theories on the honey bee and compared what I read with my own observation on the bees themselves, I have become satisfied, that notwithstanding so much has been written, very little is known of the government, police, or interior arrangements of the inmates of a bee-hive.

Writers informs us that a "*swarm of bees contains one queen, five hundred drones and nineteen thousand four hundred and ninety-nine neuters.*" Who knows any thing about this? Could we at pleasure examine the inside of an inhabited hive and closely watch the movements therein, we might form some opinions as to this army of neuters marshalled by a queen and drones, but human ingenuity can devise no way in which this can be done with any degree of exactness; we can only look around us and see how it is with other insects and animals that can be examined with impunity. Where throughout animated nature can we find a parallel? Does nature usually form neuters, or are bees an exception?

But neuters are not my object in this communication. I am even so much of an infidel as to doubt the existence of a queen bee. My doubts are caused in part by the following circumstances. I have carefully examined several swarms of bees after suffocating them with fire and brimstone, without being able to find *her majesty of "about eight lines and one-half in length, her wings so short as scarcely to reach past the third ring, and her color a deep yellow.* The present season, one of my hives swarmed and settled on the limb of a young apple tree near the ground. In a few minutes after, another hive swarmed and collected on the same limb nearer its end, leaving a space of about two inches between the swarms. The additional weight of the last swarm brought the limb so near, that the winds swung it against the ground so as to incommode the last comers. They began to gather up the limb nearer the first swarm and finally formed one cluster of bees, which I put into a flour barrel. They commenced working, and have now every appearance of prosperity. In this case where were the two queens who "*are infused with the most deadly hatred and the most insatiable thirst for each other's life, which nothing but actual death can appease?*" About sunset on the sixth of the present month I accidentally noticed a great stir amongst my bees, and on examination found a constant passing and repassing between an old hive and a late swarm from the same old hive, standing some eight or ten rods apart. The following morning at daylight the same intercourse was continued. The bees passed by thousands, and both hives appeared alive with bees. Although very anxious to find out what they were about, yet as there was every appearance of perfect harmony in their proceedings, be they what they might, I left them to settle their *own business in their own way*, and on my return after an absence of two days found that the old swarm had abandoned their hive to the bee moth and gone to reside with their children, having removed every particle of honey to their new habitation, leaving comb, bee bread, and moths in the old hive. Where were "the rival queens, who always lead the swarms, and cannot dwell in the same hive?"

In what age of the world the discovery was made that a hive of bees contained but one female and that one *the ruler of the swarm*, is unknown, probably when a great taste for the marvellous was in fashion, and Huber and subsequent writers could adopt a plausible theory with much greater safety than to thrust their heads into a bee-hive and watch the bees for some days.

J. B. T.

August 18, 1838.

THE PEACH TREE.

From a desire to encourage the culture of the peach tree, we offer the following as the result of experiment and observation.

It is generally known that worms, near the surface of the earth, destroyed them by eating the bark; the object is, therefore, to find a preventive, in order that the trees may become aged in a healthy state.

It is evident that these worms pass through the common change and assume the form of *millers*, early in the summer, and deposit their eggs on the bark as low as they can find access to it; and that the worms proceeding from them begin to operate in the latter part of the summer, when they have been found the size of a common pin. If suffered to remain they grow to the thickness of a rye straw; each of them girdles the tree about an inch, and the wood from the wounds to the heart dies. Hence it is, that a single wound impairs the vigor of the tree and a number of them will kill it. The point to be gained, is to protect the tree from the millers, and by a simple method, we have succeeded for several years, which is recommended with full confidence.

About the first of May remove the earth from the body of the tree, and shift it to the height of 15 or 16 inches, in such manner as to exclude the millers, burying the lower part of it in the earth. We have used straw cut to the length and about half an inch in thickness, bound on with twine. This should be removed about the first of September, as we have sometimes found the young worms in the upper part of the straw, being then readily discovered on the surface of the bark, covered by a little gum. The process should be commenced when the tree is young—they have been found n a rapid growth the first fall after it sprouted. Thus a few minutes in a year devoted to a tree will protect it against this cause of decay—a very trifling expense compared with the value of this healthy and delicious fruit.

JONATHAN BRACE,
JOHN I. WELLS,
WM. H. IMLAY.

Hartford, Conn. Sep. 8, 1830.—*Conn. Paper of 1830.*

For the Farmers' Register.

TREATISE ON THE CULTURE OF SILK.*

BY GIDEON B. SMITH.

NO. I.

Prefatory Remarks.

The introduction of the culture of silk in the United States has been an object of great interest for some years past, and has been steadily on the increase, until it has now become almost, if not quite, a mania. In 1826, a silk-worm was a curiosity in most of the states of the union; and but little was known or said about it. At that time the writer of these remarks commenced calling public attention to the subject, and for seven years kept a laboratory expressly for the purpose of obtaining and diffusing information. He had access to all the books then extant on the subject, but they afforded little practical information. Every thing was new to him, and every thing consequently was to be learned from experiment. Happily, the simplicity of the whole routine was such, that careful observation and diligence enabled him to acquire the information he sought without material difficulty. From time to time he has published the result of his experience, on the subject generally, and on particular branches; but as the public feeling has now become more generally enlisted in its favor, the demand for information has increased. The writer is almost daily applied to for his opinions and the result of his experience. He has therefore determined to publish the following treatise.

The subject conveniently divides itself into three parts, viz.: The *culture of the mulberry*, *rearing the silk-worm*, and *reeling, twisting, and preparation of raw silk.* And these three divisions can conveniently be discussed in three numbers of the Farmers' Register. The following pages complete the first part, *the culture of the mulberry*, and it is hoped with sufficient clearness to enable any one to understand the subject distinctly. On the whole subject we shall endeavor to avoid disputations, entering into no critical discussions or controversies on disputed points; but giving our own opinions freely. If we describe one practice and say nothing of another, it is because we know the one to be the right one, and therefore say nothing of the other; for why should we take up our own and the reader's time in describing that which we know to be useless? With these introductory remarks we submit the first number to the public.

The Mulberry, Multicaulis Culture, &c.

The first thing to be done in the commencement of the culture of silk, is, of course, to provide a full supply of mulberry leaves. The leaves must be abundant, that no stinting of the worms may occur from any cause, at a moment when the whole crop depends upon a full and ample supply of food, which is during the last ten days of their feeding. The mulberry orchard must be convenient to the laboratory, that the expense of attendants for gathering leaves may be as small as possible. There are many accidents that may cause the loss of leaves; during rainy weather it is necessary to gather a supply for a few days ahead, that they may be dried before feeding them to the worms;* these may become spoiled, and thus lost. Therefore we should generally make provision for double the quantity of leaves that we expect to consume; for if we lose none, the cost of this extra provision will be trifling, compared to that of a whole crop of worms, from a deficiency. This is the only mode by which we can effect an *insurance* against such loss.

The kind of mulberry to be employed, is the next object of attention. When I published my 'Treatise on the Culture of Silk' in 1830, I had very little experience with the new Chinese variety, the morus multicaulis. It had at that time been but three or four years in the country, was not known at all except to very few individuals, and had of course not been propagated to any extent. It is true, I had the tree in my possession, and knew its value from a brief experiment in 1828 and 1829; but my supply of leaves from it

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* This new treatise, furnished from a source of such high authority, would, under any circumstances, constitute a very valuable portion of the original matter of the Farmers' Register; but more especially interesting, and useful for practical instruction, will it be at this particular juncture, when so many persons, who are totally unacquainted with the business, are about to commence the planting of the Chinese mulberry tree, and expect to commence the rearing of silk-worms. To supply the manifest want of such a manual of instruction as could be relied on for truth, and sound views, from a writer having much practical experience, as well as knowledge of all that has been published in this country on the subject, was the object which induced our request to Mr. Smith to write a treatise on silk-culture, as much in detail as his arduous engagements would permit him to prepare. This first number of the proposed series, is the commencement of his fulfilment of our request.—ED. FAR. REG.

* I have seen with much surprise a statement in the newspapers that a gentleman had made experiments in feeding silk-worms with wet leaves, and that the result was very favorable, the cocoons made by worms thus fed containing 800 yards of fibre, &c. If the statement be not a hoax, and one calculated and intended to do injury, by causing the destruction of whole crops of silk-worms, it must have been founded upon a very insufficient scale to test its merits. I have seen the evil not only of feeding with wet leaves, but even with leaves too succulent. I would therefore caution silk-growers against such statements; and advise, that, if they wish to try the experiment of feeding with wet leaves, to do so with a single hurdle, and not risk the loss of the whole crop; for be it known that the *tripes*, the disease usually produced by wet leaves, will generally spread over and destroy all the worms in the largest establishment, in a very few hours from its first appearance.

was necessarily very limited, and though I was satisfied of its superiority as food for silk worms, I was not prepared by sufficient practice and observation of its character, to say that it was capable of supplying the place of the white mulberry. I was not sure that it was sufficiently hardy; nor, even if every way preferable to the white, that a supply could be obtained sufficient for this extensive country. I therefore said nothing about it in that treatise, but gave the white mulberry the preference. After the publication of my treatise, however, in 1830, I satisfied myself of the superiority of the multicaulis over every other variety in every point. I found that it could be propagated more rapidly than any other tree, by cuttings and layers, that it furnished a supply of leaves in one-fourth the time required by the white mulberry, and therefore could be made to make returns for capital invested in it so much sooner; that a pound of its leaves contained as much nutritive matter as a pound and a quarter of the white mulberry; that the expense and trouble of gathering the leaves was not one-tenth as great as those attending the white; that the worms consume the whole leaf, thus leaving the hurdles less encumbered with the refuse; that the silk made from it was of a very superior quality, in strength and lustre; and finally that the worms in all cases gave it the preference over all other kinds. In my experiments I had the advantage of using fifteen different kinds of mulberry, and have often placed leaves from all of them together upon the hurdles; and the silk-worms invariably seized upon and consumed the morus multicaulis first. Up to the present time I have found no reason to change my opinion of the valuable qualities of this tree in any of the above particulars; on the contrary, every year has confirmed it.

One point of comparison between the morus multicaulis and other varieties I have reserved for separate discussion; not from any doubt remaining in my mind, but from its importance, viz., its *hardiness*, or capacity for resisting the effects of our severe winters. I have now had ten years' experience, and have had the tree exposed to all the severities of the last ten winters, (near Baltimore,) and have never yet lost a tree, nor the limb of a tree of the morus multicaulis, from winter killing. Fortunately, the situations where I first planted my trees were high and dry, and the soil composed of sandy loam. The trees throve remarkably well there, grew early in the season, ripened their wood early in autumn, and withstood the inclemencies of the winter, without a bud perishing. But some of my friends to whom I had given trees, and who planted them in rich low-ground, lost them entirely, or had the tops killed to the ground; and this fact led me to the conclusion, that high, dry, sandy, or loamy soils, were the proper situations for them; and all my future experience has confirmed me in it. All who formerly lost their trees in winter, and have removed them to high situations, have experienced the benefit of the change. The conclusion is, that the morus multicaulis is a *high-land tree*, and when cultivated on high grounds it is perfectly hardy, and capable of withstanding our winters, as much so as any of our native trees. During the winter of 1831–2, my old tree, (the first one that ever came to the United States, and which I yet possess,) was removed to the premises of a friend for safe keeping, (as I was removing to a farm in the country, and not knowing how long I might remain,) and was exposed to all the severities of that most inclement winter. I felt sure that it must have been killed, if not by the winter generally, certainly by that most terrible visitation of frost on the 17th and 18th of March, 1832. But to my surprise and great pleasure it did not lose a bud on that occasion. What is very singular, there was a white mulberry tree standing within 50 feet of it, six or seven years old, that was killed entirely by the winter. Both were equally exposed. I do not intend to infer from this, that the morus multicaulis was more hardy than the white; nor can I account for the death of the latter; the fact however was before my eyes. The trunk of the white mulberry, which was about three inches diameter, was split to the heart from the ground to the limbs. This old multicaulis tree was again removed to its present site in my garden, in the autumn of 1835, and of course now receives considerable protection from the house on the north, and high fences on the other sides. It makes generally young wood from 6 to 8 feet high every year, and the leaves on the young wood are generally 12 to 14 inches long, and 11 to 13 wide. Besides this old tree I have always had others in various situations. Those I had on the farm in 1831, '32, were planted on a hill, perfectly exposed to the north-west blast. The farm is at an elevation of 3 to 400 feet above tide. They withstood the effects of the winter perfectly. From all these considerations and facts, I think I am authorized in pronouncing the multicaulis perfectly hardy, when cultivated on high ground—its proper situation. But it is said that the multicaulis is not generally adopted in France and Italy in the silk establishments; and therefore there must be some fault in it. Some say it does not live long—soon decays—the silk made from it is weak and of a flimsy quality. All of which I know, from my own experience and the experience of all who have given it a trial, to be incorrect. That it is not generally adopted in France and Italy is easily accounted for. The demand for trees has always been so great that it was found more profitable to sell them than to keep them to feed silk-worms with; as they could get more money for one young tree than a dozen would produce in silk. They have also their ancient prejudices to contend with, and their ancient customs to combat in France and Italy. There the mulberry trees are owned by land-holders, and the leaves are sold to the raisers of silk-worms by weight. These land-holders have their old white mulberry trees on their estates, and they of course will be compelled to get rid of them before they adopt the multicaulis. These facts render it quite probable that the multicaulis is not generally adopted there; it would be a wonder if it were; for it is not often that we find any people, French, Italian, or American, willing to manufacture an article, worth when made only a penny, from materials that he can sell for a shilling. And it is the same in the United States. How many societies have been incorporated for the culture of silk, and how many individuals have commenced plantations of trees for the same purpose? And yet where is the silk they have produced? We, it is true, occasionally hear of this, and that person having produced his hundred bushels of cocoons;

and of this and that fine specimen of silk; but generally these silk societies and individuals have found they could raise and *sell* trees to more profit than they could realize from feeding silk-worms, and they have generally adopted that course. This will do no injury to the public, for soon the whole country will be supplied with the trees, and then both societies and individuals will fall back to their original object, the culture of silk.

Description of the Multicaulis.

The morus multicaulis is a dwarf tree, or more properly a large shrub, with *many stalks*, as its specific name implies, growing like the hazel, lilac, &c. It is continually sending up young shoots from the crown of the root, and when these become numerous, and the tree 6 or 8 years old, some of the oldest stalks die out; but whether from natural decay or being perished by their vigorous young brethren, I am unable to say. My old tree has been as high as 15 feet, 6 or 7 feet of which was young wood; but as I generally cut off most of the young wood for propagation, it has never exceeded that height. The leaves when full grown on the vigorous wood are 12 to 15 inches in length and 10 to 13 inches wide. The rapidity of their growth causes the ribs to grow faster than the *web* of the leaf, and hence the large leaves, are always *concave*, so that they cannot be spread out flat without tearing them from the edges to the mid-rib. The leaves are so heavy that they always hang, penduleus, and folded somewhat like a towel hung upon a nail. The surface of the leaf has a somewhat glossy appearance on the outer surface, but is a little rough to the touch. The fruit of the multicaulis is very black when ripe, and when crushed yields an intense purple juice, the stain of which is exceedingly difficult to wash out. The fruit is about the size and form of the white mulberry, but generally contains very little good seed—probably my old tree never produced more than 20 at one season.

It is a remarkable fact that all the species and varieties of mulberry tree are exempt from the depredations of all insects except the silk-worm. During ten years that I have been a close and daily observer of the morus multicaulis particularly, I never saw an insect of any kind upon it. The common caterpillar seems to be omnivorous—with the exception of the mulberry only—it never attacks that. The elm a few years ago was considered exempt; but it also is now annually stripped of its foliage by insects; and the *linden* also suffers more or less, but the mulberry remains untouched. Even the grasshoppers of the present year, 1838, more destructive than they were ever before known to be, pass by the mulberry, seemingly in acknowledgment of the great law of nature which devotes it as food for the silk-worm exclusively.* On the other hand there is *no other* vegetable that I ever was able to make the silk-worm eat as food. I have starved them, it is true, till they would eat lettuce; and ultimately till they would nibble at oak leaves; but they ate them and all other substitutes, as human beings, in a state of starvation, eat old shoe leather, not as their proper food, but in the hope of sustaining nature a few moments longer. The *Osage orange, Maclura*, is an exception. They eat that freely; but it is so like a mulberry in all its characters, that it required considerable ingenuity in the naturalists to call it by another name.

Having given my preference for the multicaulis, over all other kinds, and my reasons for it, it will not be expected of me to say any thing of other kinds; for, if the reader puts confidence in what is here written, he will adopt the multicaulis without inquiring about other kinds; and if he do not thus confide in my statements, any thing I could say about other kinds would be of no avail.

The mode of cultivating the multicaulis, is the next subject for consideration. The simplest and most common plan is as follows. Prepare the ground in the spring as for corn. Run furrows four or five feet apart, as preparatory to planting corn. Then take the limbs and young wood that grew last year, cut off close to the tree, and lay them lengthwise in the furrow; the but-end of one limb a short distance, a foot or so, from the top-end of the last laid down; cover the whole limb, with a hoe, about one or two inches deep; generally every bud on each limb will grow, and make a tree 3 to 5 feet high by autumn. The ground should be kept free from weeds and grass, by cultivation, as in corn. About the last of July, it is best to take a sharp spade and separate the young trees, by driving it down midway between them; but this is not essential; they can be separated when taken up the spring following. The next spring they should be taken up and planted in regular form in the orchard, where they are permanently to remain. The best method is to plant them 6 or 8 feet apart in the row, and the rows 10 to 15 feet apart—the rows running north and south, or north-west and south-east. By this mode of cultivation it will be perceived that eight or ten times as many multicaulis trees may be raised on an acre of ground as of *corn-hills*, and that, as the crop is ready for the market, (when they are raised to sell) as early as a crop of corn, there is no reason for the extravagant prices demanded for them. They would be a very profitable crop at 5 cents a tree.

There are other modes of cultivation which it may be well to describe here. Where cuttings are scarce, and the loss of any of them is of much consideration, a hot-bed should be made in the usual way, and the cuttings started in it as follows: Cut all the limbs and young wood into short pieces, with *one bud* on each; lay them flat on the surface of the hot-bed, in lines lengthwise, the ends of the cuttings a quarter of an inch apart, and the lines of cuttings two inches apart, with the bud uppermost. Then sift rich garden mould over them, half an inch deep, and put the glass frames on the beds. Every night and morning water them with a watering-pot, merely enough to keep the earth moist. They should be planted in the hot-bed one month before the usual disappearance of frost. In and around Baltimore, about the 1st of April is the time, as frost usually

* The fact stated in the text is without doubt very *generally* true, but not *universally*. Within a few days, we have seen several young multicaulis trees, partly stripped of their leaves by broods of caterpillars, which had spread their webs over the part of the plant of which the leaves were already devoured, and whose depredations were in full progress, when they were discovered and killed.—ED. FAR. REG.

disappears altogether, about the 1st to the 10th of May. By the time the frost disappears the young plants will be about the size of cabbage plants, and may be taken out of the bed and planted in the orchard where they are permanently to grow. During the time they are in hot-beds, care should be taken in warm days to give them air, by raising the glass frames; and if severe frosts occur, to cover the glasses with straw, or matting; and when set out in the field they should be well watered for a few days, in the evening. The practice of propagating as above from single buds was first adopted by me, and followed for many years to very great advantage; and I am not sure but that it is still the best, as it often occurs that a cold backward spring rots a great portion of the cuttings planted in cold ground as first recommended above. Besides, in the hot-bed single-bud system, the trees get a month the start and make larger and finer trees. But in very extensive plantations it is "*too troublesome.*" A convenient hot-bed may be formed by those who are not provided with frames, &c., and are not acquainted with forcing gardens, as follows: Dig a pit two feet deep, four feet wide, and ten to twenty feet long, or as long as you please, if you have manure enough. Fill it with fresh horse dung six inches to a foot above the top. When you perceive it getting hot and settling down, cover it with six inches of rich garden mould, and rake it level and smooth. Let it remain for two or three days, till the heat begins to decline, and then put in the cuttings as above. At night, when cold, lay some light brush over the bed, and spread straw or mats over them, and water them as in the regular hot-bed. This method will generally be found to answer all the purposes of a perfect hot-bed.

Another method is by layers. Instead of cutting off the limbs and tops, bend the whole tree down to the ground, and cover it, limbs and all, two or three inches deep, with good mould—it would be well to turn up the ends of the limbs, so that the points are just above ground. All the buds on the whole tree that are under ground, will generally grow and each one make a tree by the autumn, when they are to be taken up and separated. The objection to this plan is, that the young trees are apt to be too crowded, and consequently do not grow as large as when the limbs and young wood are cut off, as in the first mode; and I do not find that it is any more certain, or possesses any one advantage over that mode. All other modes of propagation, grafting &c., are perfectly useless, and therefore nothing need be said about them.

It seems, however, proper to remark, in explanation of the omission to give the mode of raising the multicaulis from seed, that this tree produces seed very scantily. Probably an acre of trees of full growth would not produce an ounce of good seed. It is generally the case with all plants that are readily propagated by other means, that they do not produce much, if any seed. But though the multicaulis were to produce seed as abundantly as the white or any other variety, its propagation by cuttings would still be the most eligible mode. The mulberry seed lies a long time in the ground before it vegetates, generally 5 to 8 weeks, and in the mean time the weeds get the start, and smother the young plants as fast as they appear, unless the most untiring vigilance and care be observed in keeping the beds clean. Even then, in spite of care and industry, many—a great proportion—of the little plants will be destroyed in the process of weeding. Even after you have raised the plants above the influence of weeds, they are tardy of growth, and do not produce leaves of full size till they have been repropagated by cuttings, layers, &c., for three or four years. All idea of raising them from seed will be abandoned by every one as soon as they become acquainted with the facility with which they are propagated by cuttings, the scantiness of seed produced by them, and the difficulty of raising them from seed.

I cannot omit the present opportunity of again cautioning the people of this country against the impositions that have been for several years practised, and are yet continued, of *selling morus multicaulis seed.* No such seed ever has or probably ever will be for sale here or elsewhere; and those who pretend to sell it are imposing upon the public a worthless article. The tree does not bear seed enough to pay for the trouble of saving it, even if it sold for its weight in gold. That the seed will produce the genuine multicaulis, I have no doubt, but it will require some years of successive propagation by cuttings to develop its peculiar characters, large leaves, &c. But this question is a matter of little moment, as no person will resort to seed when they can obtain cuttings.

The soil, situation, &c., best adapted to the morus multicaulis, have already been mentioned in a previous part of this paper. The soil should be such as will yield a fair crop of corn; if made richer, the trees will grow larger, but the advantage will not compensate the extra expense. It should be sandy loam, if possible; but gravelly or stony soil answers well: heavy clay soils do not do so well. The situation *must be high land*—that is, it must not be low bottom land. Hill-sides are best; the tops of hills next; level lands are good, provided they are eight or ten feet above the streams of water, and not subject to water standing on them after heavy rains; but if they are surrounded by hills they will not do, being more subject to early and late frosts than if not thus surrounded by hills. It must be borne in mind, that we are discussing the subject of soils and situations best adapted for the permanent occupation of the multicaulis. Where the trees are raised to sell, or to be removed in autumn, then rich alluvial or loamy bottom land is best. The trees will grow larger there; and as there is to be no risk of winter-killing, there is no other objection. In cold seasons, however, and especially in cold late springs, bottom lands are too cold for them, and consequently the trees will be small. In all cases when they are grown on bottom lands, they should be taken up in the month of November, and *buried* root and branch on some high dry situation, covering them about one foot deep. This will preserve them effectually till spring, when they should be planted out, as above directed, in a proper soil and situation. Cuttings are preserved in the same way: cut them off close to the tree in November, dig a pit two feet deep in a high situation, put them into it, mingling earth among them, and finally cover them up a foot deep at least; filling the pit entirely, and arching it as in burying potatoes, &c. Those who fear the loss of the cuttings if left remaining on the trees, can certainly save them in this way; but if trees are in proper situations there is no danger of the cuttings being killed; unless indeed from late planting in the spring, or some other cause, the wood of the cuttings has not been properly ripened. In that case, all the unripe wood will of course be killed by winter if left on the tree, and it will be proper to take the cuttings off and bury them as above.

Much has been said about making *hedges* of the morus multicaulis. As a barrier against cattle or other stock it will not do. Cattle are very fond of it, and will eat the leaves and even branches as large as the finger of the young wood. It may be used as an ornamental hedge, however, and planted in hedge form in fields, to great advantage. The distance between the rows or hedges in the latter case may be from 12 to 20 feet; the latter will admit the passage of a cart for conveying leaves to the laboratory.

In conclusion, I believe I have said every thing that need be said on the subject of the mulberry, its culture, &c. In the next number we shall discuss the rearing of silk-worms, the laboratory, &c.

STRICTURES AND REMARKS UPON FORMER ARTICLES.

To the Editor of the Farmers' Register.

Sept. 6th, 1838.

As marvellous assertions, and alleged discoveries, if published in our agricultural papers, without comment, may often lead the sanguine and inexperienced of our brethren into serious errors, it seems to me that they should always be noticed. This remark has been suggested by two articles in your highly useful journal; one in the August No. (p. 269), and dated Houston county, Georgia, which you have copied from the 'Southern Agriculturist.' The other in the Sept. No. copied from the 'Watertown Standard,' a New York paper, which appears to be editorial. The Georgia planter, speaking of the treatment of their negroes, says, (I give his own words,) "*they have their weekly allowance each, of three hundred pounds of bacon, or its equivalent, and as much hominy or corn-flour as they can consume, ground at the mills, delivered to them. When potatoes and peas are in season, they are permitted to use all they may want.*" Now this must either have been a great, but unnoticed slip of his pen, or he must be a near relation of the celebrated Baron Munchausen. Counting seven days to the week, this allowance is just forty-two pounds and six-sevenths per day, which, to say nothing of their hominy, corn-flour, peas and potatoes, ought to have enabled his negroes, instead of merely doubling Mr. Frost's cotton crop of four thousand pounds to the hand, as he states they did, to have made at least three hundred times as much.

The second article which I beg leave to notice, is published to prove the wonderful efficiency of soaking seed-corn in a solution of saltpetre. This, the editors pronounce to be "*one of the greatest discoveries of modern times in the neglected science of agriculture.*" On examination, however, of this highly interesting assertion, we find nothing whatever in their statement to support it, but merely *their* own belief produced by one single inspection of an experiment made by a Mr. Massey, who planted five rows of corn, the seed of which had been previously soaked in a solution of saltpetre, (it is not said whether or not it was a saturated solution,) while the adjacent rows had not been soaked. These disseminators of useful facts in husbandry proceed to affirm, without any apparent doubt in regard to the accuracy of their own judgment, that "*the five rows planted with corn prepared with saltpetre, will yield more than twenty-five rows planted without the preparation.*" That these gentlemen believed what they said to be true, I will not permit myself to doubt; but before any general credence can be given to such an assertion, a well authenticated statement of actual measurement must be exhibited. It certainly may be imagined as a possible thing in this age of almost incredible inventions; but a five-fold increase of crop, from so simple and cheap a process, approaches too near the miraculous, to be generally taken for any thing more than the extravagant opinion of persons of very little experience in such matters, and one, therefore, but illy calculated to induce practical corn-planters to repeat the experiment.

A word or two now, as to what these gentlemen call "*one of the greatest discoveries of modern times.*" Almost from my earliest recollection, and that reaches back more than half a century, I have known the soaking of seed-corn in a solution of saltpetre to be practised. Indeed, it was once common in some parts of Virginia; but that was at a time when I paid little attention to such matters, and therefore I do not recollect how far it succeeded. The fact however is, that the practice has long been discontinued among us, and consequently it is a fair inference that the increase, if any, of the corn crop by this process, could not have been generally thought to be even double, or we should still find the saltpetre solution in general use. So much for this asserted discovery. But since the constitutions of mankind often undergo such changes, that food, which does little or no good at one time, may fatten at another, the same may happen to the constitution of plants. Many still more extraordinary analogies have been actually traced out, or imagined to exist between the animal and vegetable kingdoms. By all means, therefore, let us all feed our seed-corn next spring, with saltpetre and water, for it is not quite impossible that we may equal or beat Mr. Massey's five rows so marvellously fattened upon that food. I, for one, am determined to try the experiment should my life be spared; and you shall have, not my opinion merely, but an accurate statement of the quantity, by measure, of the corn fattened upon saltpetre and water, and that which I shall leave to seek its food from the ordinary sources of supply. In this determination I assure you that I am perfectly serious, for I have been a corn-soaker for many years, in full faith of its efficacy to an extent which renders the practice well worth continuing. My solution, however, now very common in Virginia, has heretofore been nothing more than tar and water, in the proportion of about one pint of tar to ten or fifteen gallons of water, after which the seed-corn has as much plaster of Paris or lime mixed with it as will adhere to each grain. This protects it, in a considerable degree, from moles and birds, and probably benefits the subsequent growth and product, although I know of no experiments yet made to ascertain whether this supposition be correct or not. I remain, dear sir,

Your old friend and fellow laborer,

J. M. G.

[The article respecting the wonderful (and, as we fully concur in pronouncing, the incredible) increase in corn, from merely soaking the seed in a solution of nitre, is justly obnoxious to our correspondent's strictures. It was inserted during our absence, or it would have been accompanied by remarks, showing that the article was selected as a scrap of agricultural news, and as furnishing subject for experiment, but not as ground for belief, or confidence, upon merely the present statement. We can scarcely suppose that the editor of the paper from which the article was copied, and his friend the farmer, both being named and known witnesses, could have deliberately combined to tell so monstrous a lie, as a severe judgment *may* pronounce upon the statement made, viz., that simply soaking the seed-corn in saltpetre-water, increased the crop fully 400 per cent. We infer, that there *was* an increase, (greatly exaggerated perhaps by the guessers,) but that it was owing to some indirect benefit, and in a manner not stated, and not amounting to any noticeable addition to the fertility or producing power of the soil.

So far we agree with our friend J. M. G.; but not so in his harsh strictures upon the words of another selected article. It is very true, that the phrase quoted is not grammatically or critically correct; and, if subjected to be construed literally, and according to the strict rules of composition, that it would (if the contrary were not evident,) bear the meaning that our correspondent charges to have been conveyed. But the manifest absurdity of a man's weekly allowance being 300 pounds of meat, ought alone to be enough to acquit the writer of any intention of making such a statement. To our reading and understanding, it was so plain that the writer meant a *weekly proportion* of 300 pounds of bacon allowed for the year, that it was not thought necessary to add any editorial note in explanation. If such an inaccurate mode of expression had been seen in a manuscript communication, it would certainly have been our duty, as it is our usage, to correct it; but it is not our practice, nor would it be justifiable, to alter the text of articles selected from other publications.—Ed. Far. Reg.]

PROFIT FROM CLOVER. THE DROUGHT. SEA-ORE AND SALT. COULTERING NEW GROUND. IMPROVEMENT OF LAND AND HEALTH, &c.

To the Editor of the Farmers' Register.

Old Point Comfort, Elizabeth-city County, September 10, 1838.

The wheat crops in this neighborhood have not realized the sanguine expectations entertained before harvest. The growth of straw, was most luxuriant; but the heads small, and generally light. The fallowed wheat was infinitely superior to that sown on corn-land. I sowed 45 bushels in a field of 42 acres, 12 of which had been in clover turned in in September. The exact yield I have not ascertained, as I have got out yet but three stacks, averaging 80 bushels each; but I obtained ten stacks, and of these, four and a half were cut from the twelve acres. It is proper to state that the fallowed land was naturally the best part of the field, and would, under any circumstances, have produced the best crop; but nothing like their difference would have resulted, without the aid of the clover. A gentleman in this neighborhood, of great accuracy in such matters, told me, that last year his fallowed land yielded 26 bushels, and his corn land 13 to the acre, just one-half; and that this year the difference was full as great, if not greater; the land in both instances of equal quality. Can there be a stronger argument than this, to exhibit the benefit to be derived from clover, to say nothing of the excellent pasturage it affords for two or three months, if, like myself, you are compelled, occasionally, to turn your stock upon it, until the harvest fields are ready for them.

But, says one, my land will not produce clover, and what am I to do then? Why marl it. I don't believe there is an acre of land below tidewater, that will produce any thing, that cannot be made to produce clover. Lime it, and if you have not the means to buy the lime or marl, sell one-half of your land, and apply the proceeds to the other, and with a light top-dressing of vegetable manure, my life upon it, you will make the clover grow. I have tried it, and know it to be true. Four years ago I sowed a field in wheat, and the following spring put it in clover, at the rate of a gallon to the acre. The wheat was indifferent; the clover seed thrown away: for, except here and there in small spots, not a leaf was to be seen. The following winter I dressed this field from a deposit of burned shells, which had been on the farm from time immemorial, at the rate of about 100 bushels to the acre, and gave it a light coat of vegetable manure. In the spring it was planted in corn and yielded several bushels to the acre. In the fall it was again put in wheat, and clover sown on it in the spring: and this year I had as luxuriant and well-set a crop of clover, as I ever saw in Virginia.

We have suffered this year from the drought and heat, equally with most other parts of the country. We had no rain from the 21st July, to the 14th of August. It may not be uninteresting here, to give a comparative statement of the mean temperature, and the amount of rain that fell in the last three months and the corresponding month of last year.

1838.	Mean temperature.	Inches of rain.	1837.	Mean temperature.	Inches of rain.
June.	76	$4\frac{5}{10}$	June.	75	$3\frac{5}{10}$
July.	83	$2\frac{4}{10}$	July.	79	2
Aug.	82	$1\frac{1}{10}$	Aug	79	$9\frac{5}{10}$

The thermometer is noted at sunrise, 2 P. M. and dark.

We cannot but be struck with the difference in the quantity of rain that fell in August last year and this; and although the farmer has suffered ruinously in the curtailment of his corn crop, he has abundant reason for rejoicing on another score; for the same cause that shortened his crop, has preserved his family in the enjoyment of earth's greatest blessing, health. I have never known the country so healthy at this season; and I doubt very much, on balancing accounts at the end of the year, if the farmer doesn't find himself as well off with a short corn crop, as he has heretofore been with a good one: for when there is no sickness and death, there is no toll to pay the doctors, and no reduction in the capital of his estate.

I obtained a very satisfactory result from the application of sea-ore, on a part of my corn-field this year. Whilst the neighboring corn was fired above the shoot, that to which the sea-ore had been applied, suffered comparatively little or nothing. Independent of its general fertilizing properties, then, (and I have fully demonstrated them,) this additional one of attracting moisture from the atmosphere, renders it a most invaluable manure, especially upon high sandy lands.

In a former communication, I mentioned the beneficial effects I had experienced from sea-ore on wheat and oats. I was in some doubt, whether they did not depend mainly on the salt contained in it; and this year I have fully satisfied myself on the subject.

In the month of March last, I top-dressed a bed of fall wheat, one of spring wheat, and one of oats, with salt scattered by the handful, as you would sow oats. I watched the effect closely until harvest, and could at no time perceive the least benefit from the application.

I was occupied a good deal last winter in getting up new ground, and my experience may be of some use to others. I was desirous of testing the relative value of the grubbing hoe and coulter for the first breaking up of the land; and am convinced, that the labor can be performed infinitely better, and at less than one half the expense, with the coulter than with the hoe. This may be no news to many of my readers, as I know the coulter to the north and in some parts of our own state is extensively used for the purpose: but it will be to some of our low-country farmers, who have never used it, or seen it used. I first cut around the stump, and cut out the large surface roots, then run a strong coulter drawn by four or six oxen, (I used two oxen and two steady horses,) thoroughly over the ground, and afterwards cross it. A man should follow with an axe, to chop any root that may be too strong to be pulled up.

Mr. B——, an intelligent gentleman of my acquaintance, residing in this county, is this year making an experiment on the comparative expense of keeping his hogs up, and letting them run at large, until taken up in the fall to fatten. He found that his penned-hogs required something more than food, to make them thrive. He gave them sulphur and salt, which he thinks much more highly of, and asked my opinion on the subject. I advised him to give them ashes without limit: he did so; and when I saw him a few days ago, spoke in the most rapturous terms of their effects, and insists that so valuable a remedy should be generally published. I replied, it was no discovery of mine: I had heard it, and used it with great success, and presumed it was generally known. He said, it was new to him; and as it may be to many others, I communicate it for general information.

The ashes plan, however, did not take with my friend, without some opposition from an unexpected quarter. The "old lady," whose province extended to the lie-stands, entered a formal protest against this encroachment upon her domestic economy, as she should have no ashes to make soap. But when it was proved by figures, (and figures cannot lie,) that though she might be the loser in ashes, she would be the gainer in grease, like a good wife, she gave in, and is now content to abide the experiment.

This gentleman, a practical mechanic, told me of a cheap and effectual method of rendering smoke-houses and dairies rat-proof. He has repeatedly tried it himself, and induced others to try it, and always with the fullest success. After digging out your foundation, lay the first course of bricks, to extend four and a half inches all around, beyond the wall. The operation is this: the rat always burrows close to the wall, and continues to descend until he meets the obstruction of the projecting course at the bottom; finding he can go no lower, he desists. Let not the simplicity of this plan deter any from adopting it. I will, however, add one suggestion: Do not, as I once knew a gentleman to do, who, at great labor and expense, erected what he supposed would be a rat-proof corn-crib. It was placed upon eight posts, nicely hewed and smoothly covered with sheet copper. The rat could not climb here, because there was no place to stick his claws in; and it was so high from the ground, that he couldn't by any possibility jump up, and get a foot-hold: but it was also too high for the gentleman to get into, without a pair of steps; so they were put, and the enemy had no longer any necessity for blunting his claws against the copper.

Mr. B—— is an instance of what enterprise and industry will effect. He purchased his farm fifteen years ago: it was a dense forest; not an acre of cleared land attached to it; it was low, and, consequently, sickly; but he determined to make it a productive and a healthy farm, and he has succeeded. He has cut down the forest of centuries, exposed a fine, rich virgin soil, and ditched in every direction. Mr. B——, jr., who has now taken upon himself the direction of the farm, has this year cut a canal eight feet wide and four deep, upwards of a mile, and will continue it as far again. This canal will bring into cultivation as fine a body of land, when cleared, as there is in the lower country, which has heretofore been worse than useless, as it served but as a hot-bed of malaria. A portion of it is already in corn, high and dry, and suffering from the drought. The homestead embraces every building necessary for the convenience or comfort of the farm: a large mill, worked by oxen; extensive sheds, capable of covering every article of stock on the farm, from which he raises abundant supplies of best manure; stacks with shingled roofs, for the protection of his artificial grass hay; and the best corn-house I ever saw. A few such examples, and the tide of emigration from east to west would cease to flow: for land like this was can be purchased for $4 an acre.

I sowed, in February, two bushels spring-wheat, procured from Thorburn, in New York, on corn-land of fair quality. The produce was twenty-one bushels, the grain very good, better, I think, than that sown. The general opinion here is much against it. I am satisfied it never can be adopted in this climate as a substitute for winter wheat: but I think it may be sown to advantage instead of oats, on land that will produce wheat. I also procured from Thorburn, in December last, a quart of a new white wheat, recently sent out from England as a sample, with a few of the stalks, called "Ealey's gigantic." It well deserves the name, for it was the largest stalk, largest, fairest and heaviest grain, I ever saw. I drilled it in my garden and cut it on the 6th July: it yielded three bushels and a peck. The stalk was as large as the original, the heads very long and apparently well filled, but the grains were shrivelled and evidently injured whilst in blossom, by a heavy rain and wind, from which the other wheat, being more advanced, almost totally escaped.

R. Archer.

THE CULTIVATION OF MIDDLE SOUTH CAROLINA. ADDRESS OF JOSEPH E. JENKINS, ESQ., TO THE AGRICULTURAL SOCIETY OF ST. JOHNS, COLLETON, S. C. THE LOUISVILLE, CINCINNATI AND CHARLESTON RAIL ROAD.

To the Editor of the Farmers' Register.

Sir: "*In passing through the upper country,* " the planters are *astonished*, on inquiry, at learn-" ing how little use is made by us of the plough; " an instrument of *indispensable necessity* to " them !!!! but, it is easy to be accounted for; two " systems of agriculture can never be more dis-" similar, than the one used by them, and that " which obtains in this section of country. *There* " (I speak of the section through which I passed " this spring, *videlicet*, from John's Island to Co-" lumbia,) 'twould be *preposterous* to speak of ma-" nuring; from 12 to 15 acres and upwards of land " are *commonly !!!!!* planted of cotton alone; *here*, " $3\frac{1}{2}$, and, in some *rare* instances, four of cotton, " and one of corn. We have not the facilities of " shifting our fields from a worn-out spot, to a " virgin soil, *exhausting* that, and then again " *pursuing the same process*. * * * * * " Our system approaches nearer horticulture " than farming; comparatively, "*our fields are* " *perfect gardens.*" * * * * * I did not " see a field of cotton on my return from Colum-" bia, on the 5th of June, which had the appear-" ance of having had a single working, from the " time the seed had been deposited for planting, " (the planting averaged the 15th April, in 1838,) " to that day. In most of them, *the weeds and* " *grass were taller than the cotton*. * * * * * " Do not misunderstand me, gentlemen, as con-" demning their system; to them, it may be most " profitable; to us, one thing is certain, it would " be ruinous. Therefore, the hoe is the imple-" ment of husbandry with us; and a powerful in-" strument it is, in the hands of a strong and vi-" gorous people"—a people, to subsist whom and all other bipeds and quadrupeds on a plantation, one acre of corn is planted [to the hand.] !!!!! This, at least, is the average of the low country. On Mr. J.'s plantation, it is probable his servants have of fish *quantum sufficit*.

Merely observing, that the italics and marks of admiration are mine, and not the addresser's, I cannot avoid expressing my "astonishment" at a representation of middle and upper country cultivation, so grossly erroneous, and only to be excused, because it originates in innocent ignorance. For I assert, without fear of contradiction, that 12 to 15 acres are, in general, the *maximum* of good planters, for corn and cotton: that there is not a respectable planter in middle or upper Carolina, who not only does not think manuring "preposterous," but whose conduct is diametrically opposed to it, and who does not "shift his fields," not as above described, (a circumstance now wholly out of the question,) but, from one *improved* spot to another; that there are annually to be found fields of cotton on the Wateree, the Congaree, &c., which will vie with any on John's Island for horticultural neatness; that as to "the weeds, grass," &c., I know not what road this eloquent addresser travelled; but, this I know, that, in 1838, barring a short space of time, when the grass got a little ahead, most of the cotton in the middle country was very clean; and, that in the same section, there are as fastidious amateurs, fully as well acquainted with the operations of the hoe as the most astute planter in the low country.

But, what is the fiscal fact—in short, the real value of land in the middle and low country—(always excepting the sea-island cotton and the tide-rice plantations, the latter diminishing 33 per cent. in the produce for 1837-38, and Manilla and East India rice finding a profitable market in Charleston—) literally nothing—wholly abandoned. It has been sacrificed to the "precision and peculiar elegance of the hoe," to the introduction of horticulture, *vicè* agriculture, to the abandonment of the plough, to the starvation system, which arose from the substitution of cotton for rice, and the relinquishment of the inland swamps, where cattle to any extent might now be raised. Indeed, if lawyers could be driven from the public counsels, and engineering, instead of oratory, be taught at the colleges, South Carolina has the means of producing millions she does not now do. But, to return to the price of land. Tracts in the low country, sold after the revolution for guineas, are not now worth as many dollars. On the other hand, in the middle and upper country, the price is constantly increasing.—2,000 acres have recently been sold, on two years' credit, for $20,-000, which, in the low country, would not produce a tithe of the sum—8,000 acres, sold by an emigrant for $2 50, are now worth $5, if not $10 per acre. The simple reason, the superior cultivation, greater produce of provisions, infinitely better treatment of negroes, and the employment of respectable overseers; for, planting, as they do, five acres of corn to the hand, —— acres of oats, wheat, potatoes and peas, (with the corn,) so to act is no matter of difficulty, any more than there is to be discovered an impediment to an allowance of half a pound of good bacon *per diem* to a laborer, or the payment of an adequate salary to a humane manager. [*Vide* an article at p. 269, Farmers' Register.]

In consequence of this system, the planter makes his three, four, or five bales to the hand; and, remembering the facilities of shifting fields, &c., I would observe, that I have known a bale to the acre, produced by a planter, who manures with cotton-seed, clay, leaves, &c., from land that has been cleared thirty years; and, it is not more than four years since, that on discussing the subject with four planters, in the same neighborhood, it was determined that, for every bale produced a few years before, four were now sent to market—the plough, the agent. Fields thus productive, do not permit the growth of grass, &c., though after the fodder is gathered, good crops of crow-foot grass are reaped from the corn-field.

The editor of the 'Southern Agriculturist,' (p. 414, Aug. number,) alluding to an idea of your's, laments the want of county agricultural surveys. Their want is evident in Mr. Jenkins's errors; and, while such universal ignorance, so great a disposition to cherish that ignorance, and entertain such monstrous misconceptions of the more correct management and the greater wealth and equal civilisation of the upper and middle districts, prevail in the low-country, the prospects of the south, and South Carolina especially, are dark, dark indeed. In the expenditure of the public money, it has given rise to an absolute proscription of all east South Carolina, and a denial of instrumental surveys to sections loudly and fairly calling for them. The rail-road has been made to run in such a direction as to exclude any access to the provisions of the west from east South Carolina. It has been carried, at an enormous and increased expense, to Branchville, *via* Orangeburg, in fact, to a rail-road, that cannot carry cotton down at any reasonable charge, and receives and spends $1,000 per diem, or only $320,000 per annum. This is the rail-road that is to compete with the almost completed scheme of Georgia and Tennessee—a scheme, in which, *nolens volens*, the "ancient dominion" must join. There will soon be free access, from the Atlantic at Savannah to Knoxville, which may be said to be equi-distant from the James at Richmond and Petersburg, and Charleston and Savannah. On its north-east *terminus* and in the more populous and productive character of its whole line, (lessening it to one-third if not one-quarter the distance,*) the full and forcible effect of western commerce will be felt; for, nothing can prevent a road from Knoxville to Abingdon, and thence to Lynchburg. Again, North Carolina will aid by a road along the Piedmont route to Danville, thus opening another highway to Petersburg and Richmond. To these outlets for western commerce, we may add the Baltimore and Ohio rail-road, the Mercer, (Chesapeake and Ohio) canal—ensuring to the Chesapeake bay, &c., the GREAT DEPOT; also, the Pennsylvania and Erie canals—canals coming, as well as the Mercer, into competition with an overwhelming power, if, as is said to be the case in Great Britain, boats can be towed at the rate of six or nine miles an hour by steam.

But, what is "the dominion" about? In the Knoxville Register, in a paragraph, most probably written in Charleston, we find "the main ob-" ject of the Augusta convention is to establish a " *direct* trade *from the south* directly to Europe. * " * * * East Tennessee is particularly and " vitally interested. It is important to her, *be-" cause* it throws *our* exports and imports into the " same channel." Now, gentlemen of Knoxville, permit me to ask you, for what "exports and imports" you can find a market in Charleston, (the very existence of which, as a harbor, according to the engineer Holmes*, is threatened,) equal to that on the borders of the James? None, whatever; and you would have done better by an access to Sumpter, &c., districts in South Carolina, than you possibly can in Charleston, the market of which, in bacon and corn, is to be glutted by a single train of cars; and, indeed, you had better now pray the board to take this route into its serious consideration. But, I forget myself; that is not the object of your paragraph, or of the meeting—the intention being to puff the bank and prepare the speculators to plunder the public, and fill their own pockets. It is to this effect, that they tell you their mighty agent is to sell the South Carolina bonds, bearing five per cent. interest, at par, in Amsterdam, when five per cent. New York stock is worth but ninety in London; or rather, that he can get *a premium* for them, and get money for three per cent. They have also *said* Mr. Biddle has pronounced the charter worth millions. But, there are other *becauses*—"*be-" cause*, after the establishment of the south-" western bank, (five-sixths of which are held in " Charleston and Columbia,) the rate of exchange " will be reduced *to almost nothing;* and, *because* " by a direct shipment of the great southern sta-" ples, and a direct re-shipment of European fab-" rics, the factorage and commissions now paid at " the north, *will be entirely taken off* !!!!! and " our foreign fabrics made, *by so much*, intrinsi-" cally cheaper."

It is for the sage of Knoxville to demonstrate, how exchange is to be reduced by an issue of paper, and this only payable in Charleston, the capital of a state, not having more than 300,000 whites. I have been even stupid enough to believe it was regulated by the material passing to and fro, sold and consumed. What the latter is of 35,000 persons, two-thirds negroes, in Charleston, had better be first ascertained, as well as whether, should cotton fall in price, South Carolina will not necessarily be compelled to supply herself. But the *direct* shipment is the reliance; as if it did not and had not existed for years. Only the home consumption may be said to be consigned (in 1837-8, 54,280 out of 279,957 to the 25th August, from Charleston,) to the north.† This year, Georgia and South Carolina have shipped nearly 600,000 bales, little of it going to the north. How the factorage and commissions are to be saved, is beyond my humble comprehension. Is Charleston to do the business for nothing?

I will conclude this paper by a reference to the

* See a paper as to the New York canal, and what it brings *from* the west, in a late Farmers' Register.

* "Should the uninterrupted passages of water, by the course thus formed, continue, it is greatly to be feared that a few years, if not months, will effect a total change of the currents passing by our wharves; that Hog Island will become the north channel, and the channel in front of our wharves be obstructed by large sand deposits; that the entire western portion of Sullivan's Island, including Fort Moultrie, will be swept away, thus widening the entrance to our harbor, which must substitute *sand flats* for *the channels on the bar*, and leave the city and harbor "exposed to the unchecked violence of destructive storms." Three forts at the site of Fort Johnson, and three at Fort Moultrie, have already been destroyed.

‡ A tabular statement of direct and indirect shipments for a few years back, would be instructive.

8th section of the bank act, "declaring directors and capital distinct and separate;" and, that the bank "shall never be liable for the debts of the " rail-road company; but the rail-road company " *shall be liable for the bank* in case of failure;" and, then add, in nearly General Hayne's own words, how, after all the dramatic management in Nashville and Columbia, the affair of the bank was concocted. Eight millions were to be subscribed by the 31st December, 1837, to secure the charter. After Tennessee had assented and paid to the amount of $650,000 for roads in her own state, the subscription amounted to but $5,300,-000. The only means of effecting this important object, was the purchase of the Charleston and Hamburg road, the stockholders of which becoming subscribers in the Louisville, Cincinnati and Charleston road, added a subscription of 20,000 shares, leaving a deficiency of only 7,000 shares, or $700,000, to make up the $8,000,000. But $8,000,000 were necessary for the first instalment due to the Charleston company. Of this sum, there was borrowed $700,000 of the banks, and $100,000 city stock was *liberally* advanced by the corporation of Charleston.

The company have restricted themselves to 35 cents per 100 lbs. for 100 miles, as charge for freight. In Georgia it is 50 cents. Thus, a barrel of flour by the Carolina road, will, for 400 miles, pay but $2.80—by the Georgian $4.00. Now, the Pensylvanians bring flour from Pittsburg to Philadelphia for $1.12½. What will be the freight when the Mercer and Pennsylvania canals, the Baltimore and Ohio rail-road and the James river improvements are completed? What too, will be the difference of the shipping expense on the Patapsco and the James, and at Charleston and Savannah? These, which I take to be facts, give us the reason why Georgia can go to New York and get money at five per cent. and South Carolina be compelled to go to England, and possibly for—nothing.

President Hayne, in his call, (1838,) talks of lower rates. "The charge, (he adds,) for cotton " from Hamburg to Charleston, has never, we " believe, exceeded 25 cents (per 100 lbs. or for a " bale, $1,) and has been as low as 18 cents, (or " 75 cents per bale,) or one-half the rates allow-" ed by law." (pp. 14, 15.) Now, what says President Tupper? He states the power on the road to be equal to the business, "except cotton " down, *when the steamers were stopped for the " want of water*. Their charge was 75 cents; " that of the rail-road in 1837, $1.50 cents—of " course, the latter never carrying any important " amount. For the last three months, we have " been obliged to send up empty cars to bring " down cotton, there not being up-freight enough. " This has increased the expense without ade-" quate profit, *the expenses being about equal " to the amount received, when the cars are only " loaded with cotton down*." (Report 1st January, 1838.) The cost of the Charleston road was $125 per share in old stock, (now worth $112,) 25 per cent. on new stock payable for every share sold, in one share in the Louisville, Cincinnati and Charleston company's stock, with £5 paid thereon.* The balance one-third in cash, one-third in one year, and one-third in two years with interest and mortgage. The property apparently not yet rendered. G. L. C.

* By the 8th section forfeiture is allowed. General Hayne, in his 1836 address, said, "*he will always be at liberty to forfeit his shares;*" so that the Charleston and Hamburg rail-road company may do the same. In three years they will get $2,400,000, and $5 per share, reducing it $100,000—but what is obtaining $125 for what is worth but $112, and clear of a crazy concern?

From the Farmers' Cabinet.

CULTURE OF ONIONS.

The town of Wethersfield (Conn.) has long been famous for the large quantities of onions which are annually raised and exported to the West Indies and the southern states. It has been superstitiously supposed there is something in the soil of Wethersfield peculiarly adapted to the culture of onions; and this whim has no doubt discouraged many from attempting the cultivation of this valuable root, in other sections of the country, equally favorable to its growth. It is true the soil of Wethersfield is a rich gravelly and sandy loam, well adapted to horticultural purposes; but the success of its inhabitants in the culture of onions, is attributable in a much greater degree, to a particular virtue in the fingers of its females, than any peculiar properties in its soil.

The business of raising onions in Wethersfield, is reduced to a perfect system. The following is the method of cultivation. Early in the spring the land is manured by ploughing in fine manure from the stable or barn-yard, in the proportion of about ten loads to the acre. That of neat cattle is preferred, as that of horses is considered of too heating a nature. After the manure is ploughed in, the land is well harrowed and laid out into beds five feet wide. The beds are laid out by turning a furrow towards them each way. This raises the beds above the aisles and gives an opportunity for the water to run off should there be occasion for it. They are then raked with an iron-tooth, or common hay-rake, and the aisles suffered to remain as left by the plough. Thus prepared, the beds are ready to receive the seeds.

As early as the season will admit, the seed is sown in the following manner. A rake, with teeth a foot apart, is drawn crosswise of the beds, for the purpose of making drills for the reception of the seed. The seed is then sowed in the drill, with the thumb and fingers, and covered with the hand. From ten to twelve pounds of seed is put upon an acre. After the plants come up they are kept free of weeds, which generally require four weedings. A hoe of a suitable width to pass between the rows is used in weeding, which saves much labor. When ripe they are pulled and the tops cut off with a knife. A sufficient length of top is left to tie them to the straw in roping. They are then roped, or bunched in ropes or bunches of 3½ pounds, as required by the law of the state. An ordinary crop is from 6000 to 8000 ropes to the acre. The quantity annually raised in the town, is estimated from 1,000,000 to 1,500,000 ropes which are sold at an average price of $2 a hundred, amounting to from $20,000 to $30,000.

Most of the labor in raising onions in Wethersfield, is performed by females. The cultivation of an acre requires from fifty to sixty days' labor of a female, whose wages, including board, is about forty-two cents a day. Though many of the young ladies of Wethersfield spend a portion of their time in onion gardens; yet in personal beauty, education and politeness, they are not excelled by females of far less industrious habits.—*Connecticut paper.*

From the Pittsburger.

FOUL AND POISONOUS EARTHEN WARE.

Mr. Editor.—Sir: Will you permit me to acquaint the public, through your valuable journal, that there is a kind of crockery ware, manufactured in almost every city in the union, which is dangerous to use—and which the public will understand by the term common red pottery. This ware is made of common clays from the brick yards, and when formed, is coated with a liquid called glaze, which is nothing less than a coat of lead. The clays being of the commonest kind, cannot be subjected to any heat in the burning that will make them safe for family use—*being porous*—and it is very unsafe to deposit any articles of family use in them, such as milk, butter, or in fact water, as a portion of the lead glazing will be extracted, and the article will, in consequence, become dangerous to use. I have noticed no fewer then ten instances within the last twelve months, of familes sustaining injury by the use of such ware.

In selecting the article of crockery that is suitble for family use, it is only necessary to ascertain that the body of the ware—the clay—has been hard burnt, which any person can understand by the sound of it—if well burnt, it will have a clear sound. The poorest kind will not ring at all, and therefore can be easily detected. An article of this kind will, in the course of a month's use, become very foul. Let any one who doubts this break the vessel, and they will ascertain the fact. There is a kind of ware, however, that is manfactured in almost every city in the union, called stone ware, which is perfectly good for family use. This ware is formed of strong and superior clays, and undergoes a great heat in the burning,—and moreover, the glazing is not a thick coat of lead, but is accomplished by throwing salt into the kiln. All kinds of Liverpool ware are adapted to all purposes of family use, being made of sound clays and well burnt. As a preventive is better than a cure, if I should be the means of preventing any person suffering from the use of the poisonous article—lead—this advertisement will answer the ends I design.

C. S.

From the Farmers' Cabinet.

DIFFERENCE OF PLANTING CORN ON GRASS AND STUBBLE LAND.

It has been the prevailing custom with the farmers of New Jersey, for many years, to plough their sward for corn, that they might raise more than in tilling otherwise. I admit it is a good mode to till on the sward, and has always been allowed so by first rate farmers; but I find it greatly to my advantage to reverse the practice, in order to prevent the worm making such sad havoc in my corn-fields. About six years ago I planted twenty acres on the sward, and out of that the worms took eight, scarcely leaving a hill to be seen. The tenth day of June I had it planted over again, thinking the worms would not disturb it so late in the season, but still they preyed upon it, leaving about one half to grow. The next spring, I came to the conclusion to farm differently; instead of ploughing the sward, I ploughed up my stubble field, gave it a good harrowing, furrowed it out both ways, marled and manured every hill, and then planted the corn. In about a fortnight, I made a visit to the field for the express purpose to see if my corn had got up, or if the worms were taking it as they formerly had. I must acknowledge, that never since I have been a farmer, have I had my corn to come up as well; and I am fully satisfied, that is the best manner to farm where we are harassed with worms and other insects. Although the field which I farmed had two crops in succession; yet, notwithstanding, the third crop was much better, sounder corn, than I had raised for many years till I adopted this plan.

The manure I had left was considerable, after taking out enough to go over the corn-field; and of the remaining part I made a compost, mixed with marl or lime, which make it much better for wheat than to put it on in separate bodies or portions.

The field that came in regular rotation to plant with corn, I ploughed up for wheat and rye. After the process of ploughing was over, I took a three horse harrow, gave it a thorough harrowing both ways, to make the furrows lay level, that the grass roots might rot. Before the usual time of sowing came on, I took what manure I had, put it on regularly, till it was gone. The part of the field which had no manure, I sowed in rye, and the part which was manured I sowed in wheat. Thus I have farmed for five years, with much better success than I ever did in the same length of time previously.

From the Baltimore Farmer and Gardener.

CARROT FIELD CULTURE.

We had a conversation a few days since with a Yankee farmer, on the above subject, and being pleased with the course of his remarks, we prevailed on him to commit them to writing, in the hope that as the season is now approaching when this fine vegetable may be sown, we might, by bringing the topic to the notice of our readers, induce some of them to try the experiment of raising a crop for feed for their milch cows. The parsnip too, should command attention; the same mode of culture will serve for them as for the carrot, with these exceptions—that the drills should be about 18 inches apart and the plants stand about 4 inches asunder. Thus planted in the month of April, in suitable soil manured with well rotted manure, or a compost of spent ashes and mould, kept clean and hoed three times, they would yield from 500 to 1,000 bushels of roots to the acre, which might be left in the ground all winter to be dug as wanted for feeding.

To those who desire to have butter in winter, possessing all the virtues of that article made from cows fed on May pastures, it will be only necessary to say that by a very little trouble they may realize their wishes.

The communication alluded to above will be found subjoined.

"The carrot flourishes best on a loam or sandy soil. The ground should be prepared by ploughing very fine to the depth of ten or twelve inches, fine manure, in quantity sufficient for common crops should be ploughed in, and the ground harrowed merely sufficient to level it, the seed should be sown in drills from twelve to fourteen inches apart; a machine made for the purpose is the best for sowing: four or five plants to a foot is sufficient to be left to come to maturity; a good day for planting corn is a good day for sowing carrot seed. The crop is usually from four to five hundred bushels to the acre. There is not a more profitable crop for feeding stock, raised in the N. England States, than the carrot, where the soil suits the crop; with a little more labor, you will get as many bushels of a much richer vegetable than the potato. One experiment has been made, by putting six cows into the stalls in December, and feeding five with corn-meal and hay, and one with corn-meal and carrots, and when slaughtered, the one fed with carrots was pronounced the fattest and handsomest beef. They are equally good for milch cows, increasing the quantity, and adding color and richness of flavor to the butter, but little, if any, surpassed by the best pasturing. They can be profitably used in many others ways by a farmer."

THE DROUGHT. THE GREEN SPRING LANDS OF LOUISA COUNTY.

To the Editor of the Farmers' Register.

Fluvanna, Sept. 10, 1838.

In compliance with a request in your last number of the Register, that reports of seasons and crops might be made to that journal from the different sections of country in which it circulates, I give you one which I am sure cannot be surpassed in melancholy of detail by any that may appear from other quarters. Confining myself to the section of country between the James and Rappahannock rivers, parallel with, and extending thirty miles below, the South-West Mountains, I can say from ocular proof and certain information, that no drought has ever come under the observation of the oldest inhabitant, that will compare in severity with that which has visited this country since about the middle of June. Within this range, I have heard of but one neighborhood, (about New Canton, on James river,) in which the corn and tobacco crops have been at all benefited by rain. On other water-courses, and on good highlands, they have been curtailed from more than half to *nothing* on inferior grades of soil. Pastures and meadows are burnt up, and the most luxuriant green-sward turf in our yards destroyed even to the root. To add to these grievances, the little fodder that had escaped being entirely blasted by drought, and a sirocco-like wind, which has prevailed throughout the summer, was killed on most flat lands by a *frost*, which occurred on the night of the 3d instant biting also, and in some instances destroying, a portion of the tobacco on low situations, particularly in those wanting sufficient circumambient moisture to protect them. For a week past, there has not been a mill within fifty miles of my residence that can grind more than a few hours in the mornings, and very few of them *at all.* Indeed, such is the impracticability of procuring meal, that I keep a man constantly beating coarse meal and hominy for my negroes, having neither potatoes nor peas from large plantings, to substitute for bread. *I* shall not want another such season to admonish me of the importance of a horse-mill on every farm where water-power cannot be relied on. Wheat crops have been fine throughout this country, but for want of corn the *small* farmers and planters and many of the *larger* ones will be compelled to use from the whole to a part of what is made, for bread and horse feed. By the way, could not your *disinterested* Baltimore correspondent R., *extend* his benevolence to our starving community—after first taking care of Maryland—in telling us whereabout in Virginia he ever saw such abundant crops of corn at $1 and $1 50 per barrel? Or might he not be induced to *change* his trade for the sake of a profit of two or three hundred per cent., which *I* (who am also "well known") will ensure him?* On a late visit to the Green Springs neighborhood, in the county of Louisa, I found that this *truly* green and fertile country had been visited by the same desolating evil, to a degree which an acquaintance with it of nearly thirty years had not allowed me to conceive. Still, it was refreshing to one whose sight as well as *hopes* from the soil had been seared by the presence of a universal desert, which had taken the place of luxuriant fields and green meadows at home, to witness even the partial contrast presented to the eye by the more flourishing appearance of vegetation here, where, superadded to the superiority of soil, there had been *one* shower more than was general in the parched region, which is the subject of my remarks. Had other evidence of the favored condition of this delightful country been wanting, the comparatively fat herds of *improved* cattle and flocks of Bakewell sheep with their creased backs and well-covered ribs, were enough to satisfy me of the superior richness of its grasses. By-the-by, *sheep* delight in and will fatten most kindly on grass partially killed by drought.

It may not be unacceptable to you, Mr. Editor, who feel, I know, a fostering interest in all that concerns the agriculture of Virginia, to receive some accounts of this garden-spot of it, which I believe you have never visited. The cognomen, "Green Springs," is, I suppose, derived from the mineral springs in the heart of this tract of country, on the property of Dr. James M. Morris. They were once very much resorted to, and with great benefit to invalids. Their constituent properties are said to be, (as the flavor of the water

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*The piece referred to was not a communication to this journal, but to a Baltimore paper. It was copied (for exposure) in the report on the "Season and state of crops," which accompanied No. 6, in an extra sheet, and which will be republished, immediately following this communication.—Ed. Far. Reg.

indicates) sulphate of magnesia, iron and sulphur; the springs are as bold and salubrious as they ever were. The wealthy proprietor has thought fit to suffer the improvements to go to decay, or they would doubtless be again the fountain of resort to many of the thirsty pilgrims who now seek health and pleasure in our mountains, where I think the waters little or no more salubrious, and the *mutton, certainly*, not as fine as at the Green Springs. This valuable body of land is, so to speak, a basin of about 10,000 acres, which seems, by a sport of nature, to have been dropped into the midst of one of the most barren districts of Virginia. Its upper margin reaches to within about ten miles of Peter's mountain—the tallest in the south-west range—is watered by five creeks and the river South Anna; the latter bounding its north-eastern extremity. One of the creeks, (the south-eastern,) and a barren ridge, in which most of the creeks rise, reaches across the north-western boundary. The fine character of this soil, is doubtless owing, in great part, to these water-courses, which all (but one, and on that lies very little of what is called Green Spring land,) disembogue into the South Anna at one point, in the farm of the late Major Watson, sen'r. In further proof of the intensity of the drought, I will here remark, that the beds of all of these usually bold streams, including the river, are now as dry as their banks, except here and there a stagnant pool, scarcely sufficient to slake the thirst of the cattle, which depend on them for existence. The principal farms in this tract belong to the descendants of Major Watson, dec'd., to Dr. J. M. Morris, and to the descendants of Mr. William Morris, dec'd. Of these, the Watson estate is considered the best; containing in all about 3,000 acres. Dr. Morris's may be rated next; and I cannot overlook, in this classification, a small, sub-divided tract, belonging to a family of Branches, equal, by *nature*, to the best. Mr. Wm. Ragland's, and a small portion of a farm lately sold by Richmond Terril, Esq., include nearly the whole of this body of land. The most interesting, and by far the most important feature in these lands, is, their remarkable adaptation to plaster, which has produced in the last ten or fifteen years a change in the face of this country, that is really miraculous. Dr. George Watson, of Richmond, owns, I think, the most beautiful and fertile farm, (with a few exceptions on James river,) that I know of in Virginia. He has been the most liberal user of plaster and clover, as well as improver in the exclusion of stock, in the neighborhood, though all are now reaping, in the fullest sense of the term, a rich harvest from these measures. There is no part of Virginia on which plaster acts more powerfully than here. The soil is generally of a dark-gray color, intermixed with small, round, ferruginous gravel, lying on three varieties of clay, red, yellow and blue—all tenacious. It has been analyzed, I understand, by Professor Rogers, and found to contain a large proportion of lime. On the surface of the country, is to be seen a quantity of grayish-black hornblende, the disintegration of which gives a very rich yield of lime. In conclusion, I cannot say more for this delightful body of land, and its peculiar susceptibility to improvement from clover and plaster, than that the Watson estate and Dr. Morris's have produced this year 19,000 bushels of wheat, at 23 bushels to the acre, when, 15 years ago, one-fourth of that quantity would have been considered a very fine crop. The crops of corn and tobacco on these estates are sufficient for their consumption—tobacco better than I have seen off of James river—and one of their great staples, (the finest bacon and mutton in the *world*,) as promising as it can be. H.

SEASON AND STATE OF CROPS, IN AUGUST.

[Republished from the supplement to the last No.]

During the latter part of August we were absent from home and from editorial labors, for ten days, on a visit to the Fauquier Springs. It was the first time, since undertaking these labors and duties, that we have taken even half so much time of absence, for pleasure, health, or relaxation and rest; and we find that this, in spite of all precautions taken, has been productive of inconvenient omissions. The most important of these will be partially supplied by the issuing this extra sheet to accompany No. 6 of the Farmers' Register, of which the last pages had been printed before our return.

Reports of the season and state of crops, from the subscribers and correspondents of the Farmers' Register, have become so rare and irregular, and their receipt so little to be counted on, that we had ceased, (though with much regret,) to look for them, as matter for each monthly publication. Such reports are always the most numerous under the most disastrous circumstances; and the recent unprecedented state of heat and drought, and the general suffering of all growing crops, have served to bring more information than would come in half a year of prosperity and good prospects. At some cost and trouble, the failure to attend to these favors will be supplied by this extra publication, which will be sent with every copy of the September number, now ready to be issued, and the same will be also copied into the next succeeding number.

We shall copy below a few of the most distinct and full statements which formed parts of letters that awaited our return. But far more full and general information was gained by personal observation on our journey, and from the numerous intelligent farmers whom we met at the Fauquier Springs, from various parts of lower and middle Virginia, and from adjacent states. It is needless to particularize. The hot and dry weather has been more or less mitigated in numerous places by partial rains, some of which fell heavily and abundantly, for the time, when the country around generally remained parched, and but a small extent was even sprinkled. But scarcely any where did these partial and limited supplies of rain come soon enough to prevent a great diminution in the growing corn-crops; nor did the effects continue as long as was necessary to prevent renewed damage from drought afterwards. Reports of great and certain injury from the drought are heard from almost every part of lower and middle Virginia, (with the exception, perhaps, of very small sections that have been peculiarly favored,) and from the northern valley counties, west of the Blue Ridge mountains, from the Eastern Shore of Maryland, New Jersey, and Pennsylvania. The newspapers are now full of such reports, which would extend the damage much farther; but we limit our views to what has been either seen or heard of in conversation with well informed and highly respectable observers of the scenes described, or obtained from correspondents, as much to be relied on.

In Gloucester only have we heard of even average crops of corn being expected; and two gentlemen from that county are the only persons heard from, who expect themselves to make better than average crops. The letter of one (August 4,) is given below; the other was seen as late as August 24. Also, on a few of the best farms on the lower part of James river, fair crops of corn are expected. Some of the poorer lands by the railway between Richmond and Fredericksburg do not seem to have suffered so much by drought, as by other causes of unproductiveness. Elsewhere, no estimate of any county would put the diminution of the corn crops at less than one-fourth below an average, and more frequently the estimate of loss would be one-half or more. We hope and trust that very few parts of the state have suffered half as much as the generally poor country of Stafford and lower Fauquier, which stretches from Fredericksburg to the Springs. The damage here must amount to 75 per cent. unless the land is totally worthless for corn in the best of seasons. The greater number of acres seen on the whole route of 36 miles will not yield three bushels of corn each—and many acres will not make even one bushel to each. The drought extends, with its worst effects, over the rich grazing lands of upper Fauquier, Albemarle, and the other Piedmont range of lands generally.

We know by experience the difficulty of forming in advance estimates of the product of growing crops; and also it is certain that the greater the calamity, the more it is magnified and exaggerated by the imagination and the fears of even the most cautious and judicious, as well as the most respectable and veracious farmers. Therefore we strike off a large amount of the usual estimates of general loss when we suppose that the present corn crop will be from one-fourth to one-third below an average gross product; and that through all the great regions spoken of above, there will be certainly no surplus, even if not a great deficiency to be supplied by importations from distant and more fortunate places. Gloucester, the only county in Virginia from which any *good* crops are reported, is part of a fine corn-producing district. From the next adjoining counties, and from the Eastern Shore of Virginia, nothing has been heard. The northern neck, or peninsula between the Potomac and Rappahannock, has shared in the general drought.

Even in places where heavy rains have fallen, and more than once, the injury is very great. The prevalence and unremitting action of great heat have been such, that the heaviest rains seemed to be entirely evaporated in a few days. During parts of July and August, and for several weeks, with very short intervals of cooler weather, the thermometer was from 90 to 95 degrees, at the maximum height, in the shade, in the country places in lower and middle Virginia, and from 95 to 100 degrees, and sometimes more, in the towns.

By information from North Carolina, the crops have suffered as severely by drought, in the upper parts of Northampton and Halifax, and in Warren, Granville, Caswell and Wake counties. On the low-grounds of the lower Roanoke (a very rich and highly important corn district,) the season has been favorable enough to promise average crops.

In Kentucky, as late as August 17, the season had been highly favorable to corn and other crops.

The crop of wheat, as stated in the notice in No. 5, has fallen much short of early expectations, and over a much wider extent of country than was then known. The unusually large proportion of straw, caused the general error of estimate. For the corn and other growing crops, we beg leave now to add the following particular statements of correspondents, to the general digest above.

"Gloucester, Va. August 6th, 1838.

"I have just shipped my crop of wheat, which averaged nine bushels to one sowed, all of it on corn-land. The promise from the amount of straw on the land was much greater. The quality of the grain is fair. The season has been favorable for the corn crops in Gloucester; and I think a full crop must be made, even if there should be no more rain, the ground being now thoroughly soaked. But in this favored region the rains come with such regularity and frequency, that the poor and backward lands will no doubt be visited to the hearts' content of the farmers."

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"Buckingham, August 10th, 1838.

"The drought throughout this region is fearful. A bushel of corn to the acre will not be gathered from thousands of acres of the hill-land crop. May you not render a valuable service to the community, by a condensed exhibition, in your next or an early number of the 'Register,' of the most economical means of feeding stock, &c. How hogs are to be fattened this fall, and how a stock for the future is to be maintained through the winter, are important inquiries, in the solution of which you may afford important aid."

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"Lunenburg Co. August 10th, 1838.

"Our agricultural operations are quite at a stand for the present; we are now experiencing the most distressing drought I have known for many years, if in my life. For several miles around my neighborhood, and in the vicinity of Mecklenburg Court-house, it really looks as if many, whose prospects were good a few weeks ago for an average crop of corn, will not now make scarcely a third or a fourth of a crop—some say scarcely seed—if it does not rain soon. The tobacco-crop cut short, I think, half, if not more."

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"Halifax, Va. August 12th, 1838.

"As I am at leisure this evening, I will drop you a few lines, partly on business, and for the purpose of giving your readers, through the medium of your 'Register,' a faint account of our crops that *are* made, and those that are not made, and, I fear, never will be, to any sort of perfection. Our wheat-crop was thought by some, previous to its being cut, to be very fine in quality, and promising good quantity; but, I believe, all, or at least the greater part, now admit themselves to have been deceived. The grain is generally small, and rather shrivelled than otherwise. The quantity is generally below the common estimate. As far as I have seen or heard, our oat-crop was next to a failure. At this time the corn-crop is suffering more from drought than I recollect to have ever seen one. It is nearly spent: in fact, I fear that it is entirely so. If rain does not come in a few days, I think we may not expect but little over half a crop in this upper part of the county; indeed, I do not know or hear of any part of this county, Pittsylvania, or Campbell, where the drought does not prevail to an alarming extent. Our tobacco-crops, of course, are very backward, and are beginning to burn more at bottom than they grow at top. Tobacco, however, is a part of our crops that will recover from the effects of drought, when all hopes are *apparently* gone. If it should shortly rain plentifully, and be a late fall, we may yet make respectable crops of tobacco; but, at present, the prospects for corn and tobacco are dreadful—defying all accurate description."

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"MIDDLESEX, N. J. August 13th, 1838.

"Our farming prospects in this section of the country are *very* dull. Up to the middle of June, the prospect never was so flattering. Corn, potatoes, barley, oats, all as promising as could be desired. Since that time, however, we have had no rain that has done any thing but scald—the mercury ranging from 80° to 98° in the shade. The corn half way up the stalk is dead, one-third destitute of ears, and the residue so miserable, that no calculation can be formed of the result. Potatoes, of which many thousands of acres have been planted, will be an entire loss. Barley and oats half a crop. Rye very poor and shrunk. Buckwheat, on which great dependence is placed for winter bread, in many cases never came up, and on the whole only one-fourth of an average crop can be realized. Last night we had a thunder-shower, and slight rain from the south; but all is bright and hot again. Thermometer 91° at 10 A. M."

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"PRINCESS ANNE, VA. August 14th, 1838.

"We have had the driest and hottest weather I have ever seen or felt here. We have not had a good rain since the 18th of June, and only one or two light showers since that time. A great deal of our corn is burned up to the ear, and we cannot make more than half or two-thirds of a crop."

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"QUEEN ANN'S CO., MD., August 17, 1838.

"While writing, I will take leave to add, that never, I believe, within the memory of our oldest people, has this section of our country been visited with so early and destructive a drought as that which we have lately experienced. Our crops of corn, potatoes, &c. are nearly destroyed; and it is generally thought, so far as I have heard, and so far as my own observation extends, it verifies the opinion, that this peninsula cannot now, whatever rains may come, even the most favorable, make any thing like corn sufficient for its necessary consumption. Our clover fields are burnt up, with scarcely the appearance of vegetation upon them, even since the late rains. Indeed, the whole face of the country wears a most melancholy aspect. We made large crops of straw, in proportion to the ground sown in wheat; which was less, probably, from a fourth to a third of that which, some years ago, used to be put in that grain. The yield from the straw, however, is much less—say from twenty to thirty per cent.—than a fair average, owing principally to rust. The rye and oats crops also turn out badly. But enough of this lugubrious matter."

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"FROM LOUISVILLE, KY., August 17.

"We have had through the months of June and July, and so far in August, the most favorable weather; plenty of rain and the crops of wheat, corn, &c., are superabundant. Owing to the scarcity of plants, the coldness of the spring, and the low prices last season, there will be a small crop of tobacco made."

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COGGIN'S POINT, PR. GEORGE, VA., Aug. 26.

"Our corn crop, I much fear, threatens to be even worse than I had anticipated. The stalks had made so much improvement in growth, that I thought some weeks back, there might be some approach to an average crop made on this farm. A careful examination yesterday confirms my later and worst fears. Though the stalks look generally well, the number that are without ears I would suppose to be nearly one-third; and the remaining two-thirds are very indifferent. This is what I feared would be the result, from the burning up by the extreme drought (as formerly stated,) of so great a proportion of the tassels, before the exhibition of the silks; but the extent of injury from this cause is much greater than I had anticipated. All prospects of even half a crop here, I fear, are now dissipated.

Directly in contradiction to all such accounts, from these and numerous other less authentic sources which all the newspapers are full of, the following communication appeared in the 'Baltimore Patriot' of August 17th. We know not whether it was to this very positive, and seemingly very plausible statement, or to other causes, that was owing the latter part of the remarkable occurrence in the Baltimore market of a sudden rise in the price of corn, of 15 cents or more, in the bushel, and as sudden a fall to the first mark, and all within a few days.

[To the Editor of the Baltimore Patriot.]

"I having seen a dreadful account given in the public prints, concerning the failure of crops, which by all appearance, has caused a great rise in the price of grain. I, as a well known citizen of Baltimore, deem it my duty to let the commercial part of the citizens know the true state of the crops of grain in Virginia and North Carolina. I was continually travelling in the above states, from the first of June to the first of August, and have been accustomed to travel in the same states for the last eighteen years, and do say, I never saw such fine crops of corn and wheat before, in any place; and I heard it asserted, they excelled the crops of any season ever recollected, by the oldest farmers—the corn was getting hard then, and considered as good as made. Some of the farmers had succeeded in engaging their growing crops of corn at one dollar and fifty cents per barrel, but that price could not be easily obtained. I heard a farmer say that he did expect corn to be as low as one dollar per barrel, at the heap when gathered.

I write the above for the benefit of my fellow citizens, that they may know how to make their purchases. And if any gentleman should suspect me of having any personal interest in view in the matter, I assure them, I am neither a merchant nor speculator in any article whatsoever; and they can have my name by applying at the Patriot office. R."

If some of our subscribers, in every different region, would regularly furnish monthly reports of the state of crops, so as to enable us to present in extracts from their letters a full and authentic statement of the general condition of the country, it would be of great value, as information, to the readers of this publication, and to the country at large. One of the certain effects would be to prevent groundless panics in the markets, and also to extinguish such reporters as the author of the foregoing communication.

August 29, 1838. ED FAR. REG.

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EXTRACTS OF PRIVATE CORRESPONDENCE. SEASON AND STATE OF CROPS.

Hanover, September 5, 1838.

"We have made more than half an average crop of corn in this neighborhood, notwithstanding the long continuance of the drought. I have, however, seen many fields of corn between this and Charlottesville, which will fall below half an average crop. While in the neighborhood of William Fulcher, of this county, I understood that he had last year commenced seeding wheat the latter part of August, finishing in September; and that his crop was considered a good one. I did not see Mr. F. himself, but some of his near neighbors gave me this information. While I was in the habit of making wheat, I generally found the 10th of October to be the best time to begin: of course was much surprised to hear that seeding had been successful so much earlier."

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Brunswick, Sept. 8, 1838.

"The high price of the mulberry is retarding the culture of silk, much to its injury. I had determined to retain 20,000 of my best trees; but I could not stand the temptation of the price offered for them, in these dry and high-pressure times. I am extremely anxious that the culture of silk should succeed in this section. Our soil is gone—no lime, no marl—and the litter very poor with which we used to manure our lands, such as oak-leaves, &c. It is really discouraging to view the galls and gullies on our farms, and more fatiguing to walk over them; for the gullies are so wide you can't jump them; they must be headed. We must either turn our attention to some other crop. that is not such an exhauster of land, or desert the country. I am now done with the cotton and tobacco crops on my home plantation, and shall rely on the silk crop to sustain me; and, instead of improving a few acres of land for cotton or tobacco, I shall have time to manure double the quantity of land, which will increase my grain crop, so much needed at this time."

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September 10, 1838.

"I have no knowledge of the culture of the mulberry, or indeed of farming in general, other than that I have obtained from an occasional perusal of your valuable journal. Whilst sojourning at * * * * I picked up a number of your periodical to dispel an hour's dulness. I was soon interested; read each succeeding number with eagerness; became a convert to your opinion, that "more money, apart from the consideration of comfort and many other et ceteras, may be realized by a judicious system of farming in Virginia, than by the culture of sugar or cotton at the south;" changed my occupation and residence, and have now set down to attempt the realization of hopes which you have engendered."

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Goochland, Va., September 10, 1838.

"Now that the tops are taken from the corn, a tolerable estimate may be formed of the product. On the James river low-grounds, not more than half a crop will be gathered; while on the high-lands there cannot be more than one-fourth. No person that I have seen, has expressed a more favorable opinion than this. But the deficiency is not owing entirely to the drought. The chinch bugs have infested the country in myriads; and their depredations have curtailed the crops of corn nearly or quite as much as the dry weather. Not a farm, as far as my observation extends, has escaped their ravages; in some places they have been so numerous as to utterly destroy whole acres, besides materially diminishing the product of the fields at large."

Lake Phelps, N. C., Sept. 11, 1838.

"I cultivate the rich, low swamp lands of North Carolina, and this is the thirty-fifth crop. I have never known it suffer so much from drought. I cannot get more than two-thirds of a crop. My crop of wheat was as good in quality and weight, except once, (1805,) as I ever raised; but fell far short in quantity, averaging only about eighteen bushels to the acre."

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Montgomery Co., Md., Sept. 11th, 1838.

"There is a complete failure of every crop that is grown in my neighborhood, with the exception of wheat. Corn, tobacco, oats, and the whole list of culinary vegetables have fallen victims to the incessant, and yet unending drought of the past summer. The rye crop, though abundant in straw, yields little or no grain, and that very defective, in consequence of the heavy rains that fell in the month of May, when it was in blossom. I am fully convinced that there will be less grain made in our state this year, than there was last, when there was literally no wheat; and the crop, however good it may prove this, cannot make up the deficiency in the other crops."

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Fluvanna, 20th Sept. 1838.

"The equinoctial spell was ushered in this morning, with great parade of thunder and lightning; but as yet, (12 o'clock,) very little rain has fallen, and the clouds seem light and hard, though the wind is at a rainy point, and the *season* must bring more. Several days and nights of such as we have had, would be required to start our mills, of which three can grind in a distance of thirty miles, and I believe no others within fifty. The rains that fell about ten days ago, were confined to the lower country. Here, there was a heavy *dew:* in Albemarle, not a drop. The dust in the stage-roads of that county, was, yesterday, above the horse's fetlocks, an impalpable powder, and threatening to suffocate man and beast."

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On the 11th and 12th of September, there fell through eastern and part of middle Virginia, a most abundant rain. If too late to benefit the corn, it at least permitted the fallowing and ploughing of clover-ley for the next wheat crop to be commenced, in proper manner, though much too late. The rain did not extend to the upper country. The general inability to plough for wheat during the best season, and through the best clover and wheat region, must injuriously affect the wheat crops of 1839.

P. S. Sept. 25th and 26th.—Steady and abundant rain.—Ed. Far. Reg.

LATEST REPORT OF THE MULTICAULIS TRADE AND MANIA.

A late number of the Saturday Evening Post of Philadelphia, gives the following statement.

"The sales of mulberry trees have been very brisk for weeks past, even to the amount of several hundred thousand dollars. Many culturists who were disappointed in obtaining trees last year—or postponed purchasing on the ground that plants would be a drug and "as cheap as a broom" this year, have now taken "time by the forelock," and bought largely at higher prices than when they were "so very scarce and dear" six and nine months ago.

"The prices are so various, that it is nearly impossible to give exact estimates. Buyers say the price is 50 cents per tree—the sellers, that it is 75 cents.

"Within a few days trees have been offered at 15 cents, 17 cents, and 20 cents per foot, the root with one inch of stalk being counted as one of the feet, and some fine plants have been sold at $1, and $1.50 the tree. The general belief is, that nearly all the trees for sale within 40 miles of this city have been sold. The growers generally choosing to keep a large stock on hand for seed the ensuing season; and well they may like to continue propagating, for in many instances their profits have reached 1,000 per cent, while others who have not been so fortunate in their cultivation or soil, have netted 500 per cent. within the last six months."

A purchase has very lately been made of more than 20,000 young trees, untrimmed, from J. Atkinson, Esq., Pitt county, N. C., at 40 cents. Only a few of them are of the second year's growth, nearly the whole being from cuttings set out last spring, (1838.) But, as stated by the purchaser, the youngest trees are uncommonly fine, being nearly or quite 6 feet of average height; and some few of the youngest which grew on hog-pen ground, are nine feet high. These are strong evidences of the superior and remarkable fitness of the climate of the southern states for this valuable tree. It is now a matter of congratulation, that this large parcel is purchased for planting in North Carolina. The demand of purchasers from the northern market has been so great as to threaten to leave in the south but a small stock to plant next spring.

A gentleman who has a lot of multicaulis trees in Petersburg, has been offered, and refused to take $1 per tree, (untrimmed,) for all the trees of more than one season's growth. These plants are of the second and third season; but not having been taken care of, as to proper soil and culture, they are not six feet, average height, and of much less size than all ought to have in two seasons from the cuttings. Of some of the same original stock, (brought from the north when very small, and set out in spring of 1837,) but which have stood in rich land, a few entire plants have been sold at $5 a-piece. These were not the best. They had all been cut off near the ground last fall, and the whole of the present tops, (now 7 or 8 feet high,) are of this season's growth.

Contracts have recently been made here for some thousands of plants of the growth of 1839, untrimmed, and to be from 2 to 4½ feet high, to be delivered in the autumn of 1839, at 12½ cents the plant.

A friend has shown to us letters, just received in answer to his inquiries, from the owners of the most entensive nursery in New York, and another in Baltimore. The prices of both are copied below, not only for present information, but also for the admiration of the curious hereafter, when this mania shall have subsided.

The tariff of prices at which the New York establishment offers to sell, is as follows, for the plants, all the side-branches trimmed off.

Plants 1 to 2 feet high, - - - -	20 cents.
" 1 to 3 " " - - - -	25 "
" 1½ to 2 " " - - - -	22 "
" 1½ to 2½ " " - - - -	25 "
Plants 1½ to 3 feet high, - -	28 cents.
" 1½ to 3½ " " - - - -	31¼ "
" 1½ to 4 " " - - - -	35 "
" 2 to 4 " " - - - -	38 "
" 2 to 5 " " - - - -	45 "

The writer adds, that when the expected state bounty for silk is offered, that all the plants in the United States could not supply the demand in the state of New York alone.

The answer from the Baltimore nursery men, says, "We sold last week our entire crop at 22½ cents—50 and 60 cents per tree, without side branches."—"Cuttings with two eyes are now worth $60 per thousand."

A letter from another well-informed friend in Baltimore, dated September 22, states the recent sales between the speculators, have been at 10 cents the foot of length for trimmed plants, and 20 cents the foot for those not trimmed.

From the American Silk Grower.

MULTICAULIS PLANTS ON LONG ISLAND.

We are indebted to Wm. Kenrick, Esq. of Newton, Mass., who recently made us a visit, for some information concerning the mulberry prospects at the north and east. He informed us that his trees had prospered finely, and that he should have 100,000. On his way hither he called at the nursery of William Prince and Sons, on Long Island, and said that those gentlemen planted six acres of cuttings and three acres of trees. The trees had done well, but the cuttings had failed, or nearly so, as had all the cuttings that were planted on the island. He thought, however, that Prince and Sons might have 100,000, but not more. Why will gentlemen advertise ten times as many trees as they have growing? Will it not deceive and injure individuals and the public?

For the Farmers' Register.

ON SEEDLINGS OF CHINESE AND OTHER MULBERRIES.

In a late number of the Register, there are some editorial remarks to establish the fact, that seedlings of the morus multicaulis do not conform entirely with the characteristics of the parent. I have recently had an opportunity of making a careful examination of several multicaulis seedlings; and I can also certify, that, though there is a general family likeness, they are certainly different from their parent. At the same time, there is sufficient testimony to prove, that in some instances the resemblance is complete. Gideon B. Smith, of Baltimore, who is good authority on the subject, contends for their identity of character; and David Thomas, of New York, one of the most intelligent and scientific botanists in this country, assured me in the course of some remarks he made on the article "on agricultural humbugs," that he had several seedlings which were precisely like the original; and he had no doubt the multicaulis was a distinct species, and would produce its like.

It must now be admitted that the multicaulis will run into varieties; but does this prove that it is only a variety of itself? By no means. There is no species of mulberry that has been brought into general cultivation, that can be relied on to reproduce its exact likeness in all, or even in a majority of cases. Indeed, the whole family of *morus* seems disposed to be sportive; and the long course of culture to which they have been subjected, has contributed, as in the case of many other plants, to increase this propensity. Witness the rose and the dahlia, the varieties of which are endless, but which to this day would have retained all their original features, if they had been permitted to remain in their natural *habitats*.

I have recently examined a great number of seedlings of several species of mulberry. The varieties of the *morus alba* are endless, as is well known; and there is the same want of uniformity in the offspring of the Canton, the Alpine and the Brussa, respectively. In all these species there are a multitude of varieties which are totally worthless; and if the multicaulis was produced in the same manner and to the same extent, this character would doubtless apply to its offspring with the same force. But throughout all these diversities, a practised eye will, without any hesitation, assign each individual to its appropriate species. If the multicaulis could ever run into the white mulberry, there might be some reason for the belief that it was derived from that species. The white mulberry retains its glossy, brilliant foliage through all generations; and in the multitude of individuals which have derived their existence from it, none can be produced which a botanist could possibly mistake for the multicaulis. On the other hand, whatever shape the leaves of multicaulis seedlings may assume; however they may degenerate in size; it is equally out of the order of nature that they can ever take the specific marks of the white mulberry.

A most curious and remarkable instance of the sportive tendency of the white mulberry, may be seen at John Carter's nursery, near Richmond. The individual was originated on his grounds, near to where the *multicaulis* and the *alba* had both fruited; and different as it is in some respects, from any other mulberry plant which has come under my observation, yet its parentage is sufficiently obvious. I cannot concur with the originator, that it is a hybrid. In its growth it is rather dwarfish—the joints of the branches are not more than the fourth of an inch apart—the leaves are about five times as large as the white mulberry leaf,* but in shape and character very much resembling it; and upon each branch there is such a dense mass of foliage as entirely to exclude the stem from observation. It deserves to be propagated as a curiosity—or rather as a monstrosity.

TUCKAHOE.

From the Quarterly Journal of Agriculture.

USEFUL INSTRUCTIONS REGARDING THE MILKING OF COWS.

The operation of milking is performed differently in various parts of the country. In some, the dairy maid dips her hand into a little milk, and by successively stripping the teat between the finger and thumb, unloads the udder. The plan, however, is attended with the disadvantage of irritating more or less the teat, and rendering it liable to cracks and chaps, which are followed by inflammation, extending to the rest of the quarter. This accounts for the disease occurring more frequently among the cows under the charge of one milker than it does in those which are under the charge of another; and, as this practice is more common in some parts of the country than in others, it also accounts for the disease being more common in these parts. This plan of milking, where the irritation is not sufficient to excite the extent of inflammation to which I have alluded, frequently produces a horny thickening of the teat, a consequence of the cracks and chaps, which renders it more difficult to milk than when in its natural state; and at the same time predisposes to inflammation, when any case occurs to set it up. These effects may be, and are almost entirely avoided, by the more scientific plan of milking adopted in other parts of the country, where, instead of drawing down or stripping the teat between the thumb and fingers, the dairy maid follows more closely the principles which instinct has taught the calf. (The calf jerks its nose into the udder and forces down the milk.) She first takes a slight hold of the teat with her hand, by which she merely encircles it, then lifts her hand up, so as to press the body of the udder upwards, by which the milk escapes into the teat, or if (as is the case when some hours have elapsed between milking times) the teat is full, she grasps the teat close to its origin with her thumb and fore-finger, so as to prevent the milk which is in the teat from escaping upwards; then making the rest of the fingers to close from above downwards in succession, forces out what milk may be contained in the teat through the opening of it. The hand is again pressed up and closed as before, and thus by repeating this action, the udder is completely emptied, without that coarse tugging and tearing of the teat which is so apt to produce disease.

From the Farmers' Cabinet.

BROKEN LIMBS OF ANIMALS.

An idea prevails with many persons, that broken limbs of horses and other quadrupeds cannot be cured, owing to the difficulty of keeping the part sufficiently at rest during the time necessary for a broken bone to heal or acquire sufficient strength to support its share of the animal's weight.

I heard of a case, some months since, which was successfully treated in the following manner, viz: two pieces of scantling sufficiently strong to support the horse were placed over and parallel with him in the stable; a piece of strong linen was then passed under him and the two opposite ends confined to the scantling so as to raise him from the ground or floor when required: a wooden box was provided with a bottom, two sides, and one end, composed of boards nailed together, and of sufficient length, width, and depth, to contain the leg from the knee to the foot, inclusive, besides a space of half an inch or more, on each side of the leg to admit the necessary bandages, &c., with the bottom cut away sufficiently for the foot to enter and retain its natural relative position with the leg. The broken leg was confined in this box, and treated in the usual manner that bones are when broken, and the box together with the leg from the knee to the foot confined in a horizontal position or nearly so, by straps of leather or other suitable substances passed over the horse's back and the two ends confined to the box; the horse was permitted to put his other three feet upon the floor sufficiently to preserve a healthy action to the limbs, but not so as to permit him to displace the broken limb in the box and injure it. A cure was effected in the course of a few weeks. This was one of the anterior (or fore) legs. I see no difficulty in treating a hind leg by partially suspending the animal in this manner, and varying the other parts according to the particular nature of the case. Z.

Chester county, Pa., June, 1837.

NEW BRANCH OF THE RICHMOND AND FREDERICKSBURG RAILWAY.

We understand, that the new rail-road, (about three and a half miles long, to connect the Deep Run Coal Pits with the Fredericksburg and Richmond rail-road,) was opened on Wednesday last. The road is said to be admirably constructed. The field of coal in that region is very extensive. Several shafts are about to be sunk; and the enterprising Mr. Barr has already 150,000 bushels raised. This branch road has been constructed by the proprietors of the mines; and they are entitled to the privilege of bringing their coal down the main stem to Richmond, free of toll. When the road shall have thus been paid for, it will be transferred to the Fredericksburg and Richmond rail-road company.—[*Rich. Enquirer.*

MONTHLY COMMERCIAL REPORT.

The most important feature in the transactions of the present month, is the great advance in the price of grain. Inadequate supplies of wheat for the daily demand of the millers, first gave an impulse to the market; but accounts from England to the 10th August, by which it appears that while this country was oppressed with heat and drought, the very reverse prevailed there, and apprehensions were entertained of entensive injury to the grain crops, created great excitement in all markets. Prices advanced rapidly in England, and were expected to attain, in a few weeks, to the maximum average of 73 shillings per quarter, (of 560 pounds of wheat,) at which foreign grain is admitted almost duty free. Accounts to the 8th of this month, daily expected by the steam-packet, will, in a great measure, decide the question, as to the English crops. In Holland, also, the weather was unfavorable, and the stocks of old grain in the north of Europe were unusually small. The price of wheat consequently advanced in our markets until it reached $1 70 to $1 75 in Richmond, $1 85 to $1 97 in Petersburg, and $1 50 to $2 00 in the northern cities, where there is a greater diversity of quality. Some shipments of flour have already been made to Liverpool from New York and Philadelphia, at $9 00 per barrel. These may, perhaps, be considered rather precipitate, as the result of the crop is yet doubtful—a few days will decide it.

There have been sufficient rains below the falls of the rivers to revive vegetation; but higher up the country, they have as yet, (22d September,) been so moderate, that the water courses are not filled. Few of the country mills could grind, and interior navigation has been in a great measure suspended. The same state of things has prevailed to the north and west; so that supplies of grain and flour, which are represented as very abundant in the western states, will be moderate from thence until next spring. Corn has advanced to 95 to 100 cents per bushel. In the lower part of North Carolina, and in some of the lower counties in Virginia, the crop is said to prove better than had been anticipated; but, in the upper country, very deficient. The price of bacon has gone up to 16 to 17 cents.

The weather, for some days past, has been favorable for tobacco; but "*the stand*," (as the planters term it,) was so small, and the season is now so far advanced, that there is no doubt the crop will prove very short, even with a continuance of favorable weather; and, should there be a frost soon, a large portion of the crop will be destroyed. This article has attained to high prices: $6 50 to $13 60, embrace the extremes, except for a fancy article. The export to Europe has been moderate, as are the stocks on hand compared with former years.

The receipts of cotton, during the month past, have been very light. The quantity received in all our ports, since 1st October last, is now stated to be 1,808,000 bales, against 1,360,000, in 1837. The export, 1,580,000 against 1,155,000. Prices have been sustained, better than could be expected, under so heavy a supply. In this market, 10 to 11 cents is now quoted. A few hundred bales of the new crop, received at New Orleans, and represented as very fine, commanded $12\frac{1}{2}$ to $13\frac{1}{2}$ cents, while the quotation of old is 7 to 11 cents. The crops in Louisiana, Mississippi, South Alabama and Arkansas, are stated to be fine and abundant. From other quarters, the accounts vary. In North Carolina and Virginia, the crop is undoubtedly very short.

Exchange on England has recently been at $9\frac{1}{2}$ to 10 per cent. premium; but the importation of grain into Great Britain will tend to reduce the rate between that and other countries, to cause an exportation of specie, and to advance the rate of interest in England. X.

September 22, 1838.

P. S. *Sept.* 27.—The steamer, Great Western, has arrived at New York from Bristol, whence she sailed on the 8th inst. The weather in England had been generally favorable for harvesting, since the advices previously received; and there was some depression in the prices of grain. The average of the preceding six weeks, had, however, reached 72 shilings and 11 pence, or within one penny of the rate for admitting bonded wheat, at the duty of one shilling per quarter.—There would, therefore, be a very large quantity, (not less than a million of quarters) entered for home use, which would tend to reduce the price. This news has caused a slight decline here. In the prices of cotton and tobacco, there was little variation.

NOTICES AND REPLIES TO CORRESPONDENTS.

There is no authorised general agent or collector for the Farmers' Register IN VIRGINIA; nor will any be appointed soon, nor without notice being published. Some of the reasons for this departure from general usage, were stated at page 127, No. 2, of this volume, to which those who have made inquiries are referred.

There being no agent to receive payments is no impediment to these being made, whether by new or by old subscribers. In either case, if money is sent through a post-master's hands, or evidence is taken of a letter containing money, and properly directed to the editor, being committed to a post-office, the loss is the editor's, and the proper credits will be allowed, and the copies sent, upon information of the transmission, though the money may not have been received. (See the conditions of Farmers' Register.)

The notes of all specie-paying banks will now be received for subscriptions to the Farmers' Register. The banks having generally resumed specie payments, it is hoped that much of the inconvenience suffered by subscribers, and of heavy pecuniary loss by the proprietor, during the time of suspension of payments, may hereafter be avoided.

"A subscriber," whose letter was received through the post office too late in last month to be answered, is requested to refer to and read the "Address to the friends and supporters of the Farmers' Register," at page 63, No. 1. of this volume, for the explanations and reasons which he deemed wanting.

The author of the anonymous communication from the north, (accompanied by a private note signed, *as was then supposed*, by a real and responsible name,) containing serious charges against a large and noted seller of mulberry plants, is informed that it will not be published in the Farmers' Register, until sustained by known and undoubted authority. Our pages will always be open to well established statements, *from responsible sources*, of any of the numerous impositions practised upon the agricultural public.

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THE FARMERS' REGISTER.

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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

THE ACTUAL STATE OF SILK CULTURE IN THE NORTH, AND REMARKS ON ITS EXTENSION IN THE SOUTH.

To the Editor of the Farmers' Register.

Some years past, I have been endeavoring to collect all the information that was accessible on the subject of the silk-culture, with the view of engaging in it as soon as opportunity should offer. And during the past summer I made a visit to some of the northern states, for the purpose of more fully satisfying myself, by personal observation; and to see with my own eyes what was doing there, that might justify the glowing accounts that were published in the agricultural papers. It is now my intention to give, in as fair and impartial a manner as I am capable of doing, the results of my observations; interspersed with such remarks and reflections as they have suggested.

In these times, when so much is done for effect, and when every new enterprise is ushered before the public with so much pomp and circumstance, it is natural that the sanguine should be easily led astray, and come readily to indulge in all the extravagances which characterize the projectors of novel schemes. In regard to silk-culture, though I am perfectly convinced that it will be both practicable and profitable, and that its introduction into this country will become, or ought to become, a general thing at no very distant day; yet considering the progress that has been actually made, and the little that has been accomplished, the wildest calculations have been made of its profits; theory has run far ahead of practice; and very few of those who make such extravagant boastings have tested its real advantages by experiment.

Some years ago, when the subject was first agitated with so much earnestness, a number of incorporated companies with large capitals were established in the eastern states. The most of these have now an existence only in name. Some of the most prominent of them, by attempting too much, and by combining the manufacture with the production of silk, have entirely sunk their means. Others have failed to make any dividends, through the incompetency of agents, or in consequence of the high salaries that were allowed them. Others again, and perhaps all, in a measure, have transferred their zeal from the legitimate object of their establishment, to the tempting allurements held out by the high prices of mulberry trees; and not one, as far as my information extends, has done any thing towards extending the knowledge of the silk-culture amongst the people at large, or made any attempts to introduce improvements in the management of the worms, and in the art of reeling and preparing silk. In the excess of their early zeal, the natural order of things was reversed. Lands were provided, buildings and fixtures erected, before there was any food for the sustenance of the worm. Having begun at the wrong end, and been then diverted by other considerations from carrying out the original object of their design, they have failed to answer the purposes contemplated by their formation.

Whoever therefore, depending on the ostentatious parade with which silk companies have been introduced to the admiring gaze of the readers of silk and agricultural papers, visits New England or elsewhere, with the expectation of seeing the silk culture carried on by them, and of deriving the necessary information from them for his own guidance, cannot fail to be disappointed. He must go to private individuals for instruction; he must get access into families, engaged in feeding worms, and observe their practices and management. It is amongst them only that any thing has been done, or from whom any thing can be reasonably expected. The silk business, in its present state of infancy, will not justify a large outlay, with a view to carrying it on to advantage. And especially is it necessary to consult economy in those places where the white mulberry is depended on as food for the worms. There is not, at present, skill enough in the country to justify the employment of agents, except under the immediate control of the person interested, to superintend the feeding of a large number of worms. When the business shall have been perfected in families, and the process of making silk shall have become generally understood, so that given means may be relied on to effect given results, operations may be extended to a larger scale with greater prospect of success.

At Northampton I expected to see greater progress made in the silk culture than at any other place in the United States. It has claimed for itself the merit of being the pioneer in the great work. For years the Northampton paper has been applauding the efforts that have been making to introduce and extend it. We were led to believe that it was the head-quarters of the silk business—the fountain from which instruction was to flow like a stream, to gladden and enrich the whole country. A great silk company, styled *par excellence*, the "New York Silk Company," was established there at an early date—a large capital was subscribed—a farm of several hundred acres was purchased at a great price—upwards of one hundred acres were planted in mulberries of one kind or other—a large factory was erected at considerable expense—and there the work terminated. The farm is now offered for sale; and the operations of the company are to be confined in future to the factory. Not a pound of silk, as far as I was informed, has ever been produced by the company. Glowing accounts have also been given of a silk company at Norwich, in Connecticut. Before leaving Virginia, I had been advised to take that place in my route, and was informed that silk would be produced there this year, not by pounds, or by hundreds of pounds, but by thousands! During the time I remained in New England, I made diligent inquiries about Norwich, and could not learn that any thing was in progress there that would instruct or interest a visiter. These examples are given as a fair illustration of what has been performed by incorporated companies. At Northampton, however, we are promised better things for the future; and something has been done during the past season, both in the village and in the neighborhood, in the way of feeding worms. I saw one cocoonery, in which perhaps fifty thousand worms had just completed their labors; and another, erected on a large scale, in which nearly a million of eggs were in the act of being hatched. But there was a great scarcity of food; and liberal prices had to be offered to the owners of such plantations as were situated in the vicinity of the village, for whatever amount of foliage they could supply. So great has been the trade at Northampton, in mulberry trees, that out of the hundreds of thousands of seedlings which have been grown there within the last few years, the number of those planted expressly for feeding worms is very inconsiderable. Perhaps no place has dealt more largely in the article; and the practice of selling off so close as to leave none for feeding worms, has been the subject of considerable censure. A reformation has been promised in this respect; and I was assured by a prominent and enterprising culturist, that he was determined hereafter to retain the greater part of his trees for permanent plantations on his own grounds. Should he devote his energies to the silk culture, I know of none whose intelligence and qualifications are better calculated to insure success.

It is not my intention to charge either individuals or associations with a design to delude the public. On the contrary, I have no doubt that most of them were influenced by as correct motives, in advocating the adoption of the silk-culture, as generally govern the actions of men, willing to instruct others and promote their interests at the same time that they can do it with advantage to themselves. Neither do I believe that the silk culture is intended or expected to turn out a mere delusion. If companies have failed, individuals have been eminently successful; in a smaller way, it is true, but on a scale large enough to prove that the culture is both practicable and advantageous. A number of instances might be adduced to establish the fact that worms may be fed in this country, and carried through their various ages in perfect health; that the climate is admirably adapted to their welfare; and that silk of the best quality may be readily produced. The reason, therefore, that so little actual progress has been made, considering the much that has been said and written, and the great degree of public attention and even excitement that has been elicited in its behalf, is to be found in causes sufficiently obvious, and which have already been adverted to. The wonderful demand for the *morus multicaulis* and other valuable species of the mulberry, renders the cultivation of these plants the most profitable agricultural occupation that ever was followed in this country. A greater profit is to be derived from a few acres of land under this culture, than from large fields of wheat or corn, or even cotton or tobacco. As long as men will consult their interest, it is not to be supposed that the slow and tedious process of rearing silk-worms and reeling silk, however profitable it may be, compared with most other agricultural pursuits, will be prosecuted with full vigor, while the profit to be derived from the sale of the plant which constitutes the food of the worm, transcends in value that of the silk to be derived from it. While the demand for the mulberry continues to be extensive, and the prices high, it will be idle to expect that silk will be produced in large quantities. But in a few years, when the country comes to be well stocked, and the prices decline so much that sales can with difficulty be effected, a new state of things may be anticipated. There will then be no other resource but to appropriate the mulberry to its legitimate use; the community at large will be compelled by the force of circumstances to engage in the culture of silk, and we may then expect to see the business extensively flourish. In the mean time, the experiments that are making will lead to improvements in the management of the worm; every year will be adding something to the stock of knowledge, and contributing to ultimate success. The mulberry will shortly be in the possession of every family, or readily accessible to all; and no longer, as at present, capable of being monopolized by speculators, who having no interest in the establishment of the silk culture farther than to supply the plants, and never intending to follow it as a branch of industry, are intent only on deriving a heavy profit from them.

I am not one of those that object to seeing the mulberry sell at fair prices. If there was no demand for them, all attempts to extend the silk culture would fail. But I do object to making the mulberry culture and silk culture two distinct branches of business; and, above all, to the practice which many persons follow, of calling themselves *silk-culturists*, when they are only speculators in the plants, or growers of them for the market. None talk more largely of the benefits of making this a silk-growing country—none discourse more eloquently on the advantages to be derived from adopting the culture—while the main object is to create a demand for their trees. The press teems with "silk-growers' guides," and other publications, from the fertile pens of mulberry growers, demonstrating in glowing language the enormous profits of the silk culture. It would be desirable if public opinion could be brought to bear upon such persons, and compel them—a reasonable compulsion it would be—to appropriate some of their profits to the construction of cocooneries, in order to prove to those whom they are persuading to purchase, that silk may be profitably produced; and give them ocular demonstration that their trees are worth what is demanded for them. By this mode, the sale of trees might not be diminished; it would probably be promoted; but at the same time, every person would purchase with a knowledge of what he was doing; and the trees would fall into the hands of those who would endeavor to convert a portion of them into silk. Had this system been pursued, and light shed amongst the people, even the present high prices for the mulberry might not be above their value: at any rates, the demand would not be a factitious one. It is in truth a most valuable plant, if the silk culture is practicable, and deserving of higher appreciation, from the fact that it is reproduced with so much facility. Although the actual cost and labor of propagation are inconsiderable, yet its intrinsic merits so far surpass those of any other mulberry, that for an outlay of five dollars, a stock of plants may be obtained, in four or five years, capable of sustaining millions of worms. It would therefore be better to give even a dollar a piece for a few plants, than to give a dollar a thousand for the old white mulberry, which would only be fit to feed from, at six years of age, with a scanty supply of foliage, and difficult to gather, even then.

It is generally considered that the multicaulis is the most valuable mulberry in the country. In the southern states, and as far north as to New York, and even in some parts of New England, it flourishes with great luxuriance; and the roots, and even branches for the most part, will withstand the winters without material injury. But for the more northern portions of the United States, it is extremely doubtful whether it can ever be cultivated to advantage. It is certain that in the neighborhoods of Albany and Northampton, its growth is stunted; but local causes exist to render those places colder than any others in the same parallel of latitude. The soil for a considerable distance round them is so light and sandy, that it parts rapidly with its heat whenever the rays of the sun are withdrawn or excluded. For the northern and eastern states, however, there are other species of the mulberry more hardy than the *multicaulis*, of a rapid and vigorous growth, and furnishing leaves of a large size and in great abundance. Distinguished cultivators there have their particular favorites. The Alpine was introduced and is patronized by Saml. Whitmarsh, the Canton by Dr. Stebbins, and the Brussa by some gentlemen of Albany.* At Northampton, there is such a confusion of names, that persons residing at a distance have very little idea of what their mulberries really are. Instead of being designated in such a manner as to be readily distinguished from all others, the specific term of *multicaulis* is applied to species entirely distinct, as well from each other as from the multicaulis proper. Thus the Alpine is called the *morus multicaulis Alpinense;* and the Canton, the *Canton multicaulis.* Both the Alpine and Canton have sufficient merits of their own to enable them to stand without any extrinsic aid; and the appropriation of terms to which a definite idea has been long attached, is calculated to mislead and produce a false impression. The Alpine is only known as having been brought from the foot of the Alps, where it was called the *Chinese mulberry*, and is the same kind for which, under this cognomen, the gentleman that introduced it was made the object of so much obloquy a few years ago. The odium that was cast on him then, was, as I am now convinced, very undeserved. The merits of the controversy turned on a name; and that name appears to have been inadvertently adopted, or rather continued in conformity with the designation of the species in Italy, and not with the intention of passing it off as the genuine multicaulis. The effect, however, has been to impair his usefulness ever since.

If the silk culture has not advanced with the rapid strides, in the states where it received its first impulse, which were predicted of it; yet it has made some progress in other places, where it has been recently introduced. A much larger number of worms has been fed during the past season than has ever been fed in one year before; and complete success, as far as I had the opportunity of observing or ascertaining, attended the management of them. In New Jersey, Pennsylvania and Delaware, and on the Eastern Shore of Maryland, much more has been done than in any other parts of the country. A considerable stimulus has been given to the business, in some of those states, by the liberal bounties upon silk produced within their respective limits. A large proportion of the late crop of cocoons was reserved for eggs for another year; and even now the demand for eggs is almost as great as that for mulberries. The experience of this year has satisfactorily proved that even from trees, the growth of cuttings and layers planted in the spring, worms may be advantageously fed the ensuing summer. It is only necessary to retard the hatching of the eggs by placing them in an ice-house, which should be done before the warm weather in the spring comes on. By this means, they have been kept till midsummer. Under any circumstances, the hatching may very properly be delayed till the early part of June, which is probably as soon as worms should be brought out even in Virginia. The cold, wet weather of May, which is frequently a disastrous period to the young worms, is thereby avoided; and the natural time of hatching is only postponed about three weeks. Whether they can, for a number of years, consistently with the health of the insect, be prevented from hatching until the latter part of July, may be regarded as doubtful. The practice is so contrary to nature, that it will not be at all surprising if the effect should prove unfavorable. Neither would any necessity exist for it, if the culturist would reserve a small number of standard trees or roots, and make use of the two-crop worm for his second and third crops.

I have no information which would enable me to state with precision the quantity of silk that may be produced from an acre of ground. During the past season, one gentleman in New Jersey obtained from the sixteenth of an acre, a product at the rate of 56 pounds per acre, from trees of the first year's growth. Had the trees been a year older, the quantity of silk would no doubt have been fully doubled; and might have been still further increased by successive crops. The cocoons of this year were almost invariably firm and heavy; and I heard of no worms that fed longer than twenty-eight or twenty-nine days; the usual period of their lives being thirty-five days. This abridgment of the ordinary term of their existence, is to be ascribed to the high temperature of the summer; for we know that, under different circumstances, it is sometimes prolonged to forty days. The past season, hot and dry as it was, appears to have been very favorable to the health of the worms. I heard, on respectable authority, that a culturist in Delaware had fed 150,000 with a loss of not more than twenty. Among all that I saw, some of which were a good deal crowded, I observed no symptoms of disease, and heard of none prevailing elsewhere. One or two facts that came within my knowledge, showed that much care is requisite in the treatment of eggs when the hatching is to be postponed. It is acknowledged by all, that it is important to keep them dry; and to guard against the least admission of moisture, some persons put them in bottles and seal them air-tight. Whenever the eggs remained in this condition for any length of time, their vitality was entirely destroyed; while others of the same parcels, but treated with less care, hatched without loss.

* Charles Rhind, Esq., formerly minister at Constantinople, introduced the Brussa mulberry. See his communication to the Farmers' Register, page 55, vol. V.—Ed.

Without intending to make any invidious comparisons, and premising that there were many places where the silk culture was said to be thriving, which I did not visit, I have no hesitation in saying that there was more doing at Burlington, New Jersey, considering how recently the business has been started there, than at any other place which came under my observation. A considerable number of persons were engaged in feeding worms as well as in raising trees. A few extensive cocooneries had been erected, one of which was large enough to accommodate about a million of worms; and several others from one to two or three hundred thousand. The soil in the vicinity of Burlington, is light and sandy, and well adapted to the growth of the multicaulis. Indeed the greater part of New Jersey is admirably suited to the purpose; and the business is so rapidly spreading, that in a few years, that state will probably be much in advance of any other. Within a few years the improvements in the construction of cocooneries, have contributed greatly to the facility of feeding worms. The plan of those at Burlington, struck me as being rather superior to any I saw elsewhere. The necessity of handling the worms is entirely dispensed with by the use of hurdles of net-work; at the same time that the cleansing of the shelves and the removal of the litter are more easily effected. When it is time to change them, another hurdle is laid on the one containing the worms, and fresh leaves are sprinkled over it, which are always cut up by running them through a cylindrical cutting box. In a few hours, the worms attracted by the fresh leaves, get on the upper hurdle, when the lower one, containing the litter, is removed. In this manner, a large number of worms may be cleansed in a day, by providing extra hurdles. A better fixture for the accommodation of the worms in spinning, has been latterly introduced. On the lower side of the shelf immediately above, which is not more than twelve or fourteen inches distant, strips or laths, about two inches wide and three inches from each other, are fastened at right angles to the range of shelves, to which the worms mount by very simple ladders, and spin their balls along the junction of the strips and floor. This mode adds greatly to the convenience of gathering the cocoons, and the floss is removed from them free of the litter which attends the use of brush or dried leaves. A room thirty feet wide will admit of four ranges of shelves, three feet wide, leaving an aisle between each range, and also between the outer ranges and the walls, of three and a half feet. The number of shelves in each range will be in proportion to the pitch of the room; say six shelves for a room, nine or ten feet high. Each hurdle is three by four feet, and will accommodate a thousand full-grown worms. On this plan, a room of a hundred feet in length by thirty feet in width, with a pitch of nine or ten feet, will accommodate, without crowding, about half a million of worms at a time. But in a cocoonery, near Frankford, in Pennsylvania, which was not of much more than half these dimensions, six or seven hundred thousand worms were fed in June last, which spun well. They were, however, evidently too much crowded, as was shown by the small size of the cocoons; and had not the season been of the most favorable character, the whole brood would have been in danger of being swept off by an epidemic. In a small room at New Haven, in a house occupied by a Frenchman, which did not exceed ten feet square, he had successfully fed forty thousand worms, without the appearance of any disease amongst them. I saw a number of the cocoons, which were large and firm.

Many persons have amused themselves, and the public too, by making calculations of the great profits of the silk culture. It may be no difficult matter to state with tolerable certainty how many good cocoons will yield a pound of silk; but I think an error has been frequently committed by estimating the product *per acre*. Of mulberry leaves, as well as every thing else, the crop will be very variable, and depend on the quality of the land. If worms can be preserved exempt from disease, and good cocoons can be obtained from them, the number that an acre of ground will support, at the usual prices of land in our country, is a matter of very subordinate interest. It is only important when land is worth from one hundred to three hundred dollars per acre. When the value does not exceed five or ten dollars, as is the case with most of our lands, it is better to estimate the profits of the culture by the number of worms that may be fed, than by the quantity of land that it will require to supply them.

While so much is doing in some of the states to the north of us, for the advancement of the silk-culture, scarcely any thing has yet been attempted in Virginia. The attention, however, of some individuals, has been directed to the subject; and an interesting experiment in feeding worms has recently been detailed in the 'Farmers' Register,' by a gentleman of Brunswick. A very large cocoonery has been fitted up at Fredericksburg, which will probably be filled with worms next year. Other gentlemen are making arrangements to enter upon the culture. During the ensuing season, it is hoped that interesting results may be established by various persons. But, unfortunately, almost every tree grown in Virginia and North Carolina, with the exception of those retained to propagate from another year, has been bought up, and will be taken to Pennsylvania or New Jersey. The Virginia and Carolina trees have a decided superiority in the northern markets, and are sought after with avidity; a fact of which the cultivators here are perhaps ignorant. Southern trees are mostly produced from cuttings, while those of northern growth are raised from what are called *layers*—that is to say, a whole plant, both root and stem, is laid horizontally in a furrow, and covered over with earth. The young shoots sprout up so thickly that they make a spindling growth. Plants from cuttings, on the contrary, having more distance, throw out a number of side branches, and furnish a much greater supply of wood, which, besides that it is better matured by our southern sun, adds considerably to the market value. It would be desirable to know what number of trees have been grown in these two states during the present season. It will probably not fall much short of half a million; and next year, the number will no doubt be two or three times as many. But as long as we send them abroad, we are doing nothing towards the advancement of the silk-culture in our own state. And if there be any state in the union that would be more benefited by the introduction of this culture, allowing it to be, as is contended, both practicable and profitable, or whose soil and climate are better adapted to it, or where it can be prosecuted with greater economy in reference to labor, I should be at a loss to point it out. We occupy that position in regard to climate, which is too far north to admit of ours being a planting state; and too much to the south to be a first rate grain-growing or grass-growing country. We have extensive tracts of impoverished land in which the mulberry will flourish without difficulty, and where nothing else will grow. Our dry and long continued summers are eminently favorable to the health and prosperity even of successive crops of the silk-worm. We have in almost every family a number of unprofitable hands, either too young or too old to be put to constant employment; and the more intelligent portion of our colored population, remarkable as they are for their tractableness and powers of imitation, would soon learn to conduct all the operations of the cocoonery with neatness and skill.

Many of the states to the north of us have encouraged the introduction of the silk culture by legislative bounties; and I am convinced the wisdom of this policy will be justified in due course of time. If from causes already pointed out, but little has yet been accomplished in the production of the article thus encouraged, yet the ground-work has been laid, and the superstructure will be erected upon it. The seed has been sown, which will produce, some ten, some twenty, and some possibly a hundred-fold. It will, however, necessarily be a work of time. It may be another generation, and yet another perhaps, before it is established on a durable basis. But with a climate like ours, and with a species of mulberry superior to any hitherto known, the energies of the Anglo-Saxon race will eventually command success. The mental resources, the quickness of perception, the determined perseverance, which constitute the distinguishing attributes of this people, will enable them to triumph over every difficulty, and achieve all but impossibilities.

T. S. PLEASANTS.

Goochland, September 15.

For the Farmers' Register.

THE CROW (OR DAW?) A BIRD OF PREY.

Surry, Sept. 12, 1838.

A few weeks ago, whilst I was at a gentleman's house of this county, I witnessed an act in a crow, (the corn-dealer,) which was entirely new to me, and it may be so to some of your subscribers.

My friend and myself had been noticing his flock of young turkeys, then about a week old. He was complaining of the depredation and havock the crows were playing among them, saying that he expected to raise not one out of the whole. This excited much surprise, and induced me to watch for, and to notice the movements of, the crows. Whilst talking about them, or in a very few moments afterwards, there came one, (and crow he certainly was,) and immediately attacked the young brood, and after one or two unsuccessful efforts he succeeded in taking up one, in spite of every attempt of defence of the mother hen, and bore it off, in every respect similar to the hawk. It may be said, that this was a jack-daw, a smaller, and a different bird from a crow, as some contend. I, as well as my friend above, believe them to be one and the same bird. But whether crow or daw, it is immaterial; it was one of that family, and one of a large and full size.

By your reader, D. S.

From the Farmers' Cabinet.

A TRIP TO MARYLAND.

We passed over the bridge at Wilmington, into the rich alluvial bottoms of the Christiana creek, which extends nearly a mile from the city. The causeway is hemmed with two rows of beautiful trees, and surrounded with luxuriant pasture-grounds, that have, within these few years, been very considerably cultivated and improved. The high-land immediately connecting those rich bottoms, is gravelly and poor, but the immense amount of manure produced by the marshes, enables the farmer to force vegetation in every corner of his farm, and thus make his habitation a place of comfort and plenty.

The land through New Castle county is tolerably well improved; much of it is under cultivation, and the crops of wheat look well and bid fair to produce at least an average quantity; oats and corn not forward enough to form any opinion.

In Maryland, where the ruinous three-field system of farming prevails, the wheat looks bad enough to alarm one with the fear of want, notwithstanding some of her most intelligent citizens are inclined to the opinion, that the prospect is in favor of a medium crop.

As we advance towards the table-land that divides the waters which flow into the Delaware and Chesapeake, we find a kind of soil perhaps the most congenial to the growth of wheat of any in the United States, and why it is not a subject of deeper interest to the inhabitants of Pennsylvania, particularly to the enterprising citizens of Chester and Delaware counties, is a matter of some surprise.

In Chestertown we found land selling at five dollars per acre, and shell lime at six cents per bushel, neither of which seemed to excite any anxiety among the farmers, though the land was about a mile from the wharf, and the wharf within a few hours' sailing of the city of Baltimore.

On many of the farms upon the Eastern Shore, there are immense beds of shells spread over acres of land, and in some places six or seven feet deep, in a perfectly sound state, yet covered with mould, perhaps the growth and decomposition of grass and trees for many a century. A white oak that measured fifteen feet in circumference, had once reared his lofty head over those banks, but was now prostrate in a wilderness of underwood, with his tangled roots jammed full of shells, and most of them without any appearance of ever having touched the earth. Shells make the purest and best of lime; by a chemical analysis, it is found to contain little or none of those foreign substances that constitute from twenty to thirty, and in some cases, as much as forty-five per cent. of stone lime.

Shell lime can be had on the Eastern Shore at a very small expense, compared with what a Pennsylvania farmer pays for stone lime, even if he should be so fortunate as to have a limestone quarry upon his farm; and yet such is the desponding condition of agriculture in this country, that little or no attention is paid to the subject.

We visited Wharton Point, a high bluff of rolling-land that projects some distance into the Chesapeake, and forms rather a pleasant prospect of land and water scenery; but what was far more interesting, were the beds of shells which cover a space perhaps of fifty acres from one to six feet deep.

This property lies nearly opposite the mouth of the Susquehanna, which is constantly disgorging great quantities of all kinds of drift wood upon the shore. With this wood they burn the shell lime at an expense of about two cents per bushel.

The proprietors of this estate live in Delaware, and are making efforts to introduce the Pennsylvania mode of farming into the neighborhood; they have now on hand thirty-thousand bushels of shell lime, which is to be drawn out this season and spread at the rate of one hundred bushels to the acre for the next year's crop. We had taken with us small quantities of ruta baga, mangel wurtzel, and sugar beet' seed, and here we found a person willing to prepare a piece of ground to try the experiment of root-culture with the siftings or dust from the shells as a manure. We likewise engaged him to make an experiment upon an acre of poor land in raising of wheat. We directed him to turn the land down with the plough, spread upon it one hundred bushels of shell lime, sow it with three bushels of oats; when the oats had grown up and was beginning to change its color, roll it down, plough it in and sow the ground with two bushels of corn broad cast; about the second week in October, roll the corn down, plough it in and sow the ground with wheat. To give this experiment a fair trial, the oats should have been sown in the early part of the fourth month.

I am inclined to the opinion that the above plan would make the principal part of Delaware and Maryland produce twenty bushels of wheat to the acre, which, at $1.50 per bushel, would buy the land and pay all expenses of lime, seed and labor, and if laid down with clover, would, for a succession of years, produce good crops of hay and pasture. Such an investment of idle money would be more profitable than shaving notes at two per cent. a month, besides the additional security of real estate, and the satisfaction every generous mind must feel in the reflection that his labor has made two blades of grass grow where but one grew before. This peninsula possesses local advantages that few places in our country can boast. A soil peculiarly adapted to raising of grain, one that is easily improved and very difficult to wear out. It is watered with such a number of creeks, outlets and bays, that many of their farms are bounded by navigable streams, and very few indeed that lie further than five or six miles from a landing where abundance of lime and plaster can be had at reasonable prices, stone lime from the Schuylkill sells from sixteen to twenty cents per bushel, and shell lime at about half the price.

While so many are enamoured with the "far west," parting with their friends, their homes, and their fire-sides, for a prospect of buying land cheap, and being independent, for $1.25 per acre, could here buy hundreds of acres for less than nothing, compared with the wild lands of the west, and that too within a day's journey of three of the largest cities in the Union. I say less than nothing, for such is the depressed state of agriculture in the peninsula, that farms are often sold for less than the buildings, fences and other improvements have cost.

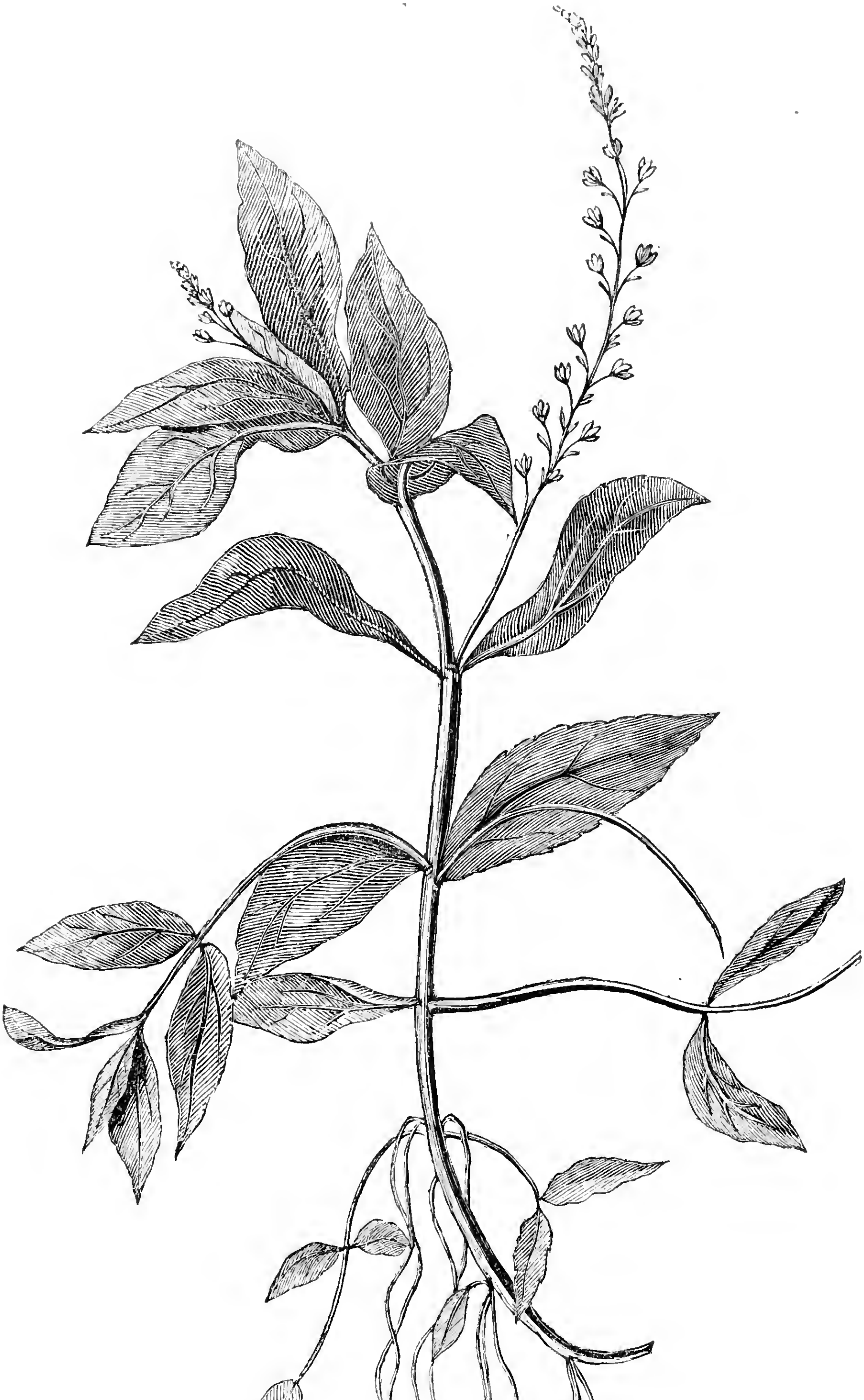
It is certainly a question of some importance, whether the worn-out lands of Delaware, Maryland, and other parts of our country cannot be improved at less expense than to clear off the almost impenetrable forests of the west. When we consider the time it necessarily occupies to clear and make ready for the plough a hundred acres of heavy timbered land, the expense of labor, where labor is not easily obtained, the distance from market, the privations and hardships inseparably connected with new settlements; it seems at least worthy of an experiment to ascertain the fact. A SUBSCRIBER.

Wilmington, Del. 5th mo. 18, 1837.

THE MARL INDICATOR.

It has been long and generally believed among the marling farmers of King William county, and the adjoining country, that the growth of a certain plant, in running water, indicates, with absolute certainty, the presence of marl, or beds of fossil shells, some where higher up the stream. The great value of any such indication, to those who are searching for marl, is obvious. We were informed of the peculiar rule of location of this plant several years ago, by our friend and correspondent, Dr. William B. Westmore, then a resident of King William; and, at that time, requested such particular information as would enable us to identify the plant, and, by publishing the description, to furnish all the readers of the Farmers' Register the means to avail of its use, in showing the before hidden presence of marl on their lands, or in their neighborhood. Dr. Westmore caused a correct colored drawing to be made of the plant, by a good artist who happened to be at his house; and from the drawing we have had engraved the representation which accompanies this article; and which, with our own description, may enable persons without botanical knowledge to identify the plant. But to those who possess any thing of that knowledge, (to which we have no pretension,) a much surer means of identification is offered in the following report of the botanical character of the plant, which was furnished at our request by a correspondent, who is much better informed on the subject, and to whom the growing plant was exhibited. His report was as follows:

"I carefully examined the plant you pointed out to me, when here, as indicating the presence of marl in the earth, or as growing only in streams supplied with calcareous matter. Though the flowers are very small, the botanical character is obvions, and easily determined. The plant belongs to the second class and first order of the artificial system, (*diandria monogynia,*) and to the genus *Veronica* of that order. Loudon describes 84 species of this genus, only one of which (*Veronica Virginica*, with a variety, *Incarnata,*) is American. This plant does not agree with any of the numerous species described by Loudon, and I very much doubt whether it is described by any bota-



The Marl Indicator.

nist. I would, therefore, be inclined to consider it a new and important species. Its botanical description is—root fibrous, stem smooth, leaves opposite amplexicaul, lanceolate, slightly serrate, flowers racemose, axillary, calix four-toothed, corolla light blue, entire base; lip four-parted, capsule two-celled. Should this be (as I think there is every probability) an entirely new species of *Veroncia*, would you permit me the liberty of suggesting a specific name—*Veronica Ruffinia?* If its presence is a sure indication of marl, it is a highly important plant, and your name is almost identified with marl."

We beg leave to decline the unmerited honor above proposed, as we have no claim to the discovery—and but only that of having appreciated the facts, as soon as they were heard of, and now of making them public. We should think the name of *Westmorea* more appropriate; but our friend Westmore also waives all claims to the discovery, and says, that he does not know who first noticed the connexion of the plant with marl. And if, contrary to the present supposition, the plant should in fact have been long on the catalogues of botanists, it will not the less deserve to be considered, for its peculiar quality now just brought to light, as a new and important agricultural discovery. We prefer for its name, the descriptive one of the "Marl Indicator."

But we have further evidence of this being in truth a new species, in the opinion of our friend and correspondent, Gideon B. Smith of Baltimore, to whom we sent the drawing to have it engraved, accompanied by a statement of the peculiar value of the plant, and a copy of the foregoing botanical description. His answer says—

"I cannot determine the botanical character of the plant from the drawing, but it certainly appears to be a Veronica. The description of the plant and the drawing agree perfectly, so far as I can follow the latter—the characters of the corolla, calyx and capsule not being distinct in the drawing [owing to their small size.] The plant is new to me; it is not described by Loudon, nor, so far as I can find, by Elliott, nor any other botanist to whose works I have access.

"It will be a curious and valuable discovery for the agricultural interest, should it prove to be in fact an indication of the presence of calcareous matter; and I shall certainly bear it in mind in all my botanical rambles."

We readily found this plant growing in several of the rivulets flowing through different beds of fossil shells, or marl, on our farm. For the fact that it is to be found in none other than such streams, we have as yet to rely on the information of others; and on the certainty of its absence as well as its presence agreeing with the absence and presence of marl, obviously depends the value of the "indicator."

The plant is an evergreen; it grows only in shallow water. The stalk is seldom more than a foot high; though we found some 2½ feet. It is so succulent and tender, that it droops and withers very quickly after being pulled up, and left dry; but when immediately placed with the roots in a bottle of water, it continued to live, and to throw out successive flowers for several weeks. It was in flower in May, and had not ceased to flower in the beginning of September. The flowers are very small, of a pale blue, or nearly of a lilac color, and appear in small clusters, or strings.

We have taken much trouble and incurred some expense, to enable our readers to identify this plant. It is hoped that many will search for it, and test its alleged peculiarity of location; and if observation should serve to disprove that peculiar character, it is further hoped that such observation and facts will be communicated for publication. To correct erroneous opinions, and mistaken facts, is as useful and as necessary to agricultural knowledge and improvement, as to announce new and undoubtedly true opinions and facts.

As no calcareous earth exists in the tide-water region of the southern states, except the fossil shell deposite, or marl as commonly termed, of course the growth of this plant, when found any where in that region, will always indicate that form of calcareous earth only. But if it grows among the mountains, and in more northern as well as more elevated lands, it will probably be found in all limestone streams.

AGRICULTURE OF UPPER FAUQUIER.

To the Editor of the Farmers' Register.

In fulfilment of a promise which I made you at the Fauquier Springs, I proceed, at as early a moment as it is possible to compose my faculties, after the stir and bustle of that deservedly popular watering-place, to give you some account of our agricultural operations in upper Fauquier. I could well have wished that this task had devolved on abler hands, and it is only in consideration of the honor done me by your request, that I now make the effort.

Before entering on the subject immediately in hand, I beg leave to be indulged in a few preliminary observations. Farmers scarcely ever write well, in consequence, perhaps, of the "difference between the diameter of a pen and a plough-handle." Be this, however, as it may, I consider farming, of all subjects in the world, the most difficult, in every thing which relates to it. To plough, to sow, to reap, garner and to gather; to sell, to buy, to use and not to abuse, are all apparently the most simple things imaginable; but, in practice, we know that each and every one of these operations are attended with difficulties which no novice can appreciate, and to overcome which, many men have utterly failed, even after growing gray in the service. And to render to the public a graphic description in detail of even a part of the mysteries of this wonderful trade, is found to be no less irksome, than to lead the operatives in the field.

On this subject, at least, the world has certainly had the advantage of a great deal of practice, without treasuring up, however, the benefits derived from much useful experience. The truth is, that from the diversity of soil, climate and the seasons, the operations of an agriculturist cannot generally be reduced to any fixed rules, and hence the knowledge of the art, is not, to any available extent, transmissible. The writings of almost all the agricultural associations and societies that ever existed, are now laid upon the shelf as useless lumber. Every man has to be the founder of his own system, and even *that* it is often necessary to change from year to year. In proportion to numbers, there are few good farmers in any country: and even among the best of them, success rarely results in the accumulation of large fortunes. A competency—a very moderate degree of independence, is all which the most of us aspire to, and even that, many fail ever to get. To make a good farmer, it requires a combination of prerequisites rarely to be met with in the same individual: he must possess the patience of Job, the wisdom of Solomon, the eyes of Argus, and the equanimity of a saint.

It is said, that between man and the earth there is a natural sympathy: the earth, "from which in sorrow he came, and to which in sorrow he must return." Every man, at some period or another of his life, aspires to the honor of becoming a cultivator of the soil; to plant a tree, the fruit of which he may never taste; to build a cabin or a villa; to enjoy a little of the "*otium cum dignitate*," supposed to be incident to the profession; to rear up an inheritor of his name and fortune, and to deck the bosom of that earth, in which he knows, at no distant day, he will find a grave.

Adam, our great progenitor, was a farmer, or, at least, it was intended that he should be one, even before his fall; for, when placed in Paradise, he was directed "to keep it and to dress it:" but he lacked experience, and managed his affairs very badly, for he lost his inheritance, "which brought death into the world, and all our wo," before he probably had pitched his first crop. Most of the patriarchs were graziers; and that rich old gentleman, Abraham, was one who did no discredit to the profession. In his entertainment of the three angels, who unexpectedly paid him a visit, his running "to fetch a calf, both tender and good," and his directions to his dutiful wife, Sarah, to cook the cakes on the hearth, we have a most beautiful picture of primeval hospitality and simplicity. The fare was plain and abundant; but how different the style from that of a wealthy herdsman of the present day!

To feed well, is one of those indispensable requisites, that cannot be too often inculcated. A farmer should feed every thing well, and last, though not least, he should feed himself well. His house should be the seat of social comfort, of hospitality and affluence. I hold no communion with your lank-visaged Shylock: he, who exacts "his pound of flesh," eats little himself, and drinks—he drinks water; and there is, after all, no real sociability without the occasional use of the "wine-cup." We are pleased with the caricature of a "turtle-fed alderman;" we are delighted with the admirably drawn character of Falstaff, the personification of good living, the very prince of good eaters and deep drinkers; we can pardon, at least, the vice of a hospitable "landlord, who never suffers a guest to leave his table, either sorrowful or sober."

There is no truth in the adage, "that there is no place like home, though never so homely;" many a poor fellow, with at least an ordinary share of the milk of human kindness in his soul, roams through the wide deserts of this cheerless world, until brought up at last by starvation and death, for no other reason, but that he has no home, or none at least with such endearments as to make life desirable—no blazing hearth—no smoking board—no prattling children—and worse than all, "no eye there, to look brighter for his coming."

A farmer should retire early to bed, and require no such monitor as Dr. Franklin, who once informed the citizens of Paris of the astonishing fact, "that at 5 o'clock the sun was up, and that it was quite light;" but with his eyes wide open, at early dawn, let him "first see that all is right, and then go ahead," without the necessity, however, of wending his way, either to "the Devil or to Texas."

I cannot speak for others, but I know that farmers like a warm fire—a cheerful candle—a comfortable bed; they like to dream of pleasant times that are past, and of a joyous prospect to come—"of wife, children and friends"—of fat beeves, of full hog-pens, of heavy stack-yards, with real old-fashioned Bonaparte pieces booming in the distance.

After this long preamble, it is time to come to the real object of this letter, and, to do it to your satisfaction, I shall try and "begin at the beginning." Fauquier county is one of the largest and most populous in the state, east of the Blue Ridge Mountains. It is composed of two large oblongs, joined together by a narrow neck of land, just at Warrenton, a little above the White Sulphur Springs. The land in the lower section is not good, the upper and larger section I shall now attempt to describe. From Warrenton to Salem, there is a good deal of poor land, but above Salem, in the direction of Farrowsville, Upperville and Middleburg, the land is generally excellent, some very tolerable, and only a small portion ordinary. The country generally is broken, rough, rugged, hilly, mountainous, stony and rocky. It is as healthy as Montpelier, and as finely watered as any portion of the habitable globe. It is a fine farming country, though not picturesque; it is occasionally romantic, but not generally pretty.

A traveller, in passing along any of the public highways, would not be impressed with the beauty of the scenery, the good appearance of the houses, or the excellence of the cultivation. Wood is in many places scarce; but still Volney would pronounce it, in comparison with France, "a great forest;" so great is the predominating effect of wood land over cleared and open fields. The general surface, as presented to the eye, is not only rough and broken, but intersected by numberless branches and little swamps, left for the most part intentionally uncleared. These, though unsightly, answer the double purpose of protecting the springs and streams of water, and of affording shelter for cattle.

The soil, in its natural state, is generally good, but not first rate, as compared with that fine region of country in Maryland, between Hagerstown and Frederick, or with some localities beyond the mountains. As far as I have been able to ascertain the fact, it is composed of seven-tenths of clay, two-tenths of sand, and the remaining tenth of vegetable matter, a little iron, and a small quantity of calcareous matter, with a substratum of stiff red clay. There is certainly too little *humus*, and probably too much clay for a perfectly good soil, or for it to be ploughed easily.

Large crops of wheat are grown in upper Fauquier, and we consider it an excellent soil for that grain, and inferior only to good limestone land; for corn and oats, it is better than any limestone; for rye, it is unsuitable; but for grass, when aided by plaster, it is unsurpassed by any land in America.

This fact points to a source of profit in grazing, to which we have not been slow in resorting—as many cattle being fattened in this section of country as in any other area of equal extent in the Union.

We sow a great quantity of clover and other grass seeds, and use plaster liberally on every plant which we attempt to raise, and this sometimes acts with an energy truly astonishing. We work well—we plough well—we cultivate well. But what constitutes good cultivation? not certainly the deepest ploughing, as supposed by some, or the most frequent ploughing and harrowing, as advocated by Tull. Without pretending to any skill in definitions, I should say, that is the best cultivation, either for wheat or corn which most completely destroys, or holds in obeyance, all spontaneous vegetation, so as to give the crop a monopoly of the soil. The *most perfect* cultivation for wheat would be, to plough in the spring, to cross-plough after harvest, harrow—sow the seed, shovel in, and then harrow again. But this is not the Fauquier method of doing the business; neither is it the best way: a single good ploughing, by which I mean that the surface should be completely turned under, with the wheat sowed on the rough surface, if there be not too many clods, and then two good harrowings are all-sufficient.

The reason for this is very obvious, which it may be as well perhaps to state. When land is first ploughed, the vegetable matter turned down undergoes a decomposition more or less violent, agreeably to the presence of heat and moisture. When the grain is sowed, immediately after the ploughing, it receives the gas as it is generated, like a plant in a hot-bed. But if the land be ploughed a great while before seed time, there is a loss of all the volatile part of the manure, which failed to combine with the soil. And the same reasoning is applicable with still stronger force to the corn crop. Fall ploughing for corn is now very generally abandoned.

In farming, generally, we use much less manual labour than our brethren in lower Virginia; we depend more upon the cheaper service of the horse and the ox. The plough has in a great degree superseded the use of the hoe. It may be admitted, however, that we have too little manual labour. And this proceeds from necessity. The "cotton fever," which raged so intensely a few years since, to the south, not only carried off some of our most active and enterprising people, but deprived us to a very injurious extent of our negroes. I shall not stop to bandy words with those who may deem this a blessing; it is sufficient for my purpose now, barely to state that we, whose interest is most affected, view it in a very different light.

In a country so rough as this is, where there are so many stones, both in the ground and out of the ground, and so many fences yet to be made out of them, a very strong force might be used to advantage, independently of that which is necessary for mere cultivation. The farms, also, are generally rather large, with a strong, but very natural tendency to accumulation in the hands of the few, to the exclusion of the many. "The rich are becoming richer," but the poor, not being willing "to become poorer," are going where they can "get richer" too—they are going to "the great West."

A great deal is generally supposed to depend on a judicious rotation of crops; but the most important thing at last is not to cultivate the land too frequently in any crop. Exposure to the influence of the atmosphere is of much more injury to a soil, than the loss of that portion of vegetable matter, which constitutes a part, and only a small part, of the food of plants. A quick rotation is generally adopted, from the fear of the effects of blue grass; but this, like every other vegetable, or animated production of the earth, has its period of youth, maturity, and decay, and a sod of five years' standing is more easily subdued by the plough, than one of three, besides possessing the advantage of being able to bring from a fourth to a third more grain. The grazing of so many cattle enables the farmers of this neighborhood to keep a large portion of their arable land constantly and profitably in grass. This accounts for the rapid improvement of the country, and the prosperity of the people.

The proprietors of upper Fauquier are generally the builders of their own fortunes. If we have few very rich men, we have, on the other hand, not many that are poor: the great mass is composed of "middle interest men," the bone and sinew of every country. Some of the refinements and luxuries of the world may yet be wanting, but we live abundantly, and, I hope, hospitably. To the ornamental part of our profession but little attention has been paid; our farms have nothing of that garden-like appearance, with which Hazlitt was so delighted on a long journey through Lombardy; neither are our dwellings embowered in trees, or embellished with tasteful enclosures, and the beautiful shrubbery and flowers of the sweet little cottages of England. But, the Bible says, "there is a time for all things." We now "go for the main chance," and hope to leave to our children, the means, and there will be plenty of room, for the exercise of all their taste in ornamental agriculture.

I remain,

Your obedient servant,

R. B. Buckner.

St. Bernard, 20th September, 1838.

For the Farmers' Register.

THE THEORY OF MANURING WITH LEAVES, SUPPORTED BY A FEW EXPERIMENTS.

There are no truths in the science of agriculture, not immediately obvious to the senses, more susceptible of proof, than that much the greater part, if not the entire substance, of every vegetable is constituted of precisely the same elements, or materials, merely differing in their proportions; and, consequently, that every vegetable substance, when suitably reduced or decomposed, is food for growing plants of other kinds. Hence it must necessarily follow that every kind of vegetable matter must be an alimentary manure; and if it does not act as such, or to much extent, that it is not because the substance does not possess the raw material of which to make manure, but on account of some inconvenience attending its form, or defect in the mode of application.

Upon such grounds, theory would pronounce, even if practice had not at all confirmed it, that the leaves of trees furnish a material for alimentary manure; and, in as much as the quantity in the reach of most farmers in Virginia, is super-abundant, that this resource for fertilization, if properly used, would be of incalculable value, on all lands so constituted as to be profitably enriched by any other vegetable manures. On soils wanting this proper constitution, profit is not to be expected, either from leaves, or from far richer vegetable manures.

But, putting theory aside, (as its authority is deemed of but small value by most cultivators,) there are enough examples, in the regular practice, and the results, of many successful farmers, to place beyond question the advantage and profit of using leaves as manure. Many striking facts of extensive and successful use of leaves as manure have been reported in the Farmers' Register, in the practices of sundry good farmers, and profitable enrichers of land.

Still, however, many other farmers have commenced, and made, for a while, energetic efforts to collect and apply leaf-manure, and have encountered so much trouble for so little of appreciable or manifest improvement, that their efforts soon slackened, or totally ceased, because they were supposed not to be compensated. Such was the impression and the course of the writer of these remarks, after a very large use of leaves for one year. But being now satisfied that the failure was owing to his own improper practice, and not to the want of value in the material used, he will state what he believes to have been his and the general errors in the mode of application; and the few facts since ascertained, as well as the reasons, which recommend a different and cheaper mode.

Though nearly the whole of every vegetable substance is a material for manure, and capable of becoming food for growing plants, it is far from being the case that all, of any one substance, is ready so to act at any one time. And it may well be with some substances, which strongly resist rotting and decomposition, that the portion which is fit to feed plants is so small, at any one time, and the proportion of the unfit (and for the time, therefore, hurtful,) so large, that no profit, or perhaps benefit, would be derived from the most abundant applications. No part of vegetable matter is ready to act as manure, unless it is at the time soluble in water; as it is only when fluid, and dissolved, that it can be taken up by the very small absorbing mouths of the roots of plants. (See Davy's Agricultural Chemistry, Lect. I, and VI) Therefore the deduction is clear, that if of 100 pounds of leaf-litter, applied as manure, 5 pounds only are soluble, the other 95 pounds are, for the time, useless; and, if buried in or mixed with the soil, may even be injurious to the crop. Saw-dust is a vegetable substance, containing still less soluble matter, and is very slowly decomposable; and though its entire substance also is capable of becoming food for plants, and of course manure for the soil, yet it has not been found worth using, in any common mode of applying manures. Tanner's spent bark, also, for immediate or speedy action, is worthless as manure, and would do more harm than good to the first crop. Vegetable substances, of a more decomposable nature than these, when under a low temperature, continue undecomposed, and of course insoluble, for ages; and, in that state, are a cause of sterility, instead of being manure to the covered soil. Such are the peat lands of Scotland, and other cold and moist countries. In such regions, there is but little of naturally poor land which, if let alone, will not, in the course of time, be covered with some inches' thickness of peat, or pure and solid vegetable matter, formed from the annual dying and deposite of the plants growing thereon; and in the most favorable situations, this covering of inert and almost barren vegetable matter, increases to many feet in thickness. Yet all these vegetable substances are still composed of materials fit to be converted to food for plants. This conversion of peat has indeed been made, in practice; and not only in scientific experiments, but economically, and profitably, in practical agricultural improvements. The means used were to make the peat into compost, with both alkaline and highly putrescent animal manuring substances, so as to induce fermentation and decomposition in the before inert and dead peaty matter. Such would be the case with any other of the least decomposable and soluble of other vegetable matters. But though theoretically true, it may well happen that the returns from some such substances would not compensate the labor and other cost of converting them to active manures. Such, however, is not the case with leaves; which, in this climate, are not too slow or difficult to decompose, even without any admixture of either alkaline or animal matters, and which are far richer in nutriment than the more intractable and insoluble substances named above for illustration.

But while maintaining the value of leaves to be important, on account of their great quantity, and usual cheapness, it is not pretended that they are to compare in richness, bulk for bulk, with straw. Upon the grounds stated above, it is presumed that their whole substance is a fit material for food for plants, and therefore may be entirely converted to manure. But still it will be a poor manure, in comparison to most others in common use, and of established value. Articles of food for plants, like those of food for animals, may be altogether nourishing; but yet nourishing in very different degrees. Thus, though meat, bread, and potatoes, are all excellent and nourishing food for man, still the nourishment received from an ounce of meat might be as much as from six ounces of bread, or from twenty of potatoes. And still the potatoes may be the cheaper and more fattening and profitable food, if, to a starving people, forty times as much in quantity can be furnished as of meat, at equal cost. This is the mode in which the value of leaves should be estimated, in comparison with farm-yard and stable manures. And the farmers who commence their use will be disappointed in the results, if they make their cost (in the labor of preparation and application,) equal to that of farm-yard manure, or expect equal effects, from equal quantities.

In applying leaves, and in large quantities, as manure, the first object of the farmer should be to make the mode of application as cheap as possible; and the next, to prevent any of its effects being actually injurious. Neither of these objects are usually attained; and hence the many disappointments in the early practice, and the general relaxing, if not entire cessation of effort in this direction. Such was the result of my own early and very extensive use of leaves; although I did not commit both these usual errors, but only the one of making the application too laborious and costly to leave any *certain* profit. My erroneous and unprofitable applications were very large; those made on more correct views, and giving satisfactory results, are more recent, and comparatively but small.

In the beginning of the winter of 1832-33, I first commenced the use of leaf-litter on a large scale, and with a view of making it a regular part of the operations of the farm. My land had then been all made calcareous, (by shell-marl,) and the soil, therefore, was then fitted, though incapable of it before, to be profitably enriched by the use of putrescent manures; and the efforts to accumulate them, and the care in saving and applying them, (which had been but small while the marling was going on,) had been extended since a year or two, much beyond my previous habits, or the general careless habits of our country, though still they were very far behind what good and improving farming would require. The offal of the grain crops were all used as food or litter for the farm-teams and a small stock of cattle, and were applied, well or ill, to the crops. My difficulties and doubts as to the best mode of securing the value of manure, and sundry experiments on the heaping and fermentation, were presented in several pieces which were published anonymously in the Farmers' Register, at page 136, vol. I, and pages 497 and 669, of vol. II. It is enough here to say, that my general mode was to have all the vegetable matters trodden by the stock in the stable and barn-yard; and the only question in applying was, whether fermented or not, or to what extent and in what manner to carry the fermentation of the manure. This was the state of things, when, by heaping the leaves in the woods, my bulk of litter was nearly doubled. For so small a stock of mules and cattle as mine, the offal of the crops had before furnished more than an abundance of litter, for profitable admixture with the animal matter. And by adding as much more, of a still poorer material, there was probably not much value gained merely by the mixture, (or more than the leaves might have had in a separate and cheaper application,) and the whole labor of hauling, in and out, heaping, loading, spreading, and ploughing in, was doubled. The portion of benefit due to the leaves alone could not be separately estimated, or fairly appreciated; and, with all the desire felt to find a favorable result, the whole benefit from the manure was not enough to admit of allowing much profit to have been derived from the leaves. Without being able to make any fair estimate of the whole benefit derived from the winter's manure, and not even to approach an estimate of the leaf portion of it, the result, as to the latter, was altogether discouraging. There was no evidence that the application had paid for the labor.

Another mode of application had also been tried on from 10 to 20 acres. It was evident that the passing all the leaves through the cattle-pens would require more labor in the after-operations than the farm could spare. Therefore, the leaves, as raked up in the woods, in mid-winter, were hauled directly on the land designed for corn, and dropped as thick as they could be ploughed in tolerably well, after being spread, by ploughs running 6 or 7 inches deep. The quantity to the acre is not remembered; nor can I say what the *supposition* was of the benefit derived to the next or any succeeding crop, as I did not reside on the farm; and not long after, my personal attention was almost entirely withdrawn. But this is certain, that there was not enough benefit to promise reward for that mode of applying leaves.

These results were discouraging, and to most persons would have been sufficient proof that leaves were not worth using. But I had been satisfied, from the beginning, that there were great objections to all the methods tried, and that no fair trial could be made, or full value known, until these defects of practice were avoided. A small experiment of what was deemed a better method, helped to strengthen my opinion. Still, the wretched superintendence and consequent bad management of my farm for some years, and latterly the want of spare time, and other labor, have prevented the reducing my plans to practice until last winter, and then not to half the extent that is hoped to be reached in the approaching winter, and henceforward.

The defects, which should be avoided, will first be stated; and to know these defects, it is necessary to recur to the chemical constitution of leaves, in different conditions, and to the established principles of the nutrition of plants. It has already been stated, that nothing can act immediately as food for plants, except it be then soluble in water. Therefore, whether it be of the richest rotten farm-yard manure, or of recently-fallen and unrotted leaves, the only parts that are ready to serve as food for plants is so much of each as can be dissolved in water by being soaked in a sufficient quantity, and for a few hours, or days. The soluble proportion of the rich and rotten manure would be very large; and of unrotted leaves, very small. But small as may be the latter, it is rendered less, if not for the greater part removed and lost, by every heavy and thoroughly soaking rain that falls, and which must dissolve and carry off, or into the earth below, most of the extractive or soluble parts of the leaves so treated. But the wetting promotes decomposition, and consequently, the conversion of insoluble to soluble matter; and whenever another heavy rain falls, there may be again formed as much or more soluble matter as before, to be again dissolved, and again lost. Thus, though it may take five or six years for the leaves of one year's deposite on poor wood-land, to rot entirely, and though, in that time, all the parts may have been successively soluble, and ready to feed plants, still, at any one period the quantity then ready to act was very small, and the value of the whole was made less and less by every successive rain. Leaves which have been two or three years lying on the ground where they fell, and are rotten and much reduced, appear richer, and more like manure, and perhaps may be more fertilizing at the present, than newer leaves. But still the former have already lost, by decomposition, and washing by the rains, half their bulk, and more than half their strength.

According then, to this reasoning, the first error which is generally made in collecting leaves, is to prefer the old to the new, and to be regardless of the lapse of time, and exposure to rains, both of the new and the old leaves.

Some farmers, who regularly collect leaves to litter their stock, and make manure, and who have more wood-land than they need to rake every year, divide it into several portions, and rake each portion in succession; so as to get as large a proportion as possible of the oldest and most rotten leaves. Their course should be precisely different; and if new leaves enough could be secured, and with equal ease, it would be better to let alone those of previous years, which have been already robbed of the greater part of their fertilizing ingredients. It is not meant that, when raking a piece of wood-land, the lower and older leaves should be left. That would cause much more trouble in the separation, than gain in the difference of quality. But, after having once removed the whole cover of the leaves, it will be more profitable to rake the same land every succeeding year, and thus obtain recent leaves only, rather than to go elsewhere for a thicker and more rotten layer, formed principally of leaves which have been soaked in every rain that has fallen in two or three years. This opinion, however, is deduced entirely from reasoning, and has not been tested by experiment.

If, however, in the absence of proper experiments, any one doubts the great waste of the soluble matter of leaves, let him take some that have recently fallen, and are quite dry, and soak them for 12 hours in a vessel of water; and the color given to the water, alone, will show that there is much loss, in that short time. Every heavy, or long-continued rain, has fully as much effect on all the dead leaves then exposed. The much greater part of this matter extracted by infusion, sinks immediately into the earth below, and is not seen, and, therefore, cannot be appreciated. But, on poor soils, (or all very deficient in calcareous matter,) after heavy and continued rains, the puddles and streams of water are all more or less deeply tinged with the brown-colored extract from the leaves; and the permanent streams, mill-ponds, and even lakes and rivers formed of water flowing from such lands, are always so colored. Such examples are numerous in lower Virginia, wherever the lands are naturally poor, and there is no calcareous matter in the soil over which the water passes. No such coloring matter remains in the water on calcareous strata, or on good natural soils, the goodness of which is evidence of lime being contained. In such cases, the vegetable extract is seized on by, and combines with, the lime, or the soil containing lime, and is saved for fertilizing use, if the soil is in a state fit to produce any valuable crop. But, if the land on which the colored water flows, or stands (in ponds) or sinks into, has not the natural constitution to enable it to attract, and chemically combine with, vegetable extractive matters, or vegetable manures, then this kind of food for plants will not be retained, nor be profitable to be applied thereto, any more than other putrescent manures on the most ungrateful soils. The propriety and profit of applying leaves, as of every other putrescent manure, of course depends on the fitness of the soil to receive such benefit. This is not the place to set forth the causes of such different qualities of soils, (and which has been done elsewhere,) and in all the remarks on the benefit of applying leaves as manure, it is understood to be on soils which would return good profit for the use of other vegetable manures.*

* See Essay on Calcareous Manures, second edition, chap. 2, 3, and 8.

If the opinions expressed above are correct, the proper practice in collecting leaves, and one totally different from the common mode, may be readily inferred. Those who collect leaves for manure, seldom rake up and heap any soon after they have fallen, and before they have been soaked by many successive rains. The raking is most generally done at leisure times, in the latter part of winter and in spring, and is sometimes continued through summer and autumn, to nearly a year after the newest of the leaves have been lying on the earth, soaked by rains, and wasting continually. If this litter, so used, is found highly advantageous by improving and judicious farmers, (of which there can be no doubt,) it is even more certain that their profits from it would be much greater, if the collection and application were made without permitting such waste previously to take place.

The raking up and heaping of the leaves, in the woods, ought to be effected as soon as possible after nearly all have fallen in the early part of winter. The work is done much the easier if the leaves are wet; and therefore a slight or slow rain, just before, is desirable. Even a single heavy rain, if not continuing very long, may assist the collecting and removal of the leaves, more than it will diminish their soluble and enriching parts. Besides, by being put up wet, decomposition will proceed in the heaps; but if heaped dry, and especially if principally of oak (or any other than pine) leaves, the upper part of each heap, forms a thatch almost impervious to rain, and the interior of the heap may remain dry and unchanged for a year. Every effort should be made to have the leaves raked up, and put into good stout heaps, as early as possible after the proper time. But after being heaped, and secured from the wind by a few hoefuls of earth, they will lose little or nothing by waiting months, or perhaps even a year, for a convenient time to be carted away and spread on the fields.

The poorest lands, when not annually raked, yield the greatest bulk of leaves; because the acidity of such soil retards the rotting so much that the leaves of five or six years may be on the surface at one time. On calcareous and rich soils, there being not only no acid, but also a strong chemical action or attraction between the soil and any vegetable matter in contact, the leaves soon disappear, if not raked up and heaped. On a small piece of wood-land, of soil both calcareous and very rich, I had the leaves raked into heaps during winter; and when hauled away the next autumn, the heaps were well rotted, and as "short" and as black as old fermented and dry farm-yard manure. Heaps made about the same time on the poor huckleberry ridge forest lands, in the same space of time were but little altered.

The greater proportion of pine there is in the forest growth, the more valuable the cover of leaves; and of course the old worn-out lands, bearing a second growth of unmixed pine, are the best to furnish this manure. There is more of substance and weight in the same bulk; the pine leaves are more easily handled in every process; and from their narrow and compact form, they oppose no impediment to the young spires of any crop on which they may be laid, and for the same reason they are not liable to be carried off by the winds. Farmers more experienced than myself in their use, and whose opinions are therefore of more worth, also believe that pine leaves are richer, than those of the other usual forest growth, whether comparing weight of litter, or the spaces of ground furnishing the different kinds of leaves.

The next greatest error in leaf-manuring upon a large scale, is passing more of the leaves through the farm-yard, or stable, than are needed for plentiful litter to the animals, and as a vegetable material to absorb and mix with the richer animal matters. When so poor and so slowly putrescent a substance as new or dry leaves are used as litter, and in very great quantities compared to the richer ingredients of the whole mass, the manure will not be fit to use profitably for corn, or other spring crops, without its being heaped, and more or less fermented and reduced. This labor, and this source of loss, would be a serious matter, besides the having double handling and hauling of the leaves, before applying them to the land.

If, to avoid the heavy cost of twice loading and twice carting of many hundreds of loads of leaves, they are taken at once to the field, and spread and ploughed under, unmixed and unrotted, then another great loss will be sustained, in the trouble of ploughing under, and afterwards among, such a cover of unrotted litter, and the early unfitness of the leaves to nourish or help the growing crop, even if it does it no positive harm (as would seem very likely) in a dry summer. If left to choose between these several modes of application, it would be difficult to decide in favor of either; and it may well be doubted whether either, on a large scale, and requiring much of the regular labor of a farm, would be of much profit. But judging from reason, more than from my yet but small experience, it still seems manifest that all farmers who can easily obtain leaves, in great quantity, and will put them on soils fit to receive improvement, and on a different method from any of those above described, may thereby improve their land and their profits, greatly and cheaply. My proposed plan is the following:

1st. To make and heap as much leaf-litter, in the woods, as the demand for other farm labors may permit, early in the winter; and the balance afterwards, as soon as convenient, and at leisure times. The leaves to be heaped when moist, in preference, and the heaps to be kept safe from wind, by having thrown on them a few sods of huckleberry roots, or a few hoefuls of earth.

2d. To use as litter for stock no more than is required; and to cart, as convenient, up to the time of next harvest, the leaves on the land, to be immediately spread, as top-dressing. The principal application, through winter, especially of the litter composed wholly or mostly of pine leaves, to be on the growing wheat; and in the spring and early part of summer, on young clover sown the season previous. When not convenient on either, the leaves might be spread on any land in natural grass, or weeds, and not intended to be ploughed until the next year, and not to be grazed.

It will be obvious at once, that whether much or little improvement is found from this mode of application, that it will be at but little cost of labor. There is no double loading and carting—no labor or loss in heaping and fermenting—no ploughing under or among the leaves while unrotted—and no possible injury to a growing crop. And if it is beneficial to top-dress young wheat with other vegetable manures, and young clover and other grass with dry and unrotted straw, as well as farm-yard manure, (both of which I highly approve, and have practised as largely as convenient for several years,) then there can be no ground to question the soundness of my conclusion, that whatever value there may be contained in the leaves will be given in this manner most completely, as well as by far the most cheaply.

My earliest trial of top-dressing young wheat with fresh and dry leaves was in the beginning of the winter of '33–4, and was made soon after the wheat had come up. If it could be done at so busy a time, it would be much better before the coming up of the wheat; as it would be less troublesome, and less liable to injure plants by the carting. Pine leaves were used, as others would have been blown off by the dry March winds; and they were necessarily put thinly, to avoid smothering the wheat. The quantity to the acre is not known more accurately. As was expected, the slight cover of leaves served evidently to protect the young plants from the severity of the cold weather in winter; and from this mere mechanical effect, (which is independent of and distinct from any alimentary or enriching matter furnished by the leaves,) there was a very perceptible, though but slight benefit exhibited by the top-dressed wheat, before any could have been supposed to be produced by the leaves as manure. A slight superiority continued plainly to be seen until the growth was well advanced, which was as late as it was observed.

It is admitted that this improvement of the crop was but small; but the cost of the dressing was also very small; and the mechanical part of the benefit, (which was probably all that was derived by that first crop,) must be certain in every winter, and might sometimes save a crop that would otherwise be killed by the severity of the cold. If clover is sown on the wheat, that also would have the same mechanical protection, both from late cold spells, and from the heat of the following summer. My later practice of this year, as will be stated below, has shown this particular and very important benefit in a striking manner.

The slower fertilizing action of unrotted leaves applied as top-dressing to clover, or other crops, will be less evident or perceptible than the mechanical. Upon my own recent and only judicious applications, there has not yet been enough lapse of time for the best effects to show. I do not pretend, therefore, to estimate what may be the full benefit derived from a certain amount of leaves laid upon a certain space of ground, nor to affirm whether much, or but little increase of fertility will be thereby produced. But having full confidence in the propriety of using dry straw and other more putrescent manure as top-dressing, in preference to ploughing under, and on young clover, in preference to grain crops, I have equal confidence in that mode of applying leaves, to profit by their full value, whatever that value may be.

It was not until last winter that the state of my farm, in other respects, made it convenient for me to resume collecting and applying leaves, to any considerable extent, and entirely upon the surface—the former modes being deemed of no certain advantage, above the value of the labor employed. The want of sufficient spare team-labor still caused the quantity applied to be much less than will be applied annually hereafter, if there is no disappointment found in the effects produced. The general results of the last applications have, so far, been highly gratifying. Particular effects, which were more carefully observed and noted, will be stated in the report of my manager below. The early benefit which he reports on the wheat, and striking later benefit to clover and weeds, the *apparent* destruction of wire-grass, covered by the top-dressing of leaves, laid on as brought from the woods, I observed myself, at different times of hasty and widely separated visits to the farm. But as there was much that is more of general statement, which I did not myself see, in the progress of the experiments, and there is much more that can neither be properly appreciated or described except by the person who has observed them throughout, it was deemed preferable that the report should be made by the manager himself, and upon his own responsibility. I therefore requested a particular and accurate report of the facts observed, and which had been mostly noted before, for publication, and which is as follows.

"*Coggin's Point, 7th Sept.*, 1838.

"In obedience to your instructions, I hereby forward to you a statement of the results of the experiments made, agreeably to your directions, of pine and other leaves, applied as top-dressing to young wheat and clover.

"The leaves were collected into heaps as early as possible after falling from the trees. The pine leaves were hauled and put on the nearest portions of our young wheat, in the months of January and February, when the ground was sufficiently frozen to admit of the teams travelling on the wheat without injury, and applied at the rate of from twenty to twenty-three loads per acre, (in carts of 118 cubic feet, and that would contain nearly one hundred bushels,) and were scattered over the wheat as evenly as possible. The benefits resulting to the wheat from this top-dressing, were very apparent soon after the application, and by the 18th of March were strikingly obvious; and from then being some inches taller, and of a deeper green color, than the general crop not so top-dressed, the ground could be easily discerned at a considerable distance. A person standing on one side of a piece of ground so top-dressed, could distinctly trace the exact outlines to where the leaves were applied. The wheat so top-dressed maintained this decided superiority throughout the whole of its growth, and continued very obvious at a distance until the wheat came into ear; but notwithstanding its superiority in every other respect, it was about eight days later in flowering than the adjoining wheat not so top-dressed. The difference in ripening however was not more than four days. On reaping the wheat, the straw was evidently much taller and stronger, than that of the adjoining wheat, the heads appeared to me as being larger, and the grains of a larger and plumper appearance. In this latter respect, it is, however, difficult to form a correct estimate, though as far as I could judge, I am warranted in saying, that the grain did not derive less benefit than did the bulk of straw. The leaves were not applied on one continued portion of the field, but on four different and detached places, and on each with the same very obvious benefits; consequently these benefits are wholly attributable to the covering of leaves, and not to any difference in soil or situation. Nor did these very apparent benefits terminate with the wheat crop; for in this unprecedentedly dry season, when a very large proportion of our clover, sown amongst wheat last spring, is destroyed by the excessive and long-continued drought, the clover on those places top-dressed with leaves looks well, is apparently little injured, and the difference in the greater growth of the clover and cover of weeds, make these spots even now, more obvious than at any period during the growth of the wheat.

"There is one circumstance connected with the above, that I consider worthy of notice. The leaves (altogether of pine) covering the wheat in one place, were extended over a portion of ground much infested with wire-grass. At this time, the ground thus covered with leaves presents a very scanty growth of this pest, while on the adjoining ground there is a very close cover of it. This difference is so evident as to be distinguishable from a considerable distance; and, when closely examined, is found to follow all the little departures from a straight line made in scattering the leaves.

"For a top-dressing to young clover, leaves of every description, convenient to the field, were collected and also applied in the months of January and February, when the ground was suitable for hauling on, at the rate of 32 loads to the acre, (in carts of the same capacity as stated above;) but as it was difficult to have all of the loads equally large, occasional additional loads were necessary, and probably 35 loads were given to the acre. The benefits resulting from this application, were soon very apparent in the earlier and better growth of the clover, though I now consider the covering as having been rather heavy. Adjoining to this was a portion of clover covered in the preceding September with straw. That covered with leaves made an earlier start, and maintained a better appearance than that covered with straw, until after the beginning of May, when the latter evidently gained the superiority, which it maintained throughout the season. The benefits, however, resulting from the application of the leaves, are up to the present time very apparent; both the clover and growth of weeds being better than on adjoining ground which had a liberal top-dressing of farm-pen manure (but of course very light compared to the bulk of leaves) in April and beginning of May.

"In connexion with the above experiments, permit me also to state what has been the result of applying unrotted straw as a top-dressing to young clover early in the fall. In the months of August and September, 1837, all of our wheat straw with the exception of a limited supply left for littering stables, &c., was hauled out and spread on young clover. The clover evidently derived much and early benefit from this covering of straw; and, with a small exception, was the only clover on the farm this season (1838) really worth mowing, which was done for green feeding; and this was the only portion of our clover from which a second cutting could have been obtained, it having longest withstood the effects of the drought. This season I had 126 loads of straw hauled out, as return loads, when hauling in wheat to the thrashing machine, between the 12th and 18th of July, and spread the loads as soon after as an opportunity offered, on young clover. This early, though small application, has proved very beneficial to the clover during the scorching weather that has since occurred. After finishing wheat-thrashing, all our straw (with the exception of a small portion for litter) was hauled out together with the chaff, summer-made manure, &c., and also spread on the young clover; and though only finished so lately as the end of August, there is already a very perceptible improvement in the growth of clover, grass and weeds, compared to that which has not had the benefit of a top-dressing.

"Having simply stated the results, so far as my observation has led me, I leave you to draw the evident inferences, merely remarking that I consider from the result of these experiments, that pine leaves, when they can be got conveniently, as being even a preferable top-dressing, for wheat, to rotted farm-pen manure. What they may want in fertilizing matter, they more than compensate by the warmth and shelter they afford to the young plants both of wheat and clover;

and I would recommend a continuance of the practice, so far as practicable. The practice of applying unrotted straw is, in my opinion, the preferable and most economical mode of applying it, particularly if on young clover. There is only one objection to the practice, which is, that seeds of spelt, &c., are thus applied to the soil in a state favorable to their vegetating. The cutting of the clover in the proper season, and consequently of these foul weeds before they get into seed, would, however, remove this objection. ANDREW NICOL."

It may seem contradictory, as well as strange, that the ripening of the wheat should be retarded by the top-dressing of leaves, which so manifestly forwarded its early growth, and improved the product. But these opposite effects are easy to account for. The leaves not only sheltered the ground from the extremes of cold in winter, but also, in some measure, from heat and drought in summer. Thus, the mechanical effect is to give the benefit of a cooler summer climate—which, to our wheat crop, especially, would be a great benefit. It is known to others, as well as to myself, that Irish potatoes, made without tillage, under a very thick coat of leaves, are of a very superior quality, (as well as in good quantity,) and more like those grown in northern and moist countries, than such as we usually make on ground not thus covered. This thick cover preserves moisture, as well as shade and cooler temperature.

It may be necessary to add, in explanation, that all the parts of the practices referred to, or described in the foregoing statement, were not considered judicious, but were compelled at the time, to avoid still greater loss. For example—though an advocate for top-dressing in general, I do not extend the approval to putting out barn-yard and stable manure as top-dressing in the latter part of summer. Top-dressing with manures so putrescent as to be soon ready to act, (as those from the stable and barn-yard,) ought to be given to a crop then growing, and ready to consume the food furnished by the decomposing manure; and all top-dressings should, if possible, be applied to a crop in its young state and early in the growing season, that it may have the longest time to derive benefit therefrom. Leaves, therefore, should be also applied to clover early; and for an additional reason, viz: that its growth may cover the top-dressing in a short time, and thereby not only protect the leaves from being moved by the winds, but, by keeping them shaded and moist, forward their decomposition, and convert them to food as soon as possible. Of course, it is an essential part of this plan of top-dressing that the growth of clover shall not be taken off, by grazing or mowing, until the previous top-dressing is decomposed by the aid of its shelter and shade. The process designed, is, first to make the leaves, (or any other top-dressing,) to manure and feed the clover—and the next, to make this crop of clover, (turned in green or dry,) manure the succeeding crop of wheat or corn.

No apology will be offered for presenting these theoretical views, sustained, as yet, by so little practical experience. The main object of the communication is to elicit, from other persons, who are much more experienced, and, therefore, much better qualified to instruct, their more practical views, and more profitable results. There are many intelligent and improving farmers among the readers of the Register, who are reported to be successful manurers with leaves on a large scale; and it is earnestly desired by the writer, that such farmers will give to the public, through this journal, at length, their more extended practice, and more valuable opinions. It will be gratifying to the writer of these observations, to aid thus indirectly, if in no other manner, in causing light to be shed on this important subject, even though it should be accompanied by the showing his own views and practice to be erroneous.

EDM. RUFFIN.

DIRECTIONS FOR THE MANAGEMENT OF SILK-WORMS THROUGH THEIR HATCHING AND FEEDING TIME, ACCORDING TO THE MOST APPROVED EUROPEAN PRACTICE.

Translated from the French, for the Farmers' Register,

BY THE EDITOR.

Translator's Introduction.

It is now more than ten years since silk-culture was proposed as a new and profitable direction for a part of the agricultural labor of the United States; and for sixty years, silk has been made, upon a small scale, and with satisfactory profits, in a part of Connecticut. In the last few years, many adventurers have embarked in this new business, in the northern states, or have made preparations for commencing. The successful and known results however, have fallen far short of the expectations excited by the first promises of profit, and the loud notes of preparation for silk culture. Some of the causes of such results, have been stated at length in an article in the last number of the Farmers' Register, (commencing at page 389, volume VI.) It is sufficient here to state the general fact, that the business of selling the multicaulis mulberry plants, offered so much greater profits than feeding the leaves to silk-worms, that the former business has superseded the latter, for the present, and may continue to do so for a year or two to come; and thus, in providing the *means*, the *end* designed seems to be forgotten.

The recent introduction of the most valuable variety of mulberry, the morus multicaulis, will so much lessen the labors of silk-culture, that it may correctly and properly have the effect of extending the business, far beyond its otherwise proper and profitable limits. The actual demand for the plants of this variety, has recently produced a speculating mania, which has enormously enhanced the market value of all the stock now growing in the country; and this fictitious demand, for speculation, and its feverish and improper excitement, are spreading rapidly over all the southern and middle, as well as the northern states where it commenced, and to which, though the least favorable region of our country, schemes of silk-culture had been before almost exclusively confined.

The first effect of this speculating mania, will be to cause a large amount of money to be made by some purchasers, and perhaps much to be lost by others. The mere cultivator of the plants, in no case has yet lost any thing, nor can he lose by the mad speculations of others, or by any decline of prices, unless in suffering disappointment of his own too highly excited hopes of enormous profits. The next, and a very beneficial effect of this mania, will be to spread the multicaulis plants, or cuttings, to every part of the United States; and so great is the facility, certainty, and rapidity of propagation, that wherever a single twig is planted, its increase may, in a few years, serve to feed a great number of silk-worms. The violent fever of excitement, produced by this speculation, is also causing the silk business to attract general attention through the whole country, and of thousands of individual farmers who could not have been stimulated to attempt a new and untried pursuit, by merely the more moderate, even though sure profits, of silk-culture proper. This will operate as an immense benefit to all the country fit for this business; and especially for Virginia and the adjoining slave-holding states, whose circumstances are such as to offer double the profits that can be obtained from rearing silk-worms in the northern states.

We do not pretend to estimate, nor even to have any correct idea of, the profits to be derived from making silk. Those who are willing to trust to such conjectural estimates, may find them in sundry publications issued in the states north of Virginia. But without discussing the claims of any such estimates to be trusted, and without deciding whether the net profit may be $300 per acre, (which some estimates make out,) or the tenth of that amount, (which might satisfy most cultivators here,)—of *this conclusion* we are perfectly sure, THAT WHATEVER MAY BE THE PROFIT OF SILK-CULTURE NORTH OF PHILADELPHIA, MUCH MORE PROFIT MAY BE OBTAINED IN VIRGINIA. And the grounds from which this conclusion is deduced are such as will scarcely be denied, or questioned. They have frequently been stated in editorial articles in the Farmers' Register, and therefore will now merely be briefly repeated.

The first superior advantage possessed by Virginia, is in the warmer climate, which is more suitable to the silk-worms, and far more suitable to the early, long-continued, and luxuriant growth of the mulberry trees, and especially the multicaulis mulberry, which greatly prefers our southern climate.

Secondly, millions of acres of land, worn down by tillage, but still very suitable for bearing mulberry trees, (and which would necessarily be improved by the general system of silk-culture,) may be devoted to this growth; which land is worth nothing to the proprietors, and would not sell for more than $2 to $4 the acre. Yet land, equally poor and unproductive, at first, in New England, if obtained for this purpose, would scarcely cost less than $20 the acre; perhaps, a much larger amount.

Thirdly, the labor required for feeding silk-worms, (which is elsewhere one of the most important parts of the expense,) would cost very little on most farms in Virginia. There are very few farms, on which there are not some slaves who are too young, or too old, or otherwise too infirm, for any common labor, and who, therefore, do nothing, and are a dead expense in their maintenance. These, now worthless and expensive consumers, would be precisely suited, and perfectly competent, to perform all the labors of a silk establishment, under the direction of an intelligent and careful conductor, male or female. Indeed, in many cases, without any hired supervisor, a farmer's industrious wife, with her before useless slaves, might make a crop of cocoons that would sell for half as much money as her husband's surplus grain crop.

Either of these three advantages over northern silk-culture is very great; and, all combined, can scarcely be less than equal to the production of a double net profit. But it must not be forgotten, that to insure this (or even any) profit, there must be applied to these superior advantages, the enterprise, industry, watchfulness, and perseverance, which our northern brethren exercise in all their undertakings and employments, and which requisites for success are generally and deplorably wanting in the southern states.

Entertaining these opinions, we earnestly hope that the now prevailing trading demand for multicaulis mulberry plants, and mania for speculation, may have the good effect of establishing silk-culture, as well as mulberry culture, in the south; and that the solid and certain, though moderate profits of the business, may not be scorned and rejected, as soon as the sales of multicaulis plants come down to a fair price, or cease entirely for want of buyers.

In urging the landholders of Virginia to commence silk-culture, we do not use, as an inducement, the very general statement of its advocates in this country, that the business "is very simple, easy, and requires very little trouble and no particular system." Such is not our opinion. It is a branch of industry promising large returns for a sufficient outlay of care and labor, as well as expense in arrangement and fixtures; but promising nothing to neglectful, careless, and indolent management. It is important, therefore, to the public interest, as well as to that of the individual adventurers in this new and untried direction of industry in Virginia, that there should be as little risk as possible of disappointment and loss, caused by ignorance, and, consequently, the omission of the cares essential to success. Whosoever may commence this business under the belief that it requires no particular procedure, and not much care or trouble, and shall act accordingly, will probably lose his trouble and expense, as little as they may be. But he who takes the opposite view, that much trouble and unremitting attention are absolutely necessary, and is resolved to bestow all that is requisite, will probably have less trouble, in the end, than the most careless conductors, and will reap as much profit as the others will find of loss. It is to guard against this very general error, and to direct new beginners to a course of proper and profitable procedure, that has induced the translation of the treatise which will follow these introductory remarks.

In the several treatises on the rearing and management of silk-worms, which have already been written and published in this country, as well as in the more numerous shorter articles on the same subject, which have appeared in periodical papers, there appears, in one important respect, a general similarity between them, and a marked difference from all known foreign works of high authority. In the latter, the method directed for raising silk-worms, is to preserve, with great care, certain degrees of temperature, with as little variation as possible from the different grades required at different times; and to give food in certain quantities, according to the age and condition of the silk-worms. To be able to command the former object, it is necessary to raise the heat of the laboratory above the average degree of the external air; and to regulate it, by means of fires in stoves or chimneys to raise the heat, and by ventilators, to lower it; and by thermometers to measure and direct the temperature according to fixed rules, which have been established by careful scientific investigation, and long practical experience. All this array of means, even though it may finally conduce to economizing of labor, and to increase the net profits, in a regular and established business, is alarming to new beginners, or experimenters, who are unprovided with any such means for a fully and properly established business; and they have, without exception, readily yielded their assent, and conformed their practice, (so far as there has been any practice,) to the very opposite opinions and directions of those who have written in the United States. These writers concur in the opinion, that the precise rules, and artificial and regulated temperature, of the European method, are altogether unnecessary; that the raising of silk-worms is a very simple operation, and may be done successfully without any particular fixtures, system, or rules, if merely enough of proper food is supplied, and the worms are kept clean enough, and not too much crowded during their growth. Whether it is that these instructions are so reasonable as to carry conviction with them, or that they are more suitable to the natural indolence of men, and their disposition to avoid labor and expense as much as possible in every new undertaking, the result has been, that all who have commenced to raise silk-worms in this country, have adopted, upon the advice of American writers, this more *natural method*, as it may be termed, in contradistinction to the highly *artificial method* of European authorities—scientific investigators, as well as successful practical culturists.

In the reported results of the experimenters and older culturists in this country, so far as they can be gathered from the very limited and imperfect published statements, the returns are said to be satisfactory, and the *prospects* of future success and profit very flattering. But it also often appears, from indirect testimony stated at first, or from making further inquiry, that there were also some heavy deductions from profit suffered in one or more of such occurrences as the worms suffering from excess of heat, cold, or damp weather—of their supplies of food being irregular, and sometimes deficient, sometimes in excess—of irregular progress in their growth, and the whole time being more or less protracted; and from all of such causes, there having resulted great increase of labor and expense in the management, diseases produced and great mortality of worms, and the crop of cocoons, in quantity and quality, being very far below a proper return. If, notwithstanding all these losses, a fair net profit is made, (compared to other branches of agriculture,) or even a fair promise of future profit is in prospect, when the worst first errors shall have been avoided, it is deemed by the culturists as sufficient evidence of the superiority of the simple and natural, over the artificial method.

In this very general opinion, held in this country, by both writers and practical culturists, we cannot, as yet, concur. Our practical experience in rearing silk-worms, it is true, has been limited to a very small experiment; and, therefore, it would be presumptuous either to condemn or approve, without reservation, any practices of which it is admitted we are practically ignorant. But reasoning from all the known facts and circumstances, and in the absence of any certain and accurately reported cases of success in rearing worms on a large scale upon the more natural method, we hold to the opinion, that the method of regular and artificial temperature is not only productive of the greatest gross products from a certain quantity of eggs and of food, but is also the safest and the cheapest. And yet, while presuming thus to object to opinions so generally, if not universally, received in this country, we feel some distrust of our course, not only upon the admitted ground of want of practical experience, but, still more, because of the contrary opinion of the few individuals in this country, whose opinions on this subject deserve much respect. Among the highest, we would place the author of the 'Treatise on Silk Culture,' which was commenced in the last number of this journal, and of which the continuation will be furnished by the author as soon as his engagements may permit. But though willing to pay the utmost respect to opposite views from such sources, and ready to yield to good reasons and proofs, whenever they are brought forward, until so convinced, we shall still maintain the superiority of the method of artificially regulated temperature, and weighed and regulated allowances of food. The reasons for this preference will be concisely stated.

It is affirmed by scientific, intelligent, and also practical silk culturists of Europe, that certain degrees of temperature are most proper for silk-worms in each of their various stages and conditions of life; and that sudden and frequent changes of temperature, even though but of a few degrees, (or much less than occur in the natural temperature of every 24 hours,) is hurtful to their appetite, health, and future product. It is also affirmed, (and that will scarcely be denied by any practical culturist, or even new experimenter,) that equality of temperature, and of other treatment, is necessary to produce equality and uniformity in the successive changes of condition (or "ages") of the worms, and of the duration of their lives; and the inference is inevitable, that, if such uniformity and regularity is totally wanting, the trouble of management will be greatly increased, even if no other evil were to be feared. It is also a settled matter among the highest authorities in Europe, that in every age and successive change of condition of the worms produced from a certain weight of eggs, a certain quantity of food is required, and that they would suffer by any material diminution; and any excess would cause a waste of leaves, be additional trouble in clearing away the litter, and annoyance and injury to the worms by the previous accumulation. Hence must be inferred, not only the benefit and expediency, but the *economy*, both in labor and expense, of knowing how much food is necessary, and furnishing, by careful selection and weighing, that precise allowance for every day, and sometimes for every meal.

It may well be, notwithstanding all the long-continued and laborious investigations of Dandolo, Bonafoux, and other scientific culturists, that the most perfect rules of treatment may not yet have been discovered. Indeed, improvements in this, as in other arts, are made every year, and we entertain no doubt but that the inventive faculties and enterprise of Americans will soon produce as much improvement in silk-culture, as in other old arts, derived from other countries. But still, the principle of the European method will not be the less true, nor less important to be observed in every laboratory, viz. that certain degrees of temperature, and certain quantities of food, are best for each of the various successive conditions of the silk-worms. And if this principle is correct, it cannot be proper or safe to leave the degrees of temperature to be regulated by the chances of the varying seasons; and the proportions of food by guessing, or even by weighing, without knowing the wants of the worms at any particular time.

It is not only the scientific silk-culturists of Italy and France, who, in modern days, have maintained the necessity for the artificial method of heating. The like opinion has obtained in China, the natural region of the silk-worm; and the like end has been reached, (though by very different, and far less perfect means,) in the practices which perhaps have prevailed in that country for thousands of years. In the extracts from the curious old Chinese work, published in the Farmers' Register, it will be seen that artificial, and carefully regulated heat, is directed to be maintained throughout the rearing; and though without thermometers, other means are used to estimate, and thereby direct, the allowance of heat. (See page 232, vol. VI, Farmers' Register.)

If the European rules are not absolutely false—if obedience to them is in truth more beneficial than the natural, simple, or chance-directed methods of rearing silk-worms—there can be little doubt but that, to pursue these, or other proper rules, strictly and carefully, it will be found economical, in labor of attendance, in quantity of food, in the good condition, and more rapid maturity of the worms, in greater security against loss by diseases and deaths, and in the products of all that may live to form cocoons.

But because approving of a very regular system in a large and established silk business, it is not meant that such regularity, or even any particular means, or rules, are necessary to make first experiments, and to meet with great success in the management of a small number of worms. No one need wait to construct a proper cocoonery, or to use any artificial temperature, to raise a few thousand worms. There will be waste of labor in attendance, because of the want of systematic procedure—there will be a waste in the excess of food given—and there may be a protracted or too rapid feeding time. But the worms, by having plenty of room, and plenty of food, may be able to withstand the hurtful variations of temperature, and may produce better cocoons than the average of regular and large establishments. First attempts in feeding silkworms ought always to be on a small scale; and in such, it is of very little importance whether the cost be greater than is necessary, or not, provided the new culturist learns what is proper for future and larger operations. Therefore, we would advise all who desire to make silk, to begin as soon as they can command enough of any eatable mulberry leaves for food, and without any expensive apparatus or regular and exact system; but to conform to a proper system, by the time their business becomes established, and upon a much larger scale.

Under the impressions stated above, we have thought that, in the present general interest felt on the subject, it would be an acceptable service to the agricultural public, to furnish a correct translation from one of the latest European treatises, which may be supposed to contain the received opinions of the culturists of the highest authority, up to the time of the publication. For this purpose, we have chosen Morins' "*Manuel de l'art d'élever et de soigner les vers-a-soie*,' etc., published in Paris, 1828; and have translated the portion which directs the whole treatment, from the first preparation for hatching the eggs, to the end of feeding the worms, when they are ready to climb, and to spin the cocoons. So far as given, the text of the author has been rendered fully and almost literally; as we are not of the opinion that a translator has any right to take any thing from, or add to, the argument, unless when fully showing the fact and its extent, and the cause of the privilege taken. Many parts of the directions are, perhaps, unnecessarily minute, and others (especially in regard to the first preparations for hatching the eggs,) may be totally useless. Of these the reader can judge what is, or is not, useful; taking care to secure the only important object, which is to have all the eggs to hatch together, and at the proper time, and to know the precise quantity hatched.

The portion of the work which treats of the various kinds of mulberry trees, and their culture, has been omitted entirely, because the more recent introduction and rapid extension of the culture of the more valuable *morus multicaulis*, or Chinese mulberry, will nearly supersede all other and older kinds in this country. Also, the portion of the original work which directs the formation of the "hedge," or shelter for the worms when spinning their cocoons, has not been given, because better modes have already been discovered in this country, which, as well as a plan of a good laboratory, will be particularly described in a future article. This translation therefore embraces only the entire hatching and feeding time.

It was not until after this translation had been written, that we obtained the first sight of the manual of silk culture, prepared under the direction of the secretary of the treasury, by order of the House of Representatives, and published in 1828 (Document 158.) It was manifest, upon examination, that our French author, Morin, and the translator, compiler, or author of the manual prepared by direction of our government, drew their instructions for the hatching and feeding, though through different channels, from the same remote source, and the highest authority, Dandolo's work. Of course there is a general similarity, and often indeed identity of substance in the descriptions and directions, as must be expected in any different treatises drawn principally, however circuitously and remotely, from a common source. Still, there are imperfections of form, and manifest errors of version, (in mistakes of the author's meaning,) so great and so important, in the manual published by order of the government, that we had no reason to consider our own labor as thereby rendered useless, or superseded by the prior, though unknown, work of another, who is compiler and author, as well as translator. This combination of characters is the first and great objection to the treatise in question; for though it is manifest that the writer is generally merely a very free translator, from a work of very high authority, yet he often intermixes the instructions or statements of others, and often his own, without distinguishing between them. It follows, that the reader is left to guess, from the context, whether he is receiving instruction upon the high authority of Dandolo, the perhaps questionable authority of others, or from the American writer of the document, whose authority on practical silk culture, like our own, deserves no respect whatever.

The French work from which this translation is made, is one of a number of manuals, upon almost every useful science and art, which, though so many separate treatises, when taken together form the '*Libraire Encyclopédique*.' This general and extensive work was prepared by the combined labors of a number of scientific and literary men, and upon much the same general plan as was conducted the 'Library of Useful Knowledge' in England. It may be inferred of any one of the separate "*Manuels*" which have recently been published under this plan in France, that it presents the latest and most correct information, and what is there received as the best system of instruction in the art of which it treats. This inference was our ground for supposing that this treatise would furnish such instructions as are deemed correct by the best silk culturists of the present time in Italy and France, or those regions of Europe, where the art of rearing silk-worms has been investigated with the most careful and scientific labor, and where the practical results have been the most profitable, and the products the most abundant.—Ed. Far. Reg.

CHAPTER I.

Of the hatching of the silk-worms' eggs.

Among the preliminaries to be observed in the disposition necessary to make for the hatching the eggs, after having detached them from the cloth or paper upon which they have been preserved since they were laid, the most important is to submit them to a temperature a little raised; as much for obtaining them vigorous, and to preserve them capable of fulfilling the end proposed, as to make them hatch altogether. It has not been very long since, for this purpose, recourse was had to the heat of dunghills, of beds, of kitchens and other places; now they construct hot-houses, or warm green-houses, precisely like those which gardeners use for obtaining flowers in winter. From the moment at which the eggs are exposed to this heat, they undergo, all together, the same conditions; and, whatever may be their number, they almost all reach the end desired in the same time. It is necessary, however, to bring to bear unremitting care and attention, and great watchfulness; for without these, the whole brood would be injured or destroyed. Supposing then, that the operator is provided with thermometers, hatching stoves, &c., as will be hereafter described, we will now proceed to speak of the hatching of the worms.

1. To prepare the eggs to hatch, it is of great importance that they should have been well fecundated, and, above all, well preserved, in the climates of France, to the latter part of April, or first days of May. The cloths, to which the eggs are attached, are plunged into common water, and suffered to remain six minutes, that the mucilaginous matter, by which the eggs adhere, may be dissolved. The water is then suffered to be drained from the cloths, for ten minutes, and the eggs are then carefully scraped off with a suitable instrument, [such as an ivory paper-folder, or a spatula,] which may be done with much facility. The eggs are collected, for the purpose of pouring them off successively, and until none are left upon the cloths. We may, in any kind of vessel, do it in half an hour. Before separating the eggs, there is poured over them a little water, which serves to wash them. All which swim on the water are thrown away. For this operation five minutes are sufficient. It has been noticed that eggs which had been laid in a cold and moist temperature, and are yellow, [the mark of not being fecundated,) yet are heavy enough to sink in the water to the bottom of the vessel. All are next poured upon a sieve, or rather upon a thin muslin cloth, to separate the eggs from the water. The eggs are then put into weak wine, either red or white. Some persons afterwards wash them again in another water, and that causes no marked difference; but prudence requires that the eggs should not be left too long in the wine, because it hardens them very much, which retards their hatching. They should be withdrawn from the wine after ten minutes. The temptation of gain alone has induced the dealers in eggs to dip them in high-colored wine, by which the eggs all acquire the color natural to those well fecundated, even when they are worth nothing. This fraud it is necessary for buyers to be guarded against. Whilst in the wine, the eggs should be separated from each other, by being softly rubbed, then stirred, shaken, and poured out with a certain degree of quickness, by which the heaviest, which are all excellent, are easily separated from the light and unfruitful. The wine is separated and the eggs spread upon new dry cloths, until they are completely dried, which requires forty-eight hours. They are then kept in earthen or porcelain plates, in beds of six to eight lines* of thickness, until it is

* The weights and measures stated in this translation are French, and both exceed the American in about the same proportion. Six French feet are equal to six feet and four inches American measure. The French foot, like the American or English, is divided into 12 inches, and the inch into 12 lines. Seven

desired to make them hatch. They must be protected from light and from humidity; and, provided that the temperature is kept at between 46 to 59 degrees [of Fahrenheit's thermometer,] it is sufficient.* All these attentions do not require more than an hour and a half.

2. In order to be able to establish the temperature which suits best for hatching of the silkworms, and in order to regulate it and keep it always equal, it is necessary for the conductor of the business to have at his disposition, and under his eyes, a well constructed and well graduated thermometer. For that purpose, those of mercury are best; but as these, if large, are very dear, M. Lagarde, optician at Paris, (Quai de Gèvres, No. 10,) makes them of spirit of wine, with which it is impossible to commit errors. He has constructed them upon the plan of a physician of Milan, and by instructions of M. Dandolo himself. For "the distance marked from the freezing to the boiling point upon ordinary thermometers is too small, the degrees are too near together, which sometimes causes mistakes to be made. To avoid this inconvenience, I have made, for the hatching-room, thermometers with long scales, the distance from the mark of one degree to another being equal to that of ten degrees of common thermometers. In this manner, I have been able to divide each degree into five fractions, which are easily distinguished, even at some distance. Thus, the least changes of the temperature of the apartment may be perceived. These thermometers have a sign which indicates the point at which the column of colored spirit of wine ought to stop." It will be most proper then, for the purpose of operating in a manner as certain as it is possible to do, to procure thermometers of this kind.†

3. The hot-house hatching room is made of a small apartment, 12 feet square, of which the walls [of brick] are quite dry, and in the midst of which, on one side, must be placed a furnace made of baked earth, or rather of very light bricks. The furnace, or stove, should be capable of being heated with but little fuel, and gradually, in order that it may prolong and preserve its heat as much as possible, or that it may be augmented or diminished, as required, without letting any smoke get into the room. Thermometers should be placed at proper distances, to mark and show that the heat is every where the same; for, if it is certain that all the eggs of caterpillars do not come to the hatching point until surrounded by an atmosphere hot enough to cause the germ of life to be developed, and as silk-worms in our climates cannot certainly obtain the degree of heat which they would meet with in those regions whence they were brought originally, it is then absolutely necessary to supply that temperature, in order to make them hatch together, and that they may be developed in the same manner. There should be arranged, in advance, trays of wicker-work, or hurdles, or moveable frames, or shelves of fir, fixed near the walls by means of cross-pieces, which are implanted in the walls in such manner as not to leave between each two but 22 inches of interval, to place upon them the necessary boxes, constructed of paste-board, or of very thin white wood. The boxes of paste-board should be 8 inches square, with sides half an inch high, for an ounce of eggs to each. When it is desired to place more eggs than this quantity, wooden boxes are provided, of greater or less length and breadth, and with edges more or less elevated, upon which their respective numbers are to be marked. They are placed near each other, leaving between each two an interval of two inches width; and placed always at a convenient height to be examined at the ease of the manager, and for him to be able to move the eggs, from time to time, with a wooden spatula, or shallow spoon, which serves well to stir the eggs, without risk of crushing them.

By means of very sensible thermometers, it will be very easily perceived which are the places in the hatching-room where the heat is lowest; and thus it will be known where to put the eggs of which it is desired to advance or retard the hatching, according as the season may have been favorable or unfavorable to the putting forth of the leaves. By also adding some light tables, upon which may be deposited the boxes in which the worms are hatched, they can easily be changed from place to place on the shelves, at will, and as required.

With one window of large glass, the room will be well enough lighted. The light can do no harm to worms of the first age; and if there is need to moderate the heat, there may be fitted in the sash a moveable pane of glass, which will be opened or closed according to the degree of heat desired to be maintained, or there may be constructed an opening in the door, or, better still, an air-hole or ventilator through the middle of the floor, to be opened or shut by means of a trap-door. When the hatching of the worms is finished, this hatching-room should be put to the common uses of a laboratory, or feeding-room; and in it may be placed worms to be fed and reared, unless subsequent hatchings are desired to be made.

4. To properly order the time of hatching the worms, there will be need to observe the progress of atmospheric temperature, compared to the putting forth of the leaves; and ten days before the worms are desired to be out of the egg, they should be put into the boxes. The time should be noted, and written down, when each parcel of eggs entered the hatching room, with the number of the box which contained each parcel. By giving spaces between the boxes, it will be impossible for one parcel to be mixed with another. The wicker hurdles, or other moveable frames, will be covered with paper in the hatching-room, which should be heated from the first moment to 64 degrees of heat, and so kept for two consecutive days. The third day, the heat must be raised to 66 degrees; the fourth, to 68; the fifth to 71; the sixth to 73; the seventh to 75; the eighth to 77; the ninth to 80; tenth, eleventh, and twelvth, to 82 degrees.

By the signs which we are going to indicate, it will be very easy to know the precise time when the hatching of the worms is to be expected. For

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pounds French, are seven pounds and twelve ounces American weight.—Translator.

* In the original, the degrees of temperature are marked by Réaumur's scale, which are changed to their equivalents in Fahrenheit's throughout this translation.—Tr.

† The degrees marked on Réaumur's thermometer, the kind referred to in the text, are each equal to 2¼ degrees of Fahrenheit's, which is used in England and the United States. Therefore, the objection made to the small divisions of the degree, does not so much apply here as in France.—Tr.

the eggs, which were of an ash-colored gray, become more or less black; they then pass to violet, then to a yellowish gray, and finally to a dull white; although those eggs which may have been washed in very high-colored wine, will retain the reddish tint to the time when the worms come out.

Often, before placing the eggs in the heated room, to make them hatch, they are made to undergo what is called *maceration;* which is done by enclosing them in little bags, which are placed under cushions, between mattresses, or in woollen coverlets. From time to time they are moved, stirred, and this operation is used only to hasten the hatching of the worms. This method is so much the more uncertain, as it is as impossible to know exactly what degree of heat the eggs may have undergone in advance, as to guess what degree will be necessary to effect the hatching properly. It is not necessary thus to grope our way to an object, in the dark, when it is possible to arrive at it with confidence and certainty.*

In every egg exposed to a state of heat continued for some time, the embryo which it incloses acquires its degree of perfection, and the worm is finally hatched. Indeed, when the eggs have been preserved from one season to another in a mild temperature, there is no need of so great a heat in the hatching-room. They may even hatch spontaneously and unexpectedly, and before the vegetation of the mulberry has yet put forth, if kept in a temperature of 55 to 59 degrees. It is then important and essential to apply the strictest attention; for it is an absolute and totally unnecessary loss when the young worms perish because their food is not ready to be used. To have them to hatch a little too soon is a great injury; but a few days too late is not so. But when the hatching has once commenced, it would be hurtful to the worms to have it retarded, and their developement would greatly suffer.†

It is only at the moment when the egg acquires the dull white color, that the worm is entirely formed, and ready to hatch; it may then be easily distinguished through a magnifying glass. At that stage, there should be placed upon the eggs, covering pieces of white paper, pierced, before-hand, with numerous little holes, made by an awl or needle of suitable size. Or very open muslin may be used instead. To collect the young worms, there must be laid upon the papers some very small shoots of mulberry, with the young leaves at their extremities. These are to be supplied as needed; and on them the worms will collect, (and may be easily removed,) after they climb up through the holes in the paper. These branches also serve to prevent any of the worms from wandering out of their proper boxes.

The worms which climb upon the paper the first day, are often so few in number, that it will be cheaper to get rid of them immediately, and to take care only of the multitude that will come out in the two succeeding days. The first few, if preserved, as they would keep in advance of the great number, would trouble the order to be established for the developement and raising of the others.

For collecting the worms as they are hatched, the small branches of mulberry are to be preferred to single leaves; because the latter might, by their weight, keep down the little worms, and prevent their climbing above; and the greater part might perish from being unable to surmount this obstacle. All the worms which are made to hatch in the manner described above, by means of the stove, possess a force and vigor which is marked by their deep chestnut color. Healthy worms are never reddish, and still less black. When newly hatched, and seen as placed upon the sheet of perforated paper, they appear to form a downy bed, spread out over the whole, in which are distinguished an infinite number of animalcules, with heads raised, which are surmounted with black and shining muzzles. The whole extent of their bodies is then stuck full of very small hairs, with some of a little greater size. Their cuticle, already white, is developed according as they advance in age, and the hairiness disappears gradually. In looking at the worms through a magnifying glass, their white skin is perceived very distinctly at the insertion of the head. Their tails are also seen to be set with a great number of hairs, remarkable for their length.

When the worms are about coming out of the eggs (by aid of artificial heat,) in the hatching-room, there must be placed at suitable distances basins of water, to moisten the inclosed air. This is to prevent a too great degree of dryness injuring their developement. The hatching is also favored by moving the eggs, from time to time, with a wooden spatula; and this movement becomes so much the more useful, and even necessary, as the moment of hatching is approached.

Nothing is lost by these operations; and, by omitting them, the inconveniences caused by the failure, might greatly and injuriously influence the worms during the whole remainder of their short existence. It is even highly to be desired, in the departments of France, where the raising of silk-worms is a general object of industry, that the government, as a means of augmenting and aiding the business, should establish in ever y small dis-

* All these preparatory steps are unnecessary to the young beginner, who does not intend, or is not prepared, to pursue the strict rules of procedure afterwards, through the feeding time. For such persons, almost all the good eggs will hatch just as well, as they stick to the old papers where they were laid. But it should be observed, that all the preparations described above are not for the purpose of making good eggs hatch more surely, but for the purpose of removing the worthless eggs, and the gummy, and every other foreign matter, so as to be able to know exactly the quantity of eggs that will hatch. It is essential to the correctness of all the future operations, to know precisely the weight of eggs.—Tr.

† Dandolo says that the eggs which have been subjected to the process of maceration, or otherwise kept through winter in a mild temperature, will hatch earlier (sometimes 4 or 5 days earlier,) than the eggs kept in a much colder state, though both parcels are subjected to the same heat and treatment in the stove-room, during the hatching process. Hence the importance of previously, as well as during that process, keeping the eggs always at certaln and known degrees of temperature. And as the extension of the time required for hatching, or otherwise the increased heat, is not so objectionable as any uncertainty in calculation, or difference in the times of the worms leaving the eggs, it would seem that it would be best to keep the eggs in the temperature of a deep dry cellar, or an ice-house. Then the time of hatching under a certain temperature, and other like circumstances, would be precisely and always the same, and would be well known in advance.—Tr.

trict, a public hot-house, for hatching in common the eggs belonging to all the neighboring culturists. There is no doubt, but that in thus charging with the business an intelligent man, well instructed in the art of hatching the eggs, it would contribute much to diminish the losses met with in every year's stock of eggs; which losses occur for want of care, or in consequence of the procedure under a blind routine of practice, established by custom, and adhered to through ignorance or prejudice.

CHAPTER II.

Of the small laboratory.

I. If the too great heat, accompanied by dryness of the air which surrounds them, is injurious to the worms, when about to hatch, it is not the less necessary to use the utmost care that they may not be exposed to the least cold, even though it should be for but forty-eight hours. The place in which they are to pass their lives will be proportioned in size to the number of worms which are to be collected there; and it should be calculated in advance what space they will require to occupy, in proportion as they grow larger, and also what space will be required, so as not too much to affect the purity of the air. It is known by experience, that the newly hatched worms of as many eggs as would have weighed an ounce, will occupy a space of 7 or 8 square feet to the time of the first moulting; that it must be extended to 15 or 16 feet to the second, and then to 35 feet to the third moulting. The number of shelves, or of frames or hurdles, should be in proportion to these measures, so that the worms may neither be troubled, nor heaped on each other. The shelves or hurdles should be 22 inches apart, in perpendicular distance, and furnished with paper with upright borders, to prevent the worms falling off. These sheets of paper, as well as of the boxes, should be numbered, in order that no error shall be committed by changing their places, and to be able to attend to the worms in the proper order of their age, until their complete developement.

In the first or small laboratory should be placed two thermometers. It is to be so arranged as to be suitably heated, either by a stove, or by two small chimneys at the corners. The windows and doors will be placed so as to give enough light, and permit sufficient ventilation. The temperature is to be kept constantly at 75 degrees, always from 5 to 7 less than in the hatching room; and progressively according as the worm advances in age and becomes strong. But when the season is cold, and the leaves backward, this heat is lowered to 71 degrees, and even to 68, which is the lowest admissible temperature.

The prudent culturist, says M. Dandolo, has done all that depends upon his care, when he has put the eggs into the stove-room at the time that he saw the sprouts of the mulberry trees well developed, and the weather fair and warm. If, afterwards, the weather suddenly changes to cold, as took place in 1814, it is a highly important power to be able, without danger, to retard the hatching of the worms, and to prolong for some days their two first ages. To obtain this great advantage, there is nothing else to do, if it is the first day that the worms are placed in the small laboratory, but to lower, after four or five hours, to 73 degrees the temperature which before stood at 75, and four or five hours after to 71, and the next day to 68, if that should be necessary. This cooling of the air diminishes the appetite of the worms, gradually and without danger; and by this means are hindered the modifications which, at the 75th degree, would have led sooner to the moulting. At 75 degrees, the first moulting (or casting off the first skin of the worms) would be accomplished in five days; but six or seven are necessary at the reduced temperature. The second moulting is completed in four days at 75 degrees; but requires more than six days, if the temperature is between 68 and 71. Thus it may be seen how the culturist, who is prudent and intelligent, by thus prolonging the two first ages, may gain seven to eight days of time to ward off the dangers of an inclement season. There may be also gained some days in the course of the other ages, as will be seen hereafter. This gain of time for the leaves to grow, as will be readily perceived, may be a very great advantage.

The tables annexed at the end of Dandolo's work show that in 1813 the worms had climbed (to begin to spin their cocoons,) in 31 days; and that 38 were necessary in 1814, to give the time required for the mulberry leaves to ripen. I do not include in these seven days of gain the three of retarding the hatching of the eggs, which might have been used, when delay is required still earlier.

Those persons who will not take this care, and who do not employ any of the means indicated by art to prevent the ill effects of inclement weather, would be obliged to throw away all the worms hatched too soon, or otherwise to strip the mulberry trees so completely, that they would offer leaves of bad quality for the adult age of the worms.

These considerations ought to cause to be generally felt the necessity for retarding, rather than hastening, the putting the eggs to hatch; especially as knowing that, with a good method of taking care of the worms, there is nothing to fear from some days of hot weather; which would have no other effect than to complete the last moultings some days sooner. It is besides certain, that the silk-worms which are retarded choose the leaves suitable to their age, and particularly the ripest leaves, when they are in their last age; the time decisive of the profits of the proprietor, as the worm then acquires all its value.

II. After being hatched, if it is intended to raise the silk-worms in the same place, the little branches of mulberry, scattered over the whole extent of the perforated papers, which cover the little boxes after being filled with worms, are placed in the boxes, upon the little table, (or board, suspended by a wire, or by strings,) which is to serve to transport them to the small laboratory. There, upon other and thicker sheets of paper, numbered and marked like the boxes, should be taken those boxes which bear the same numbers; and the table being placed upon the edges of the hurdles, it will be easy to lay hold of the perforated paper upon which the worms are, and, by means of the the branches which support them, to make them slide off, to the papers placed upon the hurdles. To effect this more safely than with the fingers, (which always endanger the worms,) a little hook, made of wire, may be advantageously used. Care should be taken to place all the little branches at suitable distances, so that they, as well as the intervals between, can be covered equally with leaves; and that the worms may be distributed equally every where. The space which they ought then to occupy, is 20 inches square. The sheets of strong paper ought to be 23 inches long and 21 broad. Of these, the worms should not occupy but 10 inches square, in the middle; and the worms hatched from one ounce of eggs, will therefore require four of such paper sheets. That will suffice until the end of the first moulting; for their extent of surface being four-times that of the little box, there will be no need of moving the worms at all, during that time. The worms should then be fed with a few young and very tender leaves, cut up equally into small pieces, spread equally upon and between the branches, in order that the worms may cover them regularly. And if, by chance, the worms should gather together too thickly in some places, some whole leaves should be put on these places, and after enough of the worms have crept upon them, these leaves should be put in spots the least supplied before. These should be fed as the first; but nothing should be given to them before the sheets of paper are completely furnished, in order that they may all together receive their second meal.

As the whole number of worms designed to be raised together, will scarcely hatch in less time than 48 hours, all the earliest hatching will have gained some increase of size before the last appear, which difference of time is caused by the difference of heat in different parts of the room. But this difference of size will disappear soon, upon giving the most food to the latest hatched worms. They will soon be as large as the older ones.

After all that has been said, it may easily be imagined that there will often be more than three days required to hatch all the silk-worms desired to be obtained from a certain quantity of eggs. For, if the moths, according to the temperature in which they are kept, take from ten to fifteen days to appear, and come out of a certain quantity of cocoons, it is clear that their eggs will also be laid in the same space of between ten and fifteen days. But it would be difficult to explain why eggs which are all put to hatch the same day, exposed to the same degree of heat, do not permit their worms to come out at the same time. It can only be attributed to the peculiar constitution of each egg, and the care taken to confine them to the degree of temperature which suits them best.

It is not the less true that a culturist who has but one little box of eggs, and of which the worms are all to be hatched and reared in the same chamber, ought not to count upon raising the first, and still less the last hatching; not that they are not good, but to avoid the trouble caused by the difference of age. Those persons who hatch many silk worms, and trust their rearing to other persons, ought to keep together all of the same day's hatching, and never mix the first with the last. It is much better to lose the worms hatched the first day, and all the eggs not hatched on the third, than to be troubled with the care of them.

As to those which have to be carried to laboratories far from the hatching-room, it is necessary to place the whole ounce upon a single sheet of paper, in a single square of 18 inches, which is divided into four. By passing the hands beneath the litter to which the worms are attached, and making the fingers penetrate to the middle, the separation is made with facility, observing to divide them as equally as possible.

If these early attentions are neglected, a large proportion of the worms will be lost, even if they do not come [to the different changes of condition] very unequally, and do not contract particular diseases which will be described hereafter.

For the greater facility of transporting to a distance all the worms which have been hatched together by artificial heat, use may be made of a close box, or case, made in the form of a small book-case, with folding doors; but of which the shelves are only two inches apart. The shelves are moveable, and slide in parallel grooves. The case has two handles, or straps, on the posterior face, to enable it to be fixed to and carried on a man's back or shoulders. If such a box or case cannot be readily procured, a common scuttle, *(hotte)* or hamper, may be substituted, taking care that the worms are not exposed to cold. To secure this object, the case should be covered with paper well secured with paste. The shallow paste-board boxes, containing the young worms, will be placed on the shelves, which will leave a space of $1\frac{1}{2}$ to 2 inches above the worms; which will afford room to sprinkle over them tender mulberry leaves, cut up into fine slips. If the journey is to be of much length, it should not be made but in the mildest part of the day, between 11 o'clock and 2 or 3 at latest. In the morning, and still more in the evening, the atmospheric variations would be injurious to the worms.

If the embryo worms experience any damage from the alternations of heat and cold, they will suffer much less when the temperature becomes four degrees colder, than when it becomes as much warmer. As to the light, its influence is of a kind so little marked, that it would be difficult to perceive its effect. If, in the morning, when the sun strikes directly on the windows, the worms are seen to appear in greater quantity, it is solely on account of the increase of heat. If all things were equal in the preliminary dispositions in relation to the brood, it is certain that they might almost all hatch at the same time. And when the worms are to be distributed among other persons, to be fed and reared, they should be given out upon sheets of paper which can contain an ounce, all hatched at the same moment. That will facilitate the proper division of the worms, as hatched on the first, second, and third days. In the stove department, no good eggs can pass the third day without hatching.

CHAPTER III.

The different ages of the silk-worm.

The most important part in the management of silk-worms is to know well, and to maintain steadily and without variation, the degrees of heat, and the temperature, which is most suitable and beneficial to them, during the term of their existence.

It cannot be said that the silk-worm is endangered by any degree of heat of the climate of France, however considerable it may be. Originally from Asia, it supports in its natal country a heat certainly more powerful than any which it can experience in Europe. But it is hurt by any sudden transition from a feeble to a strong degree of heat. It may be said in general, that the too rapid changes from cold to heat, and from heat to cold, are very injurious to them. In their own country, they are not exposed to these vicissitudes; therefore they thrive there very well, and do not require the care which we are obliged to give them in our climates, where the temperature of the atmosphere is so inconstant, that without the help of art we would not be able to have it steady in the laboratories where the silk-worms are fed.

A long course of experience has proved that, in France, the 68th degree of heat [indicated by the thermometer of Fahrenheit,] is the most suitable to silkworms. There are some culturists who have pushed the heat to 73, and even to 77 degrees, and the worms have succeeded equally well. It must be kept in view that it is not the degree of heat, but the too sudden changes, from one to another, which injure silk-worms. If it happens that it is necessary to hasten the growth of the worms, on account of the advanced state of the leaves, (of which the progress could not be retarded,) it should be done by increasing the heat very gradually, so that the worms will scarcely perceive the changes. For they suffer, it may be said, as much by sudden variations of temperature, as they would by the difficulty of breathing, if plunged into nephritic air.

M. Boissier de Sauvages states that being pressed by the advanced growth of the leaves, which were well out in the first days of April, he gave to his silk-worms about 100 degrees of heat in the two first days after hatching, and about 95 during the remainder of the first, and through the second age. They took but nine days for both these ages, or from the hatching to the second moulting inclusively. All the persons who visited the laboratory supposed that the worms could not but suffer by so great a heat, which produced profuse perspiration in a few minutes after entering the apartment. The walls, and the edges of the hurdles were so hot that it could not be endured to keep the hand on them. They felt sure that all would perish. Nevertheless, all went on perfectly well, and, to the general astonishment, the crop of silk was abundant.

He afterwards allowed 93 to 95 degrees of heat for the first age, 89 or 91 for the second; and, what was singular, the duration of the first ages of this raising was nearly as short as the former, of which the worms had much more heat. The cause of this probably is, that there is a limit below which the life of the worms cannot be abridged, whatever degree of heat they may be made to bear. It is true that to these had been given, in this raising, and in the ordinary mode of treatment, a like number of repasts. But what is still more strange, is, that the worms thus hastened, took but five days for each moulting in the two first following ages, although they were then in a temperature of only 82 degrees; while worms which have not been, from the commencement, pushed forward in the same manner, require, at the same heat, seven to eight days for each of these same ages, that is to say, for the third and fourth. It seems as if it were sufficient to have put these little animals in the proper train, for them to obey the first impulse, or the first bend given to them. This early high degree of heat, as given in this case, which produces a rapid growth, gives the worms, at the same time, a vigor and activity which they carry into their following ages; and this is an advantage in the hastened rearing, (that is, pushed forward by heat,) and which, besides, prevents many maladies. This hastened management abridges the trouble and the labor, and releases the manager sooner from the inquietude and sense of insecurity which he will always feel until the cocoons are completed, and gathered.

To pursue this method of using high temperature, it is necessary to pay the utmost attention to the seasons' being more or less advanced, and to the state of growth of the leaves, and that there is no danger of that growth being afterwards checked by cold. On the other hand, if the putting forth of the leaves is backward, and it is followed by heat which lasts long, as may usually be expected, and yet if but little heat is kept up in the laboratory, the worms will advance slowly, and their growth will be prolonged. Still the leaves grow and become harder, and have too much consistence for the worms in their backward state. This then is a state of things in which the growth of the worms should be hastened by continued higher temperature, in order that their progress may be brought up to that of the growth of the leaves, which is an essential point.

If a culturist should determine early to pursue this method, he should set and hatch his eggs some days later than the others. For a still greater degree of prudence, he will wait eight days, and will calculate afterwards the duration of the ages; or rather, he will do better to so arrange his procedure as to have the latest feeding of the worms to correspond in time with the state of full growth of the leaves.*

It has been said above that the worms produced from an ounce of eggs, ought to occupy, in their first age, and to the first moulting, a space of 7 or 8 square feet; of 14 or 15 to the second moulting; of 30 to 35 until the third; and for the fourth and last, the space ought to be at least 83 or 84 square feet. It is also necessary, in fixing the proportion of the quantities of food, given to the worms, to the spaces allowed, not to forget, that until the first moulting the temperature must be constantly maintained at 75 degrees; in the second age it will descend to 73; in the third, the temperature should be from 73 to 71; and from 71 to 68 degrees in the fourth age. These degrees of heat being well established, there should be given to

* This new mode of rearing worms under an unusual and very high temperature, if sufficiently tested by experience, would be a far more valuable improvement in practice in Virginia, and the more southern states, than in France. For, one of the greatest dangers which threatens silk-worms here, is the circumstance of the heat of the weather occasionally rising so much higher than the proper temperature for the interior of the laboratory, that the latter could not be kept down by shading and ventilation. This evil would sometimes happen to the earliest broods; and would certainly attend second or third broods, reared in midsummer, if the usual degrees of temperature directed above, were attempted to be preserved, or if no artificial mode of heating were put in use. This new mode of using great heat would be an admirable and sufficient safeguard against this otherwise certain and great evil; as the heat used would rarely be exceeded by the natural heat of our hottest days.—TRANSLATOR.

the worms then, after their hatching, their arrangement, and their distribution upon the papers, 6 pounds of young mulberry leaves, clean, and chopped or sliced very small. In the second age, the quantity should be increased to 18 pounds, but cut up less finely; in the third, 60 pounds of leaves will be required, still less cut; and, lastly, in the fourth, the quantity of leaves must be increased to 180 pounds, the leaves only cut about to half the size.

However, there may arise some unforeseen circumstances, of which it would be difficult to calculate the effect in advance. But with care, and, above all, with foresight, we may be able to effect the hatching precisely when the trees offer tender leaves, and which will acquire more or less firmness in proportion to the advancement of growth of the worms. If the contrary case should occur, it would compel the loss of the stock of worms, (unless another brood could be procured,) whenever a bad season should greatly retard the shooting of the leaves. If after hatching the worms in good and apparently settled weather, it becomes inclement unexpectedly, it is easy to retard the rate of growth of the worms, at least during some time, and thus to suit their after progress to that of the before suspended growth of the leaves. In the case when the leaves shall not have the requisite qualities, they should further be diminished or increased for the repasts, according to circumstances. For, all the quantities which have been determined by approximation, although confirmed by reiterated experiments, depend almost entirely upon the degree of heat in which the worms are kept and fed. In fine, the economy or procedure prescribed in such cases, does not prevent them from devouring their food with great appetite, digesting it easily, and being preserved constantly in a state of vigor, and excellent condition.

To economize the food and to obtain a crop of cocoons as abundant as possible to have, such are the principal objects which every silk-culturist should have in view. It is known, by experience, that by over-loading the worms with food, there is not only lost the value of the food wasted, but also, by the accumulation of litter, the little vigor which the worms enjoy during some moments of their existence undergoes changes in the time of moulting, which make them pass from having good appetite, to astate of visible languor; and if care and attention are not redoubled, the worms become weak, languishing, sick, and do not wait long to perish. But if, to the contrary, nothing is neglected of the attentions which should be observed, and if the course advised for the best developement of the worms is followed exactly, there will be saved a quantity of cocoons proportioned to the quantity of eggs set, and of the mulberry leaves consumed. For M. Dandolo assures us, 1st. that when 110 or 120 pounds of cocoons are obtained from one ounce of eggs, there will have been consumed very nearly 1650 pounds of leaves; 2d. that when from an ounce of eggs, there is obtained but 55 or 60 pounds of cocoons, there will have been used about 1050 pounds of leaves; in which supposition, there would be required about 2100 pounds of leaves to obtain, from two ounces of eggs, the first named quantity of 110 or 120 pounds of cocoons; 3d. that the 110 or 120 pounds of cocoons obtained from a single ounce of eggs, are worth much more than the same products from two ounces of eggs.

If, as M. Dandolo affirms, from an ounce of eggs, hatched and well taken care of, we may obtain about 165 pounds of cocoons, any deduction from that amount must be considered as so much actual loss; even though the consumption of leaves may have been much more considerable. And if there is added to this loss the injurious influence, which the worms which die in the course of their developement, have upon the survivors, the amount will be greatly increased. The dead bodies increase the indisposition and feebleness of the living; and the more the number is diminished, by want of care, the less silk of good quality will be furnished by the remaining worms, in proportion to the number. It is much to be desired, to remove all doubts on this subject, that there should be established a parallel between the quality and quantity of cocoons produced by a good manner of treating the worms, and the bad, which results almost always from the common routine of practice, and from prejudices, as much as from negligence. A series of tables, which even though but approximations to truth, in a succession of many years, with the meteorological indications of the atmosphere, during the season, would be the best means to employ for the purpose of knowing well the losses caused by the state of ignorance, out of which the managers of silk-worms are not willing to be drawn, whatever efforts may have been made for their instruction and benefit.

The first age.

The first day. Scarcely are the worms hatched and distributed on the squares of paper, as described above, when it is necessary to give them food four times, in quick succession. [$3\frac{3}{4}$ pounds in the twenty-four hours.] For that purpose, the young leaves are cut into slender shreds, either with a sharp knife, or in a suitable cutting box, [constructed upon the principle of a straw-cutter,] and distributed with moderation for the first repast, to be augmented for the second, third and fourth, at the distance of six hours from each other. There is not necessary to the worm but an hour and a half, or two hours at most, for it to be filled and to fall then into a sort of torpid state, during which there is need to watch and keep the temperature constantly equal, and to avoid all changes of hot and cold. For five ounces of eggs, it is proper to place the sheets of worms upon a space of the shelves of 36 square feet, 8 inches; and to distribute over them very nearly 4 pounds of young leaves, tender and cut small; while for one ounce of hatched eggs, it will not be necessary to exceed a pound and a half. A space of twenty inches square suffices also to contain them, so that the leaves will be found eaten through. As the worms as yet reject no excrement, it would be useless to change their place. Then they are so frail and delicate that they should not be touched with the hands. If any of them get too much scattered, they should be carefully lifted with a slender twig, or a large needle, to be put back to their place. For gathering up the leaves scattered too far from the worms, a little broom will be found useful. At this stage of its life, the silk-worm will eat its own weight in leaves in twenty-four hours; therefore, all, for one repast, should not be distributed at once. On the contrary, some should be reserved to give in the intervals, and principally on all the places where leaves appear to be deficient, because strewn there too thinly at first.

The second day, there should be used, in the twenty-four hours, from 6 to 7 pounds of fresh leaves, cut very small; taking care to give a smaller share of the day's allowance at the first time, and all that remains at the last. The squares are enlarged by degrees. Already the aspect of the worm is not the same as on the day before. Its head is larger, and whiter; the color of its body diminishes; its villosities are much less apparent.

On the third day, as the worms now eat very greedily, and as they occupy almost two-thirds of the sheets of paper, there should be given to them 3 pounds of cut leaves at each of their four repasts. In order to satisfy them the better, the first time there should be given but half of the allowance; and if it is eaten in an hour, the time for the second regular repast should be hastened, as well as to give the reserved help of the first repast, in the interval between the two. Without their being entirely covered over, their particular disposition and the quantity of leaves cut to distribute, might alone serve as guides in the matter. Their heads, towards the close of this day, are much whiter; they have taken much more developement; the villosities have almost disappeared; their skins have become reddish-brown; their bodies, and especially their heads, have become shining, with a semi-transparent appearance.

On the fourth day, as the appetite of the worms diminishes, so ought their food to be lessened. There should not then be used but 7 pounds of cut leaves. The first distribution will be of $2\frac{1}{4}$ pounds, and the others will be diminished in proportion to the quantity of leaves of the preceding repast which may remain untouched. The attendant will also take care of the sub-divisions of the intermediate distributions. The sheets of paper are now covered with worms completely. By enlarging the space covered with leaves, at each repast, they are prevented from being heaped upon each other, which might be injurious to them. As from the first part of this day the worms agitate their heads, it is a proof that their outer skin now troubles and overloads them. A great number of them eat but little, and their heads have grown much, and are more shining. By the evening, the worms are almost all still, or torpid, and eat almost nothing. Their bodies are almost transparent; they approach to moulting, and if observed near, and against the light, they appear of a dull white, livid, and yellowish.

On the fifth day, during the whole of it, $1\frac{1}{2}$, or at most 2 pounds of fresh-cut leaves are sufficient. They should be scattered as equally as possible in the course of the day, and only in the places where worms are perceived in a condition to eat. The quantity of leaves indicated, should, of course, be increased or diminished, if, from any circumstances, the worms should need more, or less. There cannot be too much attention paid to the exactness of the distributions, and the economy of the leaves. Towards evening, the worms are almost all torpid or still; some of them are beginning to revive.

The first moulting, [or casting off the first or outer skin,] is now terminated. The worm takes an ash-color. Its vermicular, or crawling motion is very decided; all its rings go and come upon themselves in a manner much more easy and free. The leaves which are to sustain them ought to be gathered at least eight hours before being given to the worms. Leaves may be preserved even for a day or two, in a cool and dry place, sheltered from heat and light.

Thus the first age of the worms is usually complete on the fifth day, without countng in the two days occupied in their hatching, and in collecting and distributing them from the moment of leaving the eggs. To this time they have consumed a little more than thirty pounds of leaves. They have increased to fourteen times their first weight in the space of six days; and increased in length to four or five lines, since coming out of the egg, when they are scarcely one line in length.*

It is especially recommended, to renew, from time to time, the atmospheric air which serves for the worms to breathe in the small laboratory, either by opening the door, or the window, if the season is mild. In the contrary case, of cold weather, the worms are warmed by the furnace, or the fire-places, if there are any, to maintain equal and constant the degree of heat which is necessary to keep them healthy, vigorous, and in good condition. It is even, in some manner, upon this first period of their existence, that depend all the other circumstances which are to bring on the successful termination in view.†

II. *Second Age.*

In arriving at the second age, the worms from five ounces of eggs should occupy a space of 73 square feet of the shelves, or thereabout, and the whole space should be covered with paper. The temperature in which they are kept ought to be from 73 to 75 degrees. To change the litter, it is proper that the greater number of the worms should have awakened; and when they come out of the leaves where they were placed, they ought to be changed immediately. When they are unequal in reviving, it is caused by their not having been distributed according to the rate of their developement; from the greater part having eaten continually, while some have remained under the litter, and all the others upon them, and prevented thereby from breathing freely, or were nearly suffocated under the leaves, where they become torpid, when they should have awakened. In short, the inequality of awakening is owing to the differences of vitality, or the decrease of it, into which the worms have been forced by the negligence of those who should have watched over them. The inequality of awakening, may also be attributed to the first hatched worms not having been put in the coolest places of the laboratory, or the latest hatched not being put in the warmest; or by not having increased the growth of the latter by supplementary distributions of

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* A line is one-twelfth of an inch.—Tr.

† Throughout each of the ages, the like general increase, first, and then the decrease of appetite, occur, and the same general rules for distributing the food should be observed. That is, during the first part of the age, the meals of each day should successively be increased in quantity, as well as the successive days' allowances, until the maximum of appetite and of food is reached; and then a decrease of each day's several meals, in succession, until the worms again suspend their eating.—Tr.

leaves, to make them overtake the growth of the earliest ones. From the operation of these causes of inequality, some worms are in the torpid state, while some others are eating, after having awakened, and the slowest still eat because they have not arrived at the torpid state. Also, it is as common to see, upon the same sheet of paper, worms of four different sizes, as it is for the last-comers to perish. It is upon going out of the moulting, that they experience the greatest need of air, and of mild heat, equally distributed, to hasten the consistence and energy of their organs, and especially of their muzzles, which, now stripped of their first scaly covering, are again hardening by contact with the surrounding air.

In the *first day* of the second age, and the sixth from the birth of the worm, there should be provided nine or ten pounds of small twigs of mulberry, as tender as possible, and as many fresh leaves, cut small, after being cleaned and picked over.* Also, all the preparations should be made for changing or removing the worms, in order to clean the first sheets of paper upon which they were kept. When they are perceived to be generally awakened, that they agitate their heads, or hold them elevated, as if searching for something, and when some of them have wandered from the litter, the removal should be commenced with those which show most motion. For this purpose, the small mulberry branches, with their leaves, are laid over the papers of worms, with spaces, [one or two inches wide,] left between. Very soon these boughs are covered with worms; then, by means of small moveable boards, very smooth and even, the little branches of mulberry may be changed with the worms on them; and, instead of keeping them as before, in squares, there are placed bands, (or moveable dividing strips of wood,) across the shelf, and are disposed in such manner, that there is nothing to do but to enlarge the two sides of the compartment, [by moving outward the bands, or sliding strips,] whenever there is need of more room; for, at first, the worms ought not to occupy but the half of the space in each small compartment, which is intended for them afterwards.

By means of the little tables, or boards of transport, which are rested with the long side upon the hurdles or shelves, and inclining them, the little branches on them, with their burden of worms, are gently slided off upon the shelves, where they must be arranged in proper order by the hands. Whenever there are seen a few more revived worms, left still uponthe old litter, more of the little branches are put there, to gather up and to remove the worms, as the preceding, to the leaves disposed for them—which must be counted as one distribution; for, in a very short time, there will be nothing of them remaining. The contact of warm air is then sufficient to develope their jaws, enfeebled by the moulting; and far from being inclined to remain upon the litter, where they were, they are seen grouped upon the little branches which have served for their removal, and adhering so closely as to remain heaped together. For the purpose of changing the place of silk-worms, at all times, this is the best method to follow.

One or two hours after the worms have been removed and placed upon the shelves, there should be distributed to them three pounds of leaves, cut small, as before. In the cases where the worms, though crowded upon the stripped branches, may leave vacant intervals between them, there should be placed on these intervals other leaves, so as to make them extend themselves, and occupy the whole space designed for them, after this first repast. The two others, for this day, are to be given at intervals of six hours from one another.

The removal of the worms to the other shelves, being finished, the first sheets of paper which they occupied must be rolled up, to be carried out of the laboratory. For what remains on them is only excremental matter, and the cast skins, mingled with the remains of the leaves fed on since the birth of the worms. Out of thirty pounds of leaves given, it may be counted on that twenty-two and a half will have been completely digested.

In the *second day*, there should be given thirty pounds of cut leaves, to be divided into four portions, and given at intervals of six hours. The two last distributions should be rather larger than the first. The enclosing strips should be enlarged, and moved to the compartments this evening, so as to permit two-thirds of the whole space to be completely occupied. The worm is now of a clear white color; its head is a little larger. They are dispersed, as has been said, by taking them upon little branches, to bear them to the places where there are too few. It is very important that they should be equally spread over the surface.

In the *third day*, the two first meals should be more abundant. There should be used for this day thirty-three pounds of leaves, cut small, taking care to proportion them according to the wants of the worms. For, towards the end of this day, not only does their appetite lessen, but again they hold the head high, they cease to eat, and fall into a marked state of torpor. Their spaces are again enlarged, so that they now have four-fifths of the whole.

In the *fourth day*, there should be distributed to the worms only nine pounds of leaves, picked, cleaned and cut, observing always, to divide them equally and lightly. When once completely torpid, it is not until the next day, and after the termination of their second casting off their skins, that they will awaken. Then their second age will be entirely completed. In calculating their consumption of ninety pounds of cut leaves and little branches, with what remains of the litter, it is seen that it required twenty-one pounds to feed each ounce of worms, considered separately. During this second period, the worms are become of a clear gray color; the hairs are so shortened as to be seen with difficulty; the muzzle, which had been black, has whitened, and, immediately after the moulting, is soft, soon to retake its first form

* It is obviously an important saving of trouble to pick over the leaves carefully, before chopping them, and to remove all dead leaves, and other parts, or foreign matters, which are unfit for food. For even if none of these matters are otherwise hurtful to the worms, their presence will prevent the quantity of food given by weight being accurately estimated, and moreover will serve greatly to increase the mass of litter and filth, and will cause more labor to separate it from the worms, when removed at last, than would be required to avoid distributing them with the clean leaves at first.—Tr.

and first color. It hardens even according as it makes progress, and according to the need of having food a little more solid. Upon the back are seen two curved lines, opposite to each other. The worm has grown in length two lines, and already it has need of a much greater quantity of air to respire at its ease. Its respiration, greatly increased, exacts a more frequent renewal of the air, either by opening the windows when the outer air is mild, or by opening the door, or the smaller opening made in the door, and until the thermometer shall have sunk two degrees.

III. *Third age.*

For the *first day*, the preparation for feeding should consist of 15 pounds of clean-picked and fresh leaves, less cut than the preceding, to which should be added as much in weight of small branches. The worms of five ounces of eggs will now occupy 174 feet of the shelves, which should, as before, be covered with paper. They will be kept in a temperature ranging from 71 to 73 degrees. They must not be changed to new places until it is seen that they have almost all come out of their torpid state, (which usually takes place in 24, or 30 hours at most,) by a movement of turning which they make with the head. Agitating the air cannot hurt them, though, when breathed upon, they seem to experience a disagreeable sensation. To remove them, after this moulting, there should be used the same procedure and precaution as before. If the spaces which silk-worms should occupy, in their different ages, are correctly calculated, there will be nothing more easy than to lift them, to clean them, and to dispose them anew upon hurdles or frames, where they are left until they have completed their moulting, at a sufficient distance from each other. They eat now with the greatest facility. Their litter cannot injure them in any manner. Their first repast will consist of the 15 pounds of little branches with all the leaves growing on them, which, when eaten, will be replaced by 7 or 8 pounds of other leaves, equally distributed by means of the broom. The most essential point, then, for him who is charged with the care of silk-worms, is to distribute them equally upon the shelves, or the hurdles, as well as to watch over the just distribution of the leaves with which he feeds them; for to furnish too great a quantity would be an absolute loss, and the excess would serve but to augment the litter, which would lead to its certain fermentation, and might be the occasional cause of many diseases.

This day will be terminated by a distribution of 7 pounds of leaves. Or if they should not be wanting, they should be kept to add to the supply for the next day.

It may take an hour, or two at most, to change the worms which are to cover 174 feet of shelves or frames. Always as soon as possible after removing the worms, the litter should be rolled up with the paper, and carried out. Before getting rid of the litter, search should be made in it whether there may not remain there some torpid worms, which the contact of the open air will reanimate much sooner than that of the laboratory; and after having placed them upon some little branches, they should be brought back to the others. As to these last roused, they should be kept on separate shelves, in the warmest parts of the laboratory, and allowed plenty of room.

From this time the consumption of the worms is very great. To give them the leaves easily, there should be provided square baskets, shallow and wide, with handles, by which they can be suspended on hooks, any where, and may be emptied, using both the hands together, of the leaves which they contain, to be distributed at will, whether at the height of the individual, or upon the more elevated shelves, by aid of little stools, or very light ladders. When the worms shall have eaten three or four of these meals, it will be perceived that their size is sensibly increased, that their color is brighter, and at the same time that the muzzle is lengthened.

On the *second day*, there must be provided 90 pounds of picked and cut leaves, of which the two first meals will be smaller than the two last, because that by the evening the appetite of the worms is increased. The space occupied by them also should still be enlarged gradually.

On the *third day*, there must be distributed to the worms seven pounds of cut leaves more than the quantity of the previous day; observing to give the greatest shares at the two first meals. The distribution of food for the evening ought to be less, because the worms are then losing their appetite. They have now grown much in size, are becoming white and transparent, their heads are lengthened, and the circumvolutions which they make with it, precede the moment when they are going to become torpid again.

On the *fourth day*, the food will be only 52 pounds of leaves, because the appetite of the worms is much less. The greater number are already torpid. The share for the first meal should be the largest, and for the last, much less. The leaves should not be spread but in the places where they are needed, and the want of them is perceived. In case there are found on the same shelf some which still require food, there need be no fear to give it to them, that they may more quickly reach the state of the others. Excellent effects are obtained from these intermediate meals.

For the *fifth day*, the distribution of cut leaves should be only 27 pounds in all, and shared only to the places where it is seen that food is wanted. Since the day before, there may be seen throughout some of the foam or slaver of silk, which the worms have rejected. They are seen now to seek to go to their sleep, in free air, in the dry places, and holding the head continually raised; and those which are compelled to remain on the litter, elevate their heads above it, maintaining the same position. At the instant when they are passing into their state of momentary torpor, they evacuate all that they have within their bodies; the intestinal canal is then distended by a lymphatic fluid, yellowish and transparent; the outer skin becomes wrinkled and dry before being cast off. During all the time of the moulting it is necessary to agitate and renew the air of the laboratory, taking care to keep the temperature at the previous degree of elevation.

On the *sixth day*, the greater number of worms are disposed to revive from their torpor. Their third age is now completed. They have passed through it in the space of six days, consuming 300 pounds of leaves and small branches; which is nearly 69 pounds to the ounce of eggs. Their muzzle is lengthened, and jutting out; from black, which it was before, it has become of a reddish-gray; the head, the body, have sensibly increased in size; the body is covered with wrinkles, as well as the head, and the skin no longer appears hairy. The general color borders upon yellow orange. All their feet towards the posterior end being developed, permits the worms to cling strongly to whatever they touch and eat. There is even heard a slight sound, which they make in moving from one place to another, which ceases when they fix themselves, and which becomes more strong as they grow older. Since the second moulting the worms have gained six lines in length, and have increased their weight fourfold.

IV. *Fourth age.*

The space which the worms should now occupy is of 412 square feet, and the temperature required for them is from 68 to 71 degrees; and even should it rise to 73 degrees, or higher, there will be no danger, provided the air be renewed from time to time, by opening the doors and windows, [keeping closed the venetian blinds.] By this means, the litter, is almost always moist, is hindered from entering into fermentation, and disengaging exhalations which would be extremely injurious to the worms. Many times entire broods have perished for want of such precautions being taken.

The hurdles should not be changed until almost all the worms have got over their torpor. Those first revived should be put in the places the least hot, and the last where the temperature is highest. The thermometer will easily direct to the proper places for both. These attentions are even indispensable, when it is required to make the worms climb (to begin their cocoons,) all at one time.

The third moulting being thus ended, the worms should be removed, that they may no more be disturbed, to the great laboratory; where they should have, that they may be at ease, 920 square feet of surface on the shelves, whether in one large apartment, or in several smaller, but contiguous, for the greater quickness and ease of the services to be performed. However, as at coming out of the third age, they did not occupy but 459 square feet, it is necessary to mark off the spaces in advance, and fix them by proper bands, or strips, which may be moved to enlarge the spaces gradually, and at will. There result from this arrangement, essential in every rearing of silk-worms, 1st, that the litter, (which it is not necessary should be taken away in the fourth age,) increases insensibly, and as it has very little thickness, there is disengaged from it no marked or hurtful odor; 2d, by such thin scattering of the leaves, it results that they are more equally eaten; they have no time to fade, and still less to be spoiled; 3d, that the worms, being suitably dispersed, eat much better, and at their ease; it is much easier for them to move themselves; and their perspiration, as well as their breathing, is performed in a manner which is extremely beneficial.

For the *first day*, which is the sixteenth of their existence, there should be provided for the worms thirty-eight pounds of small branches, and sixty pounds of leaves cut only to about half sizes, by the cutting-machine. When it is necessary to remove the worms, there should be spread some of the little branches of mulberry over two hurdles only at a time; and when these are filled and covered with worms, they are transported on the boards as before. The little branches may be substituted by numbers of the whole leaves tied together by their foot-stalks, to be spread out to receive the worms, and to be lifted and moved when filled with them. Two persons being charged with this part of the operation, and two others conveying the boards with the loaded boughs, or bunches of leaves, as quickly as possible to the places destined for the worms, will soon effect the removal. If there remain some which are still torpid, they must be collected and put in a separate place.

There are then distributed to the whole number thirty pounds of leaves, all along the bands, in strips, which are kept still at some width. The scattered leaves are gathered to the places where they are wanted, by the little broom. Soon all the silk-worms are disposed equally over the frames; and if the leaves are still cut for them for three or four more days, it is to induce them to eat quicker, by the leaves exhaling a stronger smell, and presenting many more surfaces to the mouths of the worms. The second meal being ended towards evening, when it is entirely consumed, the worms become whiter, have much more strength and vigor, and their movements are more marked.

For the *second day*, there will be used 165 pounds of leaves, still cut, though but slightly. Of this, the three first meals will be moderate, and the last ample. The space which the worms occupy is gradually enlarged, as they now increase in size rapidly. At the same time they take a much whiter color.

For the *third day*, there should be given in the four meals 225 pounds of leaves, cleaned and cut into large pieces. The quantities for the two last meals should be much greater than the two first.

On the *fourth day*, there should be fed 255 pounds of leaves. The three first shares should be about seventy pounds each, and the last, forty-five. Towards the close of the day, the silk-worms are about 18 lines in length; and they are still whiter than on the preceding day.

On the *fifth day*, as the hunger of the worms will have sensibly lessened, 120 pounds of leaves slightly cut, will be enough. The first distribution will be the most considerable. The worms almost all become still or torpid. The other distributions of leaves should be made only on the places where worms, not yet torpid, are seen. Generally they have increased in length two lines more.

For the *sixth day*, no more will be required for feeding than thirty-five pounds of leaves divided and given according as the want of them is perceived. By the evening, the worms will have evacuated; they are become much smaller; the green color has disappeared; they are covered with wrinkles which are scarcely visible.

In the *seventh day*, the silk-worms accomplish their fourth moulting, and come out of the torpid state. During the last 7 days they have increased in length six lines. They are now of a grayish and reddish color, deeply tinged, and their augmented weight is quite visible. During all the time of this age, it is absolutely necessary that the air of the laboratory should be kept in a state of continual purity. Thus it must be renewed as often as is found necessary, either by opening the doors, the windows, the air-holes, or the ventilators, whenever the outer temperature is nearly the same with that of the laboratory; and, in the contrary case, by making fires in the chimneys with very dry combustible matters. The purity of the air, in which the worms are continually kept, is of the first necessity, to maintain their existence in a state of sustained vigor, and to prevent the contracting of diseases. The persons occupied in attending to the worms, ought also not to suffer any disagreeable sensations in breathing the air of the laboratory; and if they experience any such sensation, or affection troublesome to the organs of the chest, however little it may be, they should immediately use all the means at their disposal to renew the air which surrounds them.

V. *Fifth age.*

In the *first day* of the fifth age, which is the twenty-third of the life of the silk-worms, their fourth moulting is finished, and almost all are again aroused from their torpor. They ought now to be kept at a temperature of 68 to 71 degrees. Spread out upon 918 square feet of the shelves by a sufficient number of persons, this operation ought to be completed in eight hours at most. The first distribution which is necessary to them, amounts to ninety pounds of small branches, or whole leaves, and as much of others, but after having been cleaned. The branches must be spread out upon four or five hurdles. As soon as covered with the worms, the branches are carried to other frames, in the middle of each of which there is left a vacant interval of more than half the size of the frame. The frames from which the worms are thus removed, are then cleaned; and all the worms which may be still torpid, and left on them, are to be collected together, as directed formerly, upon separate shelves, in the warmest part of the laboratory, and taken such special care of, that they may arrive at the latter conditions in the same time with the others.

If attention has been paid in first placing the worms on half of the shelves—if the interval in the middle of the hurdles has been well preserved—in two changes, all the worms will be found equally distributed through all the interior of the laboratory, and in a suitable manner. The leaves of the branches used will have served for one of the meals; what remains of the leaves and other branches will be given after an interval of six hours; taking care to bring together with the little broom all the leaves too much scattered, and to disperse the worms which may be too much clustered together, into places where there is space to spare. At the last meal, which will be but of forty-five pounds of leaves, the boards should be again moved, to allow more space to the worms. All will then appear to enjoy a degree of vigor sufficiently well marked. Fresh air should be given by the windows, if the outer temperature should be nearly equal to that of the laboratory, and especially while the cleaning is done. Slight attention to the thermometer and hygrometer will serve to show what changes may be made in the air. *

In the *second day*, the spaces should be again enlarged, and there should be given to the worms, 270 pounds of clean leaves, divided in the following manner: fifty-two pounds for the first meal, and ninety-seven for the last; [the balance of 121 pounds, for the two middle repasts.] It is plainly seen, towards the end of the day, that the worms are much whiter than the day before, and that they are rapidly tending to their further developement.

On the *third day*, there should be spread over the worms, which are now very voracious, 420 pounds of clean leaves. The first meal will be of 77 pounds; the second and third, of more than 100 pounds each; and the fourth will take 120 pounds. It is very certain that they can eat much more; but the quantity indicated here has always appeared sufficient to keep them vigorous, when care is taken to continue to manage the bands, and enlarge the spaces in proportion to the increase of food. The worms are now 26 and 28 lines in length, and their whiteness is also much increased.

On the *fourth day*, the quantity of leaves to be given should still be increased. The first meal will be of 120 pounds, the two following of 135 each, and the last of 150. The appetite of the worms is still greater, and they have, in very little time, reached a length of about 3 inches. They consequently require much food, and there is nothing to be feared in giving to them the 540 pounds of leaves.

On the *fifth day*, the provision of leaves ought to be augmented to 810 pounds; of which the first distribution will be 150 pounds, the last 210, and the two intermediate meals, 220 and 230 pounds of leaves. It is also often of necessity to make some partial distribution of leaves, in the intervals of time between the greater, especially in places where it is perceived that otherwise the worms would be too long without food. If the frames need clearing, it should be done at the close of this day, or early in the next, in not distributing the leaves but upon four frames at once. But as the worms are no more to be changed, or moved away from the frames they occupy, the following method for clearing will be followed. In a little time after the leaves are spread, and as soon as they are covered with the worms, they are taken and placed as quickly as possible upon the little tables, or moveable boards, used for transporting, which are leaned for that purpose on the edges of the frames. The litter is then immediately taken up from the frames, and thrown into the baskets. This done, the worms are replaced as before on the frames; and so on, successively, with all the frames to the end.

With whatever quickness the litter may be changed, the operation is always too long; and, therefore, it is necessary to feed the worms first cleaned, so as to leave no interval, and that the meals may be shared equally between the last and the others. The manager must look well to the state of the interior of the laboratory, in respect to

* A hygrometer is any instrument for measuring or comparing the different degrees of moisture in the atmosphere. If no better can be conveniently provided, a very simple but sufficient one may be made with a long twine suspended from one fixed end in the laboratory, and having a weight at the other end, to keep it well stretched. The length of the string will contract in proportion to the degree of moisture in the surrounding air, and extend in proportion to the dryness; and the changes will be readily shown in a graduated scale, along-side or over which the weight will rise or sink, as the string contracts or expands in length. As the amount of variation will be in proportion to the length of the string, and, of course, the size of the degrees, marked on the scale, and the accuracy of the scale, the length may be made as great as desired, and yet the whole kept within convenient limits, by passing the string backwards and forwards, and horizontally, over the rollers of sundry small pully-wheels, which will yield freely to the slightest impulse of the string.—Tr.

humidity, to the atmospheric heat, and to the state of the air which is contained, in order that the worms may be preserved in their condition of vigor acquired by the progress of age. It is scarcely necessary to say that the litter heaped in the baskets should be carried out of the house immediately; and that in the handlings required for changing the leaves covered with the worms, great care should be taken not to wound or hurt the worms with the fingers.

On the *sixth day*, without being an eye-witness to the circumstances, it is scarcely possible to have a correct conception of the voracity with which the worm seizes on every thing presented to it. It even attaches itself to the fruit of the mulberry tree, which by chance are left among the leaves. This day, there will be distributed in four times, 975 pounds of leaves. The last meal should be much the largest share of the four. It must not be forgotten to add more leaves in all the places where the worms appear to need them, between the times of the regular meals, in the prolonging of which the worms now gnaw and tear all that is given to them. They are now 3 inches long; and if they are very white, soft to the touch, and of a velvet smoothness, they may be considered in the most perfect health.

The *seventh day* is that in which the worms complete the greatest length which they can acquire, and arrive at their full weight. If no more than six worms are required generally to weigh an ounce, they are then in their highest state of vigor. There will be distributed to them, in meals decreasing in quantity from the first to the last, nearly 900 pounds of leaves; and giving intermediate supplies, if required by circumstances. Towards the evening, their extremity, which had been white, assumes a yellowish color; it is said then that the worms are "*ripening*." Their mastication perceptibly lessens; it is the same of their weight, and of their length; they discharge a considerable quantity of excrement; there is a continual exhalation and evaporation rising from their bodies; and if they have, in about seven days, doubled their length, they are now going to decrease as fast.

On the *eighth day*, as the appetite of worms is much lessened, there will be need of no more provision than 660 pounds of leaves, which should be chosen as good as possible, and from the oldest trees. The first share should be the largest, say 200 pounds, and the following meals be lessened successively. And that the worms may ripen together, still, as before, some intermediate distributions should be made, wherever they are seen to be needed. The yellow color of the worm now extends from one ring to another; they become shining; are no more greenish; they diminish perceptibly in bulk; they seek the edges of the hurdles to evacuate all that ought to be discharged from their bowels. In proportion as it is perceived that they approach maturity, and, especially, if there is too much moisture, the litter should be removed, as quickly as possible. Strict attention must be paid to the state of the atmosphere in the laboratory, and to the removal or correction of every thing that can be injurious in any manner to the worms.

On the *ninth day*, the thirty-first since the birth of the worms, the provision of leaves will be only 435 pounds, to be distributed throughout, and wherever there is more special want. The worms are becoming more yellow, the surface on the back is more shining, the rings are orange, the muzzle is more clear. Currents of air, and exposure to sudden changes of temperature must be guarded against; though it may seem that the healthy and vigorous worms may suffer no remarkable inconvenience, even if exposed to considerable inclemency of the weather.

The worms, from their hatching to this time, have grown to forty times their first length, and, in a month, have increased to nine thousand times more weight than they were when just come forth from the egg. The most active period of their short life is the space of nine days comprised within the fifth age. There is yet, however, need for great watchfulness over the worms, that they may arrive safely at perfect maturity, which will not be until they throw off the skin that now covers them and change to the *chrysalis* form, losing, at the same time, half the bulk and weight of their bodies. The transverse bands reappear upon their backs, and the scaly prolongation of the muzzle becomes blackish, brilliant, and very strong. Their whiteness is much more decided that it has been before; and to the touch, they have the firmness of flesh, as well as velvet softness, especially when healthy and vigorous. At this time the worms should be kept not only in a warm enough temperature, but in air continually renewed, if for no other purpose than to favor the evaporation and aid the removal of the perspiratory fluids, which are transuding from the worms continually, during the last part of their existence in this form.

In the last period of the fifth age, for the formation and perfect completion of the cocoons by the uninterrupted spinning of the silk, until the moment when the worm becomes a chrysalis, it is necessary that the silk-worm should have its body composed of but two substances, the one the silk material, and the other purely of animal matter; and that the intestinal canal should be evacuated of all the excremental matter which it contained. It is therefore necessary to keep the worms in the most perfect state of cleanliness, and also to continue to give them leaves at the same time, not only to finish this day, but still to wait some twenty-four hours more for their maturity to be fully completed; which will be known by the following signs:

On the *tenth day*, the thirty-second from their hatching, when fresh leaves are given to the worms, if they climb upon them and do not eat—if they keep the neck stretched and the head raised, as if searching for something—if they are transparent, and of a fine yellow color—when they raise themselves upon the hurdles where they were supported, crawling slowly, and when they reach the edges, endeavor to go farther—when their rings disappear, and their greenish hue is entirely changed to orange-yellow, the neck becomes wrinkled, and all the body becomes soft—finally, if in placing one of the worms in the hollow of the hand, and looking at it facing the light, it is perceived that the light shows through it—then immediately every thing should be disposed to favor the immediate climbing of the worm, for the purpose of their beginning to spin their cocoons, lest any fruitless efforts in searching for places to spin, may exhaust some of their silk.

For the Farmers' Register.

TREATISE ON THE CULTURE OF SILK.

BY GIDEON B. SMITH.

No 2.

The laboratory, fixtures, silk-worms, &c.

The laboratory, or building in which silk-worms are to be raised, must be of a size proportioned to the number of worms intended to be kept. As to its form and structure, no precise rules can be given, nor, indeed, are any such necessary. Probably no two persons in Europe have laboratories precisely alike; and this fact goes to prove that no particular construction is necessary. All that is required, is, that the room should be of sufficient size to accommodate the number of worms intended to be kept; that it should be provided with fireplaces or stoves, for raising the temperature when necessary, and drying the air, and with ventilators in the ceiling, and windows on all sides, for the purpose of ventilation and light. I would, however, recommend wooden, instead of brick or stone buildings, as they are more easily managed as to temperature, than the latter; and, in damp weather, do not condense and collect water from the atmosphere so much. In a large room, three or four small stoves at the extreme ends and sides are very useful in severe cold times, and also in very damp weather. Ventilators may be very usefully made at each side of the room (if the house be a frame,) by leaving a space one or two feet deep, and the whole length of the room, and reaching to the floor, occupied by long shutters, hung by hinges on the upper sides. In ordinary warm, dry weather, these shutters may be raised, more or less, as desired, and thus the room kept well supplied with fresh air. During cold or damp weather, the shutters will, of course, be kept closed. A large room ought to have several vents for the escape of foul air, in the ceiling. These may be nothing more than ordinary trap-doors, two feet wide and three feet long, with shutters to close them at pleasure. When these are opened, and the ventilators at the sides also open, a free current of air will be kept up through the hurdles, and thus the laboratory will be kept free from impure air. They will be found particularly useful after a time of rainy or damp weather, during which it has been necessary to keep the room shut up. I have found *fire* particularly useful in these damp times, (though the temperature was sufficiently high of itself,) in purifying the atmosphere in the room. I generally make a brisk blaze with light-wood or shavings in the fireplaces or stoves. It has an admirable effect, not only in expelling foul air, but in enlivening the worms—probably by drying the damp air. I have found much more use for fire, during such times, than I ever have on account of cold weather. Indeed, we seldom have weather cold enough to do harm at the season of feeding silk-worms; though we do sometimes, however, it is of short duration. Permit me to make one remark here, on the effect of temperature on silk-worms. I would not be understood as saying or believing, that the temperature could be neither too high nor too low for a profitable result; but I do say, that silk-worms are not affected more than other insects, by its variations. Indeed, I am pretty well convinced, that ordinary variations of temperature are as beneficial to the constitutions of silk-worms, as they are known to be to other animals. *Extremes* only do harm. Do we not find that a continued sameness of temperature, especially if warm, is debilitating to our own systems, and to those of all other animals? Look at the people of the tropics. The temperature there is seldom higher than with us in summer, but it is more equable—always nearly the same. I need not allude to the effect of it on the constitutions of the people: their imbecile, languid, lazy, spiritless characters, are proverbial. As we go north, where the variations of temperature are the greatest, we find the constitutions of men and animals the most robust. Indeed, variations of temperature, and the agitation of the atmosphere in the form of heavy winds, appear to be beneficently provided by the Creator, for the well-being of all his creatures. Why, then, are silk-worms supposed to be exceptions to this rule? I cannot believe that they are; and my experience supports me in the belief of their being, like all other animals, only injured by extremes.

A pretty good calculation may be made as to the size of the room required, from the fact, that a room eighty feet long and forty wide will accommodate one million of worms. Instead of one room of that size, four of forty by twenty, I think, would be preferable, as being more conveniently managed, and being better adapted to a proper *division* of the worms, which may then be separated, each day's hatching being placed in a distinct room. The temperature of the rooms can also be more easily regulated, though possibly at something greater expense of fuel.

In large establishments, a hatching-room will be useful. This need not be large—say twelve by fifteen feet. It should be made close, with a couple of windows, capable of being perfectly closed by shutters at pleasure. A good stove should be provided, capable of raising the temperature to summer-heat, when required. This room may be conveniently used, also, for killing the chrysalis in the cocoons, as will be hereafter shown.

Another room will be necessary for the accommodation of leaves, a good supply of which for a day or two a-head, should always be provided, that no lack of a supply may occur during rainy weather. A loft over the laboratory, or a room in the basement, may be very conveniently used for the purpose. In a basement, leaves will keep fresh for three days, but they should not be left in compact masses, as they are apt to *heat*, from spontaneous fermentation. It is proper that they should be occasionally stirred and shaken about, to prevent such an event.

The fixtures of the laboratory, are convenient hurdles or shelves, for the accommodation of the worms while feeding, and spinning their cocoons. The best form and construction, are those first adopted by me, and which I believe are now in general use. They are two and a half to three feet wide, and four to five feet long. The size may, of course, be varied at pleasure, without detriment or inconvenience. The size mentioned will accommodate about 500 worms, when ready to spin cocoons. They are made like the outside frame of a window-sash, with a floor of netting.

The netting is now woven in the north for the purpose, and only requires to be tacked to the frame, well stretched. Formerly it was necessary to make the netting ourselves, which was done by perforating the sides and ends of the frame with a broad awl five-eighths of an inch apart, and inserting good skein twine first, length-wise, until it was filled, then crosswise, weaving it by passing it over and under the other twine alternately, and drawing it quite tight. The twine will be about five-eighths of an inch apart each way. It is of some importance, that the twine should be *tanned*, by immersion in a tanner's vat, for a few hours, dried, and then thoroughly washed, to remove any remains of the tan that may be on it. This ought also to be done with the prepared netting, if that be obtained. The utility of the tanning is obvious: it prevents rotting, to which the twine is liable, from the dampness of the filth. The netting should also be put on the frames in dry weather, because the twine is then at its greatest expansion; and if put on in that state, is not so liable to stretch and *lag*, when loaded with worms and food. Another frame of the same size, is to be covered with *paper* or muslin, to be placed immediately under the net frames, in the *stands*. These latter are used for the purpose of catching the ordure and filth that falls through the netting of the hurdles. They may be placed two or three inches below the hurdles.

The STANDS, for the support of the hurdles, are simply upright posts, made of three or four inch joist, firmly fixed to the floor below, and to the ceiling above, two feet apart one way, and just far enough the other to permit the free passage of the hurdles sideways between them. Pieces of wood are to be nailed to each two posts to support the hurdles, at about twelve inches apart. I had mine only nine inches apart; but I think they are better at twelve inches. Another piece is to be put upon the posts two or three inches below the others, to support the paper shelves. On this plan, it will be perceived, that the hurdles have the appearance of a set of shelves. The whole room is to be thus occupied with the hurdles, leaving alleys between each range for the free passage of the attendants.

The fixtures in the hatching-room, are simply one or more ordinary tables, sufficient to accommodate the eggs to be hatched, a thermometer, and a good stove.

HATCHING.—About the first of May, the eggs, which have, of course, been kept in the cellar since the time they were laid last season, are to be put in the hatching-room; the papers on which they are, are to to be spread out on the tables. If the temperature be not as high as 70°, it must be raised to that point before the eggs are taken to the room; if it be higher, *naturally*, it is of no consequence. Every day the temperature should be increased one or two degrees until the eggs are hatched; unless, as just observed, the temperature be above 70° naturally, in which case all that will be necessary is to prevent a depression at night, and changes of the weather. It will not be necessary, at any time, to raise the heat higher than 80°. Generally, in about five days the worms will begin to hatch. The first day, but few will come out, and these need not be regarded; but on the second day, considerable numbers will hatch, and they should be taken and placed on the hurdles, and the hurdles containing each day's hatching should be marked with the date of the hatching. Where there are four laboratories, as recommended in a previous page, each day's hatchings should be conveyed to separate rooms. On the third, fourth and fifth days of the hatching, the same routine must be observed. On the latter day, all the eggs will be found to have hatched, except a few scattering ones, which, like those of the first day, need not be regarded, as they will be too few in number to be worth any trouble; and if mixed with the others, will only cause confusion by their irregularity in moulting, &c.

For removing the young worms from the hatching-tables to the hurdles, I have found the best method to be, to lay whole mulberry leaves on the table, covering the eggs and worms completely. The young worms will soon collect upon the leaves, when they are readily conveyed to a small portable hurdle, by taking hold of the stem of the leaf, borne to the laboratory and laid upon the hurdles. Many thousands may be accommodated on each hurdle for the first week; and as the worms grow, and become crowded, they must be distributed to other hurdles. All these minute affairs will suggest themselves to the intelligent operator, as they become necessary. The morning is the time for removing them, as they generally hatch from day-light to 7 or 8 o'clock.

As soon as the young worms are placed upon the hurdles, a supply of food must be given them. The leaves may be torn into small pieces, and scattered over the surface of the hurdle, covering the young worms with them. They will speedily commence eating. The leaves on which they were borne from the hatching-room will, however, be sufficient for several hours. The worms are now to be regularly fed three times a day, with fresh leaves, torn into small pieces, the size of a dollar, or thereabouts, for the first week; after which, they are as well laid on whole. Care should be observed, not to lay on more leaves than will be consumed, as considerable waste would thus occur; and, also, not to allow the worms to remain one moment without food; it were far better economy, indeed, to waste leaves by giving too much, than to stint the worms, at any stage of their existence. For the first two weeks, no other care is necessary than attention to their being properly fed three times a day, as above remarked; keeping the room at a moderate temperature, by artificial heat, when cold, and by ventilation, when hot and sultry. The French divide the time of the worms' existence into periods, which are distinguished by their moulting, or shedding their skin. These periods are called ages, and very particular directions are given for observance at each of these periods or ages. I, however, have never found any particular necessity for much variation in treatment. Cleanliness, moderate temperature, and a full supply of food, at all times, are all I ever found either necessary or useful at any time. The periods of moulting are generally about the seventh, thirteenth, nineteenth and twenty-fourth days from the hatching; but these periods are materially influenced by the care and attention bestowed, and the state of the weather. Some worms will be ready to spin on the 25th day, while others will delay their spinning even to 40 and 50 days, according as they are well or illy attended to. And here let me advise the young beginner, that *care is money;* for there is no kind of human employment in which care is so well rewarded, as in the management of silk-worms. The worms that by want of attention are made to spin out their time of feeding to 40 or 50 days, will have consumed double as much food as those that begin to spin their cocoons on the 25th to the 28th day; will have occupied double the time of the attendants; and, after all, will not produce much, if any, over half as much silk, and that of an inferior quality, as they would have done, if well attended to, and thus made to spin at the proper time. This fact, which I have abundantly proved in my own practice, should never be lost sight of.

The French also direct certain quantities of leaves to be given each day, during each age of the worms. This I never found of any service whatever. Worms will eat double as much one day as they will another, owing, probably, to the dampness or dryness of the air, or to various other causes; but whatever the causes be, the *ten* or *twenty pounds* of leaves directed to be given them, may be entirely too much or far two scanty an allowance. My plan is to keep fresh food on the hurdles at all times, and this I believe to be the only economical rule. I have often weighed the leaves according to Count Dandolo's scale, but never found the quantities he recommends to agree with the demands of the worms—they sometimes requiring more, and sometimes less. I imagine, that the idea of weighing the leaves for each day's consumption, in France, originated in the fact, that the leaves are grown by one person and the worms raised by another in that country; the person who raises the worms purchases the leaves by weight, and this making it necessary that the consumer should form some estimate of the probable quantity he would want each day. It could not have originated in practice; for, as before remarked, the consumption of leaves is not regular at any particular time.

The French also direct the leaves to be cut fine, and have knives for the purpose. The Chinese also do the same. For several seasons, I followed these directions, and cut the leaves with a sharp knife, but was ultimately led to doubt the utility of it, and to abandon it. On close observation, I found that the worms did not like the cut edges of the pieces of leaves, and have often seen them turn from them in apparent disgust. I at first supposed my knife was not sharp enough, and that hence the edges of the leaves were somewhat bruised in cutting; but it was the same with the sharpest knife I could use. Besides this, I found that the worms would get upon and press down the finely cut leaves, and thus cause considerable waste; and, further, that the leaves thus cut, would wither and become useless much sooner than whole leaves. On trying even the youngest worms with whole leaves, I found they would eat them just as easily as when they were cut. Even the old full grown leaves were as readily devoured by young worms, as young and tender leaves would be. From these facts I concluded that even if cutting the leaves were never so unobjectionable, it yet was a useless trouble, and I abandoned it altogether. Indeed, when I fed with white mulberry leaves, I even went so far as to gather the leaves by cutting off small branches and laying these on the hurdles with all the leaves on them; and this is by far the best plan, as the leaves keep fresh much longer—indeed, until they are entirely consumed, and allow the worms a much better and more natural position while feeding; as they get upon the branches, in all directions, they are not crowded upon a flat surface, but are supported by the branches. *They* prefer this plan to all others.

Clearing the hurdles must be attended to, not at regular periods, but as often as the accumulation of filth and offal makes it necessary. The use of the net hurdles renders this not so often requisite, but still it must not be neglected, especially in damp weather; for it must be borne in mind, that nearly all the diseases of silk-worms proceed from foul hurdles. To clean the hurdles, all that is necessary is to lay over the worms some large fresh leaves in the morning, and as soon as the worms attach themselves to them, which they will immediately do, take the leaves by the stem, and lay them on a clean hurdle. In a few minutes a hurdle may thus be cleared of the worms, when the filth and offal may be thrown away, and the hurdle used for the reception of the worms from another; proceed in this way till all are cleared. It is a good plan to carry the filth to a distance from the laboratory; as, if deposited, as is too often done, *under the back window,* it may do just as much harm as it would if left on the hurdles.

Fresh leaves are essential to the health and vigor of the worms, and therefore great care must be observed that fermentation has not commenced, when they have been kept on hand some time, as is necessary in wet weather. Fermentation will be readily observed from the effluvium in the room, and also from the appearance of the leaves, which will exhibit dark-colored spots. When the least appearance of it is discovered, it were better to throw away the whole, than run the risk of injuring the worms. To prevent fermentation, cause the leaves to be well stirred about two or three times a day.

Wet leaves, must in no case be given to the worms. They are almost certain to cause disease, and that of the most fatal character. I once lost a whole crop by this means. In wet weather, the leaves may be dried by spreading them about the room, and frequently shaking and stirring them about.

Vermin, mice, ants, &c., must be guarded against. Mice devour silk-worms with wonderful avidity; and the bite of an ant is almost instant death to them. The only way to guard against mice, is to exclude them from the room by some means. Ants may be guarded against by not allowing the hurdles to touch the walls, and by surrounding the legs of the stands with small leaden troughs, filled with water. These are easily formed, and ought not to be neglected when these little pests are troublesome.

The moulting, or changing the skin, takes place generally with the common silkworms, as above stated, and will be observed by the worms ceasing to eat. Generally all of the same day's hatching moult at the same time; and at these times they do not eat, but seem sick. All that is to be done is simply to leave them undisturbed. The food last given them will be left unconsumed, or only partially so. This forms convenient recesses for them to retire to for moulting. They remain in this sickly state from 24 to 36 hours, and their recovery from it will be immediately observed by their activity, and increased size, and considerable change of color. They should be fed immediately with fresh leaves. The first and second change is so imperceptible as to require a close observer to discover them.

Strict attention to cleanliness, and ventilation, and undeviating regard to keeping a full supply of fresh leaves on the hurdles, are all that is meant by me when speaking of *care and attention*. If the above rules be completely carried out, the worms will begin to spin in from 25 to 28 days. If the worms are not thus carefully attended to, they will begin to spin at any time within 60 days, and then their cocoons will be the less valuable for every day their spinning is protracted beyond 30 days from the time of hatching.

THE AIR of the worms must always be kept sweet and pure. If from any cause whatever, a stench be observed, sprinkle the floor with a solution of chloride of lime, and set cups of it about the room. It is a good plan always to keep a stone jar of it sitting in one corner of the room, and frequently changing it to different places, even when no foul air or disease is present; for it is always better to prevent than to wait to cure diseases. All the diseases I ever discovered in silk-worms are readily cured by the free use of chloride of lime or soda. The *tripes* is a disease induced by foul air, and is closely analogous to the plague in the human species. I have known it to destroy a whole laboratory of worms, consisting of about 500,000, in one night; and have myself lost at one time about 100,000. Since, however, I discovered the preventive and curative powers of this most excellent article, I have never lost a worm by any disease. All that is necessary, usually, is to keep the chloride of lime in the room, as above stated, and occasionally sprinkling the floor with a solution of it. A table spoonful, put into a pint of water, is a good quantity to use. If, however, the disease has commenced its ravages, lose no time in removing the hurdles containing the diseased worms, from the room—then take half a pound or so of the chloride, put it into a gallon of water, sprinkle the floor well with it; put a spoonful of the chloride in each of several saucers, with a gill of water, and set the saucers about the room, particularly where the disease was first observed. As these diseases always, or at least generally, appear in damp, cloudy, or rainy weather, make a brisk blaze in the fire-places or stoves. Throw open all the windows and ventilators; and take care that all the filth, if any there be, be removed. In a few hours you will find the disease checked. If there are any dead worms on any of the hurdles, they must be removed forthwith.

Here I must be indulged with an explanation of a circumstance of a rather laughable nature, though it is as much at my own expense, as any body's else. It is in relation to the discovery of the valuable properties of chloride of lime, in preventing and curing disease in silk-worms. It is well known, that I have often claimed the *discovery* of this most valuable agent, and that some years ago a scientific *Frenchman* read a paper before a learned society in Paris, setting forth the important fact of its then recent discovery, and elucidating its great value to the silk growing interest. What will the public think of me, and of the Frenchman of science, and especially of the learned society of Paris, when informed, that we are NONE OF US entitled to the credit of discovery; that it is an old remedy—an old agent, used and recommended by Count Dandolo himself, whose writings we all of us had read, whose writings were and had long been familiar as household words to the savans of Paris! Yet, such is the fact, though I never was aware of it until this present writing, when I discovered it while looking over a translation of the writings of Dandolo in the Silk Manual, published by order of Congress, in 1828, in which work it will be found at page 119. The article chloride, it is true, is not mentioned by Dandolo at all, but its elementary principles are described and recommended, for the purifying of noxious air, very distinctly. I had often read the passage, and understood something of chemistry too, but never suspected that the combination of a portion from Dandolo's bottle of common salt and black oxide of manganese, and another of sulphuric acid, would produce chlorine gas. It is true, had I reflected a moment, I should have discovered it; but all of us are in the habit of considering things *themselves*, not the individual materials of which they are made. Hence my oversight, and of course that of the learned men of Paris. For my own part, I ask pardon of Dandolo for the claim I have heretofore set up to his property; but would recommend him to be a little more explicit in future, in his descriptions. But the fumigation of Dandolo, though it be chlorine gas, is not as good as the chloride of lime or of soda; as the gas evolved is not pure, but contains large portions of deleterious gases which are necessarily evolved with the chlorine. Besides the chlorides of lime and soda are infinitely more convenient, and even cheaper.

It seems necessary to recur to the *temperature* of the room, for the purpose of noticing an omission while treating on that head. In very high temperatures, the French recommend sprinkling the room with cold water, for the purpose of cooling it. I have often done injury by doing so, and recommend that it be not resorted to. It of course creates a dampness in the air, which is injurious and often dangerous. If the weather be dry, free ventilation is all that is necessary, where proper cleanliness is observed, let the weather be never so hot. Darkening the room, has a good effect in hot weather; and at no time must the sun be allowed to shine upon the worms. A *twilight* is preferred by the worms.

The worms will begin to spin cocoons from the 25th to the 35th days from the hatching, depending on the care with which they have been attended to. As before observed, if carelessly attended to, they may not begin before the 40th or 50th day; but generally the 35th day will be the time of commencement. Their readiness to spin will be immediately observed by their transparent, slightly amber color, by their ceasing to eat, and wandering about, leaving fibres of silk on the leaves, and by some of them actually beginning to spin cocoons among the leaves and rubbish on the hurdles, in the corners of the frames, &c. It is then necessary to prepare the *hedges* for them to spin on, or such other contrivance for the purpose as has been determined on.

The hedges for the worms to spin their cocoons on are composed of various materials, and are as various in form. The French and Italians use brush of oak and various other kinds of trees, from which they construct hedges across the hurdles, resembling miniature bushes set close together in rows, and pressing against the hurdle alone. The worms climb these hedges, and spin their cocoons among the branches. I always used *broom-corn*, and found it to answer admirably. The seed is carefully to be combed off, the stalk cut off close to the commencement of the straw or brush; the top cut off square, and spread out, pressing against the upper hurdle or paper shelf, and the lower end resting upon the netting of the hurdle. Rooms of these set across the hurdles, six or eight inches apart, and as close together in the row as the tops will admit, answered the purpose with me. Of late, however, cocoon frames, made of laths, have been used, and with success, by many persons. I have never seen them, and am unable to give such a description of them as will enable the reader to construct them. Various other contrivances have been adopted, entirely different from either of the above, and even from each other; and, their authors assert, equally effectual for the purpose. These facts only prove that the silk-worms are not very particular as to where or on what they form their cocoons. They will, indeed, spin them any where; the only object to be attained by particular structures for them to spin on, is the prevention of waste of silk matter in forming the *outlines* of the cocoon. Where there is a space just large enough for the cocoon, very little silk will be wasted in the form of tow, or refuse silk. If the space be too large, the worm is compelled to reduce it, by filling it with loose fibres, to the proper dimensions for the cocoon.

As the worms on each hurdle begin to spin, the hedges, or whatever else is to be used, must be supplied; and the attendants should keep an eye upon the worms, to see that they all spin in the proper places. Some will not rise to the hedges or other places prepared for them, but commence spinning on the leaves in the corners of the hurdles, &c., they must be taken and placed upon the proper place. Observe that they do not get crowded too close in the hedges or other places, so that they will not each have room for a cocoon; for if they do, they will form *double cocoons*—that is, two or more will join in forming one cocoon, which is good for nothing, except for carding and spinning, as it cannot be reeled.

The worm is four days spinning its cocoon. Consequently they should be left perfectly undisturbed during four entire days after they commence spinning. On the fifth day after the whole have commenced, the hedges or other support of the cocoons may be taken down, and the cocoons taken off. Select the number of cocoons you may want for the production of eggs for next year, and prepare the others for reeling or for sale. If you can do so, the best way is to reel them at once; if not, the insect must be killed.

Various methods of killing the insect are in use. In France they bake the cocoons in an oven from which the batch of bread has just been drawn, or which has been heated for the purpose to about 150°. If too hot, the silk will be scorched, and thus ruined; if too cool, the insect will not be killed. In Italy they effect the object by exposing the cocoons to the hot sun for several days. Others kill them by filling a vessel containing them with hot steam; others with vapor of spirits. I have lately suggested that they may be effectually killed by the vapor of charcoal—carbonic acid gas—and for this purpose they may be carried into the *hatching room;* all the doors, and windows, and chimney of which must be perfectly closed. Dispose the cocoons about the room on the net hurdles, one above another, similar to the hurdles in the laboratory. Fill a common portable furnace with charcoal, and set it on fire; place it in the middle of the room, and close the room perfectly. In a short time the room will be completely filled with the deleterious gas, and must of necessity smother the chrysalis in the cocoons. I have heard of this plan having been tried in one instance only; but, in that, it was perfectly successful, and I have no doubt it will always be so. If it is, it is an important improvement, not only in saving much labor and time, as well as expense, in this part of the business, but in saving a great deal of trouble in reeling the cocoons, as it does not harden the gum, as all other processes do, and consequently they are easier to reel. Besides, there is no danger of injury to the silk, which is always more or less depreciated in value by the heat applied in killing the chrysalis. I am at present clearly of the opinion that this process will be universally adopted; but I have only *theory*, and one experiment, for the basis of this opinion. I am not now engaged in the business, and have no opportunity to make the necessary experiments. I would advise that a few cocoons be at first tried, say two or three pounds; that the cocoons thus tried should then be spread out in a warm airy room, for at least two weeks; if none of the *insects* come out, the result will be conclusive. The cocoons are now ready for reeling, or for sale.

Eggs for the next year's use are to be obtained as follows. Spread out the cocoons selected for the purpose on a large table, in any room that can be kept warm and comfortable, and that can be made dark. In about ten days from the time the cocoons were finished, the *moths*, or butterflies, as they are sometimes called, will perforate the cocoons, and come out. They will immediately couple, and are then to be taken in pairs, and placed upon the paper suspended for their accommodation, as described in the following paragraph.

Stretch a small cord across the room, about as high as your head, then two others, two and a-half feet apart, and one foot below the first cord, so that the first will be over the centre, between the lower ones. Then hang old newspapers over the cords, and pin them to both top and bottom cords. This will form a long range of papers, resembling the roofs of a long row of houses. As the moths couple, place them on these papers; take them by the wings between the thumb and fingers, as they will not be separated by it. You need not trouble them further; as after they separate, the female will commence laying eggs, and attaching them to the paper in a small spot about as large as a cent. Put moths enough on each paper to cover the whole sheet with eggs; but not so many as to compel them to lay their eggs on those already there, that is, to pile the eggs on top of each other. This they never do unless from necessity. After they have done laying eggs, the moths generally die in a day or two; the males generally die soon after they separate. The moths do not eat. The recommendation of the French, to separate the moths after they have been coupled *six hours*, is perfect nonsense, and is one of the ridiculous refinements that refined people have tried to apply to the silk-culture, without the shadow of utility to recommend them, and only remarkable for the great additional labour and perplexity with which they encumber the business. Like all the other fooleries of the French, I tried this, and got for my pains no other result than a loss of about one-third of my eggs, which were *not fecundated*, as I might have expected. Let the moths remain together till they separate of themselves, and all your eggs will be good. The room where the cocoons and moths are should be kept nearly dark.

As soon as a sheet is filled with eggs, take it down, roll it up, and put it away in a cellar or an *ice-house*. They should be put in a *tin* or other metal box, to prevent mice and other vermin from eating them, and should be kept dry, to prevent mould and mildew. If it be desired to keep eggs to a late season the next summer, for the purpose of raising several crops, it is best to put the box of eggs, immediately after they are laid, into an ice-house, and keep them there till wanted. If they are only kept in a cellar till the next spring, and then put into the ice-house, they will hatch in the ice-house very nearly as soon as those exposed for hatching in a warm room. I once had more than a million hatched in this way, in the largest ice-house in Baltimore, the basket containing them sitting in the midst of the blocks of ice, under the straw. I do not even know that putting them in the ice-house immediately after they are laid, will prevent their hatching, but am informed that this has been the effect in several instances where it has been tried. For myself, I have no faith in the double or treble crop theory. I do not believe it will ever be profitably pursued. The natural time of hatching the eggs cannot in my opinion be either anticipated or postponed with complete success—at least I never was able to do so.

To estimate the number of cocoons you will want for a given number of eggs, all you have to do is to divide the number you want by 150—thus, if you want 100,000 eggs next year, or 2½ ounces, divide 100,000 by 150 and you have 667 as the number of cocoons required. It is true, the moths often lay more than 300 eggs, but you must allow for various circumstances that may diminish the number. I need not remark that it requires *two cocoons*, a male and female, to produce the 300 eggs—however, we allow 150 to each.

This essay may not be considered as full and minute in its details as desirable by some; but I believe I have described every thing necessary to the most profitable carrying on of the business. Many particulars contained in books, especially French books, are not noticed at all, for the simple reason, that I deem them useless, and do not wish to occupy the reader's time in useless criticisms. My next number will treat of the *reeling* of cocoons, &c., which will complete the series.

From the Magazine of Horticulture.

PROTECTION AGAINST HAIL-STORMS.

By A. J. Downing.

The *paragrele*, or hail-rod, appears to be scarcely known at present in this country. Hail-storms are undoubtedly much less frequent here than in the middle and south of Europe; but, nevertheless, some districts of the United States seem peculiarly liable to hail-storms in summer, and an account of the means at present in use on the continent of Europe to guard against such evils will be acceptable to many of the readers of this Magizine.

The paragrele, we believe, was first invented by M. Lapostolle, of Amiens. It has, however, been considerably improved by Professor Trollard, of Tarbes, whom we quote for authority for the following description from Berneaud's excellent *Manuel du Vigneron.*

"To make the hail-rod, a rope of straw is the first thing necessary; it must be made of ripe wheat straw, soaked and twisted, plaited with three strand and then with four ply, making twelve strand to the rope. This cable of straw must be twenty-five feet long, and through the centre there must run a strong twine of tow yarn: this cable of straw must be fastened at top and bottom to a stake of the same length, solidly fixed in the ground, and armed at the top with a metallic point of tin, *(latten,) with no iron.* The stake should be a pole of firm wood, entirely cleared of bark, which makes it liable to rot. The cable is fastened, at each end, by a wire of tin, or, what is better, red copper, and must be stretched tight, and tied to the pole, at intervals of every foot and a half, with the same wire. The tin point at the top should be one and a half inch thick and eight inches long, placed in direct contact with the tow yarn. The hail rods should be about six hundred feet apart, and fixed upon the most elevated points, such as the tops of hills, roofs of houses, or trunks of stout trees. The cost is about a franc a piece, (twenty cents,) and they last at least fifteen years."

These hail-rods, so simple in their construction, and easily obtained in every part of the country, have now, we believe, been in use nearly twenty years in France and Switzerland. Many extensive districts in both these countries, which formerly suffered severely from hail-storms, and in which the crops and vineyards were subject almost annually to great destruction, are, since the paragrele has been generally adopted, protected almost entirely against their desolating effects. The Linnæan Society of Paris, some time since, with a commendable zeal, made extensive inquiries in all parts of the continent respecting the utility of this instrument, and the result, as exhibited by them, proves the paragrele, in all districts liable to hail-storms, to be an invention truly invaluable. Public experiments were made in such parts of the country as were most subject to hail-showers, and while those districts where paragreles had been erected were quite protected, neighboring districts not guarded by these hail-rods, were, as before, much devastated. The society, drawing their conclusions from the facts elicited by the various trials made in France, estimated that the annual saving which would arise from the general adoption of the paragrele, throughout that country, would not be less than five millions of dollars.

Considerable difference of opinion exists as to the method by which the paragrele produces its effects. A commonly received theory, based on the supposition that hail is produced by a congelation of the drops of water, in very elevated strata of the atmosphere, is, that the hail-rod, by attracting and detaining these vapors in a lower stratum than that in which freezing takes place, prevents its formation. But as hail-storms are generally accompanied by thunder and lightning, an American writer has suggested that the paragrele acts by abstracting the superabundance of electricity from highly charged clouds. The formation of hail, according to this writer, takes place only when, by the sudden passage of the electric fluid through the cloud, a portion of the water is decomposed, and returns into its original gaseous state, the heat abstracted (by the change from a liquid to an aeriform state,) from the neighboring particles (or clouds?) is so great as to convert them into ice, when they descend in the form of hail. The decomposition of a single cubic inch of water, according to the tables of *Biot*, will reduce the temperature of 5,64 pounds of water from 72 degs. to 32 degs., the freezing point of Fahrenheit. The decomposition of water by the electric spark is now a well known fact, but the peculiar manner in which electricity acts upon the clouds, or the exact manner in which they must be situated, in order that hail shall be produced, does not yet appear to us to be clearly demonstrated. That, however, the electric fluid is a necessary agent in the production of hail in summer, we can scarcely doubt; and the claims of the paragrele or hail-rod appear so well established, that we do not hesitate to recommend strongly the use of so valuable a means of protection in all parts of the Union liable to frequent or destructive hail storms.

Newburgh, N. Y., July 15, 1837.

From the Farmer and Gardener.

SMITH'S LIME-SPREADER.

We have before noticed the invention of a machine for spreading lime, by our ingenious fellow-citizen, *Francis H. Smith*, Esq., and revert to it again in consequence of the repeated applications that have, of late, been made to us for information as to its efficiency and cost. To speak then, first, of its efficiency. There is no doubt in our mind, and we believe there is none in the mind of any person who has seen it in operation, but that it is a most useful machine—one that is eminently calculated to promote the object for which it is intended, and that it not only economises time, but does the work better than it can possibly be done by hand.

One of the most desirable things aimed at in liming, is the *equal distribution* of the mineral over every part of the field, and this, it must be admitted by all candid persons, cannot be effected by shovel-spreading, as with all the care and precaution that may be taken, inequality will ensue in despite of the best directed efforts.

Again, it is almost impossible, by such spreading, to *regulate the quantity* sown on the acre, and hence disappointments often occur to the mortification and cost of farmers.

The injurious effects, too, of the old method of spreading, upon the lungs and eyes of those engaged in such work, have always been subjects of regret, if they have not restricted the use of this generous agent in the fertilization of the soil.

We are happy to say, that one and all of these objections have been completely obviated by Mr. Smith's machine, and that by it the following results are produced.

1. Owing to the beautiful and nice mathematical arrangement of the several parts of this machine, it is perfectly practicable to distribute any given quantity of lime evenly and equally over every part of the field; such is the equality of the operation that the ground after the work is done is covered with as much nicety as if the distribution had been effected by patient laborers from hand-sieves.

2. By the substitution of different cog-wheels, the machine may be so regulated as to spread 50, 75, 100 or 150 bushels of lime upon the acre, as may best suit the views of the farmer; and any of these quantities may be distributed with the greatest nicety and exactitude.

3. From the peculiar construction of the machinery, no disagreeable effects result to the workmen while engaged in their labor, as but little dust arises, and that which does, is left behind by the cart, so that the laborers are not at all incommoded thereby.

The above advantages we have pointed out, will, we are sure, be considered as important *desiderata* by all intelligent farmers; but independent of these, there is another of great moment. We allude to the superior despatch with which the work can be done. Two hands with a cart and horse, can spread *an acre* an hour, with perfect ease.

The reader, we hope, will be able to comprehend the principle and construction of the *spreader* on perusing the following description.

It is a neatly made *cart*, adapted to either one or two horses. In the bottom of it, about a foot in the rear of the axle, a hopper is formed, within which two rollers, reaching from side to side, revolve by means of cog-gearing, moved by a cog-wheel located upon one of the hubs. The rollers are made of iron, one of which is fluted to the depth of about three-fourths of an inch; the other is smooth, one of these rollers is borne upwards by a spring, which is of great strength, but which is so constructed as to give way, or recede back whenever a stone too hard to be crushed presents itself for passage between the rollers. This is an object of great value, as it not only provides against a stoppage of the machinery, and consequently saves time, but preserves the machinery itself from injury.

The machinery is *simple;* easily kept in order, and may be repaired by any common country *smith.*

It is calculated for spreading *lime*, either dry or wet, (stone or shell,) *ashes*, *marl*, or *ground bones*.

When not used as a *lime-spreader*, by fitting in a slide, which also accompanies the cart, it may be used for all other farm or market purposes.

The *price* of the cart, together with its machinery, including the two cylinders for *dry* and *wet* lime, is $110, a sum which should not be considered an object with any agriculturist who has a farm of a hundred acres or more to *lime*, as it would pay for itself in a single season in the saving of labor, besides doing the work infinitely better than in the old way.

From the Mining Journal.

ANTI-DRY-ROT PROCESS.

The advantage arising from the application of Kyan's process for the preservation of timber, has been so generally acknowledged, and has been so well tested by experience, that its general introduction in the mining districts, is one of the natural consequences attendant on its success. It is now some months since it was first introduced in Cornwall, where its use is becoming very general; indeed, when the expense of timbering, shafts, and other uses to which timber is applied in mines, and the heavy cost attendant on works of this nature is considered, its importance must be apparent. In rail-way undertakings it is also adopted; and we learn with much satisfaction, that Earl Fitzwilliam has also ordered its use in the mines possessed by his lordship. This additional evidence of the estimation in which it is held, will, we feel assured, be hailed with satisfaction by all who take an interest in scientific discoveries like the present, and which, in the onset, had so much to contend with, not only from popular prejudice, but from the necessity of testing it by some years' experience.

From the Southern Telegraph.

MEXICO-EGYPTIAN COTTON.

A few days since we accidentally saw a very small quantity of the Mexico-Egyptian cotton, produced the present season on the plantation of the late Dr. Nutt, near this place. We were much pleased with the evident superiority of the article, and solicited* an account of the experiments by which this superiority was obtained. We are happy that our solicitations have elicited the very interesting letter which follows, and to which we invite the attention of our readers—especially that portion of them who are engaged in the production of our great staple. We have in our office, some specimens of this new article of cotton, which we will take great pleasure in showing to all who feel sufficient interest or curiosity to call upon us; and we hope there will be many such.

Messrs. Editors: You requested me to give you the result of an experiment instituted by the late Dr. Nutt, with the view of improving the growth of our cotton, by crossing it with that of Egypt. I cannot, as yet, give you the result, as the experiment cannot be fully carried out, until we have gathered the *small crop* of Egyptian cotton planted last spring; after which I may be able to show you what amount *per* acre it will produce, and to note particularly the relative advantages to be expected from the Mexican and Egyptian cotton. So far the experiment can only prove interesting to the curious. When we are more fully convinced of its usefulness, I will then inform you of the further progress of the investigation.

I learned from Dr. Nutt, that the cotton of the *Nile* seldom grows higher than *three feet*, that the bowls are small, and have only *three compartments*, containing as many *locks* of cotton. The Mexican cotton, as it grows with us, differs in each of these particulars. The stalk grows much higher; the bowls are larger, and usually have *five compartments*.

That these two *varieties* of cotton do cross when approximated, admits of no doubt when we have examined the *new product*, which is an amalgation of qualities peculiar to the Egyptian and Mexican, yet differing from both.

The seed Dr. Nutt brought from Egypt, was planted in a line contiguous to the Mexican cotton; the seed procured from these stalks were planted the following year, from which was obtained seed enough for something like an acre of ground—the subject of our present remarks.

This cotton was planted on the 14th of April, three weeks after the usual time. The consequence of this is, that it is still growing, and but very few bowls as yet have opened; and although the cotton on this place, as well as in the neighborhood, has suffered serious injury by the shedding of *forms* and *bowls*, yet this looks healthy and is weighed down by its rich burden.

The *Mexico-Egyptian cotton* as it now appears, has two or more stalks, measuring in circumference from eight to ten inches. These stalks have innumerable branches, which are larger than the stalks of common cotton growing in like situations. The stalks of each plant attain a common height, say from six to twelve feet. The branches grow erect, and these have arms that extend three or four feet horizontally; at every joint there is a blossom, square or bowl. Mr. H. Nutt had the curiosity to count them last summer. He found upon a single plant, *five hundred*. There is a plant now near the house, which, if any one had the patience to count, may be found as many *well-formed bowls*. The peculiarity of its blossom, is worthy of notice, which is a beautiful bright buff-color. The bowls have but *four compartments*, a feature given it by a compromise between its progenitors. The fibre of this cotton, (a sample of which I send you,) it will be readily seen, is *longer*, possessing *greater strength*—the color, *Mariet*, less bleached, approaching somewhat the much desired "cream-color," and that its texture is finer than the Mexican. This sample, you will mark too, was picked from a few bowls, the first to open, and that the seed were torn out by the fingers. You can conceive how much more beautiful it will appear when its second picking is ginned.

It is a fact, well attested by naturalists, that subjects of the *vegetable*, as well as the *animal kingdom*, when made to procreate from their respective species or families, degenerate. In a few years, the Mexican cotton of the Gulf Hills, which has so long occupied such enviable pre-eminence, may lose that proud title, and become as inferior as the *black seed* that preceded the introduction of the Mexican. Another fact may suggest to the planter the necessity of making some attempt to improve the culture of cotton in *the Hills*. You know, gentlemen, that land, which for a series of years, has produced a certain grain or crop, will become *tired*, and refuse at last to *bear* that crop any longer; that by changing the crop or alternating it with another, thus *resting* it in some degree, that its capability to produce will again be

* Dr. New.

restored. Now, there is no concealing the fact, that much of the land in *the Hills* is impoverished, and some entirely exhausted, and that, unless something is done to restore its productiveness, it will fail to bring good cotton before long, and at last fail to bring any cotton at all.

It was to remedy these evils, to wit: to prevent the degeneration of the Mexican cotton, and to arrest the exhaustion of the soil, that this attempt to cross the cotton has been made; and if the experiment of the Mexico-Egyptian cotton succeeds, we shall have the novel spectacle of worn out lands, *resting*, and, at the same time, *producing* finer cotton and larger crops than at present.

I sat down, to notice simply the peculiarities of this *mongrel cotton ;* but your inquiries have elicited an extension of my remarks, which probably should have been reserved till better warranted by facts, or till my time should have given me leisure to render this communication more satisfactory. But as your curiosity *is to blame* for this hasty account of an interesting operation of nature, you must be satisfied with this statement till the future has developed the result of these speculations. Yours, respectfully,

C. B. New.

Laurel Hill, Sept. 5, 1838.

SUPERIOR PRODUCT OF THE TWIN CORN.

To the Editor of the Farmers' Register.

Old Point Comfort, Oct. 15, 1838.

Any thing connected with the mooted question of the prolific qualities of the Baden or twin corn, must be interesting to your agricultural readers. I will not undertake to settle the controversy; every one should be his own judge from his own experience; but, unless something unexpected occurs to change my opinion, I shall hereafter plant the twin corn, to the exclusion of all other varieties: this determination, is the result of a full and satisfactory experiment.

I planted, three years ago, a field of twin corn, adjoining one of our ordinary large white kind. The product, unfortunately, was not accurately determined, but I was satisfied, that it was greater than the latter. The overseer and negroes, however, condemned it, and I was compelled to relinquish its cultivation. I determined this year to give it another and a fairer experiment, and planted with it a lot of three acres, that was last year in our common corn, and yielded twenty-four barrels. The product this year was thirty-seven barrels of twin corn, upwards of 50 per cent. more than the yield of the previous year. The lot had received no manure, and, as it is fair to presume that it had lost a portion of its productive property by the previous crop, the advantage of soil was decidedly in favor of the first crop. The corn was planted both years alike, in rows five feet wide, and about one and a half feet in the step, and received, as nearly as could be, the same amount of cultivation. As one valuable property of the twin corn is to mature early, it suffered very little from the drought.

From the above facts, let every one draw his own conclusion. Mine is, that on rich land, there is no variety, that we know of, as productive as the twin corn.

Whilst I am writing, I will call your attention to an important typographical error in my communication of last month. Instead of "*several bushels,*" read "*seven barrels.*"*

R. Archer.

THE VERY LATEST AGRICULTURAL HUMBUG, ANNOUNCED IN THE VERY BEST MANNER.

From the N. Y. Commercial Advertiser.

Important to Farmers.—I think, Messrs. Printers, that we have had enough in all conscience of puffing and blowing about family Ravels, *Tree* play actors, men singers, and women singers, Italian fiddlers, and rope dancers, live elephants and monkeys. (By-the-by it is a very prevalent opinion at Cow Bay, Cow Neck, Oyster Bay and Hallet's Cove, that if all those drones were turned out to fell trees, grub up brush and hoe corn, we would not need to import peas-meal and rye-flour from Germany—things which feed the sense of sight only.) Now we, some of your clod-hopping subscribers, think ourselves entitled to half a column of your paper to speak of things which feed the taste, and give nourishment to the body corporate.

Mr. Jefferson says the man who makes three blades of grass grow where only one grew before, is more the friend of man than he who conquers kingdoms. I think if Mr. J. had always preached such sound doctrine, he would have been the greatest philosopher of the age. Seeing, then, that this proposition about the grass is self-evident fact, what think you should be done to the man who makes three ears of corn grow where only one grew before? inasmuch as grass feeds the horse, and corn the man. But to come to the point at once:

Some three years ago a merchant in New York, while emptying a box of tea, observed therein a few grains of corn. Concluding that corn from China must be something new under our sun, he had them planted, so they grew and multiplied. Last spring, I received from a worthy friend, a portion of said corn—it's a new variety—so I gave it the name of China's fall prolific, or tree corn; as it strikes off in two, three, and frequently four branches, in appearance like a small tree, and produces an ear at the head of each branch, whereas the common corn shoots out the ear from the side of the stalk; it grows from eight to ten feet high, produces an abundance of fodder, and is a large white flint twelve rows long, and ears from ten to fourteen inches long. I counted six hundred and sixty grains on the ear; it was planted on the 10th of May, and had ears fit to boil on the 10th of July. Its produce was curtailed by the long drought, but notwithstanding I counted two thousand one hundred and twenty grains, the product of one stalk: being an increase of two thousand and one. The Dutton (which is an excellent corn) planted on the same day, on the same field, and received the same quantity of manure, cross ploughed and hoeing, did not produce one half. The patch about two hundred hills,

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*This was indeed an important error, and which our readers are requested to correct in their copies.—Ed was examined by many respectable farmers, who all pronounced it something new, and something superior.

The corn may be had of G. C. Thorburn, New York, and at the store of Wm. Thorburn of Albany, price 25 cents per ear; the net profits to be given to some of the charitable institutions in New York and Albany. Now, if there is a farmer between Maine and the Rocky Mountains who would rather pay 25 cents for two gills of brandy, than to buy one ear of this corn, which will plant 100 hills—I say, if there is a man, he ought to be fed on nothing but supaun and buttermilk as long as his little soul and big carcass will hang together. A stalk, having the ears on, to show the manner of growth, may be seen at the above stores.

☞ Every printer in Kings, Queens, Dutchess, Orange, and Albany counties, who is fond of *Jennie cake*—(for if my informant speaks true, it took its name from a Southern lass by the name of Jennie Dawson, who was famous for manufacturing this delicious article; but that at a meeting of the Bachelor's Club, Jennie was voted out and Johnny put in her place—I only hope that some of those chaps who were concerned in an affair so ungallant, may never taste one of those new made cakes, when well anointed with fresh butter)—will please insert as much of this long winded story as they see fit; and every printer who has children, who ere long may be orphans, will please insert the whole, and place it to the credit of the widow and the fatherless—he who is their Judge will register the thing in Heaven, as Uncle Toby says.

GRANT THORBURN.

Hallet's Cove, Sept. 24, 1838.

We take the earliest opportunity which the time of our publication offers, to give additional circulation to the foregoing communication; and to award to it our praise of its being the most admirable, as well as the newest specimen which we have met with, among the annunciations and puffs of agricultural humbugs. Readers, of almost every description, are like to be induced to read the article, by some one of its attractive points. First, the general heading, of "important to farmers," though so often falsely and foolishly used, is very sure to attract, at least, a cursory glance from every one of the profession; and then the attention will be held by the little matter of narrative—by the slip-shod and familiar gossiping manner of the writer—the novelty of the article described—and confidence in the truth and disinterestedness of the writer will be fixed, and the reader entirely captivated, by the noble offer of giving the profits, (*net profits*, mark you,) to some charitable institution. Now, on this point, we will merely observe, *en passant*, that if the charges of all expenses of agency, commissions, &c., &c., &c., such as are often made, and may be made without question in this case, do not serve to give the lion's share of the profits to the salesman, and benevolent discoverer of the merits, of the Chinese corn, then he understands less of his business than we give him credit for.

But with all the merit of Mr. Thorburn's laudatory annunciation, we must say, that in one particular it is very deficient—astonishingly so, when it is considered that Mr. Thorburn is so old and well experienced in his business. He has certainly lost the chance of increasing his purchasers ten-fold in number, and his profits, (gross and perhaps "net" also,) by his charging so low a price as 25 cents per ear for his corn. According to all the rules of humbug, he ought to have charged 25 cents *per grain;* and the eagerness of purchasers would have been increased in the ratio of the difference of price. On the contrary, if he had asked only $1 the bushel, or offered to give away single ears, very few persons would care to try the planting.

So much for the annunciation. Of the corn itself, it may, or it may not, be a good kind. It would be as presumptuous in us, upon this statement, to pronounce it of no greater value than the ordinary kinds, as it is in Mr. Thorburn to assume so much value for it, upon his few facts, and very slight experience of its growth. We merely *believe* that it is of no superior value to other kinds, except, like spring wheat, as a humbug; but do not pretend to *know* it. But we deny that the product of 2120 grains from the several ears of a single stalk, on garden culture, is any proof of its superiority, or great value, as a field crop. Such a product of particular stalks on rich land, is not very rare here, and probably of grains larger than the "Chinese." Of a particular kind, called the "Georgia gourd-seed corn," we have heard of, (and believe we have counted, some twenty years ago,) more than 2,000 grains upon a single ear; and for aught that we know, the stalk might have borne more than one ear. At least we know that some ears had as many as thirty-six rows; and the largest, when just ripe, would yield very nearly a quart of grains. This kind of corn united several of the requisites considered so important by fancy-variety-corn-culturists. The ears, when well made, were not only enormously large, and the number of rows and of grains very great, but the grains were very deep (or long) and the cob very large, so as to hold so great a number of grains. We remember well the delight with which we received a few ears of this mammoth corn, and the care with which it was planted, by single grains, and at wide distance, on the richest spot of a good field. Yet the returns, tried for two years, proved that it was very unproductive (for this climate) in measure; and, in all respects, it was the worst kind of southern corn we had ever tried. Yet what a glorious subject would this very corn furnish for a successful humbug, in such good hands as those of Mr. Grant Thorburn!

We see that the editors of newspapers are already helping Mr. Thorburn handsomely in his appeal for the widow and orphan, by re-publishing his letter. The editor of the 'Sun,' however, out-strips all his brethren, and even Mr. Thorburn himself, in commendation. He closes an account of the letter and its subject, with the following sentence. "It is considered as much superior to our corn, *as the morus multicaulis, or Chinese mulberry, is to that of the American tree.*" Aha! Mr. Thorburn! "*Chinese* corn" was a lucky name, and its application highly creditable to your judgment. There is now a fascinating power in the word "Chinese;" and there is no knowing how large a "Chinese corn" bubble might be blown, before its bursting at next gathering season, but for the committing the grand blunder of not charging 25 cents a grain for the seed!

From Brewster's Journal, 1830.

VILLAGE LIGHTED BY NATURAL GAS.

The village of Fredonia, in the western part of the state of New York, presents this singular phenomenon. I was detained there a day in October of last year, and had an opportunity of examining it at leisure. The village is forty miles from Buffalo, and about two from Lake Erie; a small but rapid stream, called the Canadoway passes through it, and after turning several mills discharges itself into the lake below; near the mouth is a small harbor with a light-house. While removing an old mill which stood partly over this stream in Fredonia, three years since, some bubbles were observed to break frequently from the water, and on trial were found to be inflammable. A company was formed, and a hole an inch and a-half in diameter, being bored through the rock, a soft fetid limestone, the gas left its natural channel and ascended through this. A gasometer was then constructed, with a small house for its protection, and pipes being laid, the gas is conveyed through the whole village. One hundred lights are fed from it more or less, at an expense of one dollar and a-half yearly for each. The flame is large, but not so strong or brilliant as that from gas in our cities; it is, however, in high favor with the inhabitants. The gasometer, I found on measurement, collected eighty-eight cubic feet in twelve hours during the day; but the man who has charge of it told me that more might be procured with a larger apparatus. About a mile from the village, and in the same stream, it comes up in quantities four or five times as great. The contractor for the light-house purchased the right to it, and laid pipes to the lake; but found it impossible to make it descend, the difference in elevation being very great. It preferred its own natural channels, and bubbled up beyond the reach of his gasometer. The gas is carburetted hydrogen, and is supposed to come from beds of bituminous coal; the only rock visible, however, here, and to a great extent on both sides along the southern shore of the lake, is fetid limestone.

From the London Farmer's Magazine, August, 1838.

WHAT QUANTITY OF MANURE SHOULD BE APPLIED TO THE ACRE?

The answer to this question involves many considerations which preclude a definitive reply, such as the condition of the land, the quality of the manure, and the kind of crop. Too much, as well as too little manure may be applied. What would be beneficial for an autumn-ripening, or hoed crop, would be prejudicial to a small grain, or summer-ripening crop, and more particularly if the manure is applied in an unfermented state, and be withal a waste of fertilizing matter. Twenty tons to the acre would not be too much for corn, potatoes, ruta baga, &c., if applied broadcast, and plouged in; but, if long manure, and applied in the drill, or hill, and a dry season should ensue, it might prove an injury; and if this quantity of long, or even short manure, were applied to the acre of small spring grain, it would probably cause a flush of straw, likely to be affected with rust, at the expense of the more valuable part—the grain. Dr. Coventry, late professor of agriculture in the University of Edinburgh, whose business and study it was to collect data, and make correct deductions in this and other agricultural matters, was of the opinion, that from four to five tons are yearly requisite to keep up the fertility of a soil of the kind usually denominated spit, or tolerably rotted dug; and this supply he thinks a well managed farm may be made to produce. To show how this quantity may be obtained, and how it should be applied, we quote from Mr. Youatt, the writer of British Husbandry.

"According to that calculation," says our author, "it must be observed, that the course of crops is supposed to consist—on light soils, of the alternate plan of corn and green crops, (see New System of Husbandry,)—on clays which do not admit of that system, that the holding contain a proportionate quantity of grass land; and that the quantity of manure should be supplied not in small quantities annually, but in large ones, at intermediate distances of four, five and six years. Light soils, in the common course of husbandry, rarely require the application of putrescent manure oftener than once in four years, and in all cases where the clover is allowed to stand two seasons, it may be deferred without disadvantage for another year. Heavy soils may run six years without it, provided that the land be laid one year in fallow, and that there be sufficient meadow to be reckoned at least one crop in the course. It being, however, clearly understood, that—whether on light or heavy land—nothing but grain, seed and live stock is to be sold off the farm, unless replaced with an equal portion of purchased dung; that the whole of the green crops; the haum of pulse, and the straw of corn, be used in the most economical manner; and that some of the live stock be either soiled or fattened upon oilcake, which plan, if carefully pursued on good soils, with capital sufficient to secure an abundant working and fattening stock of cattle, ought, under fair management, to furnish an adequate supply of dung for any of the usual courses of culture."

Having thus submitted to our readers all that occurs to us of importance on the subject of farm-yard manure, we shall here recapitulate a summary of the chief points which we deem particularly worthy of their consideration:

1. To bottom the farm-yard with furze, fern, dry haum, (stubble, &c.) or any other loose refuse that takes the longest time to dissolve; and over that to bed it deep with straw.

2. To occasionally remove the cribs of store cattle to different parts of the straw-yard, in order that their dung may be dropped, and their litter trodden, equally.

3. To spread the dung of other animals, when thrown into the yards in equal layers over every part.

4. To remove the dung from the yard at least once, or oftener, during the winter, to the mixen.

5. To turn and mix all dung-hills, until the woody fibrous texture of the matter contained in them,

and the roots and seeds of weeds, be completely decomposed, and until they emit a foul putrid smell, by which time they reach their greatest degree of strength, and arrive at the state of spit-dung.

6. To keep the dung in an equal state of moisture, so as to prevent any portion of the heap from becoming fire-fanged. If the fermentation be too rapid, heavy watering will abate the heat; but it will afterwards revive with increased force, unless the heap be either trodden firmly down or covered with mould to exclude the air.

7. To ferment the dung, if to be laid upon arable land during the autumn, in a much less degree than that to be applied before a spring sowing.

8. To lay a larger quantity on cold and wet lands than on those of a lighter nature, because the former require to be corrected by the warmth of the dung, while, on dry, sandy, and gravelly soils, the application of too much dung is apt to burn up the plants. Stiff land will also be loosened by the undecayed fibres of long dung, which, although its putrefaction will thus be retarded, and its fertilizing power delayed, will yet ultimately afford nourishment.

9. To form composts with dung, or other animal and vegetable substances, and earth, for application to light soils.

10. To spread the manure upon the land, when carried to the field, with the least possible delay; and, if laid upon arable, to turn it immediately into the soil.

11. To preserve the drainage from stables and dung-hills in every possible way, and, if not applied in a liquid state, to throw it again upon the mixen.

12. To try experiments, during a series of years, upon the same soils and crops, with equal quantities of dung, laid on fresh, and afterwards rotted; in order to ascertain the result of their application to the land. The whole quantity to be first weighed or measured, and then divided.

The fermentation of farm yard manure is, in fact, a subject of far greater importance than is generally imagined, for on a due estimation of its value mainly depends the individual success, as well as the national prosperity of our agriculture. The experiments to which we point, cannot therefore, fail to come home to the interests of every man; they may be made without expense, and without any other trouble than the mere exercise of common observation and intelligence. Leaving, however, aside the discussion concerning the disputed worth of fresh or fermented—of long or short dung—let the farmer sedulously bend his attention to the accumulation of the utmost quantity that it may be in his power to procure. The manner and the time of using it, in either state, must, however, be governed by circumstances which may not always be within his control; and every judicious husbandman will rather accommodate himself to the exigency of the case than adhere strictly to his own notions of what he conceives to be the best practice. In fine, whether favoring the one or the other side of the question, let him collect all he can, apply it carefully to his crops, and then trusting to events, "*let the land and the muck settle it.*"

SCRAPS OF INFORMATION IN REGARD TO THE CULTURE OF THE CHINESE MULBERRY.

In the present unparalleled and general excitement, in regard to the speculations in purchasing, and intended culture of the morus multicaulis, no apology need be offered to our readers for giving to that, and to kindred subjects, so much space in this publication. Indeed, whether viewed as a valuable future improvement in the agriculture and industry of this country, or as a subject of national mania, the subject is one of intense interest to almost all who read agricultural publications, and to even most persons who read nothing. Almost every one of our subscribers, stimulated by some one or other motive, will desire to cultivate at least a few plants; and all are but slightly informed on the subject. Therefore, in addition to the valuable general directions for the culture given by G. B. Smith, Esq., in the last No. we shall add here some interesting extracts from several private letters from T. S. Pleasants, an extensive cultivator of some experience, and whose general intelligence, and correctness of observation, deserve the fullest confidence. These letters were designed only for our own perusal and use; but considering the suggestions as interesting, and likely to be useful to many others, we have asked and obtained permission to share the benefit with our readers.

To these extracts will be added other scraps of information received from various sources, and principally from the Rev. Sidney Weller, of Halifax county, N. C.

It is gratifying that the favors of fortune, in this sudden and surprising mulberry madness, have fallen in some cases upon most worthy receivers; and there are none in whose successful and profitable cultivation we are more gratified, than in the cases of the individuals named above. In general, these unexpected visitations of good fortune have fallen upon a class of cultivators, who usually work more for the public benefit than their own, and whose improvements, or schemes, subject them always to ridicule, and often to loss. These are the book-farmers and experiment-makers—*and especially the regular and devoted readers of the Farmers' Register, or other agricultural periodicals.* To this last fact we desire particularly to call attention; and would be much benefited if it could be presented fully to the view of all who have made nothing from this golden harvest, simply because they had read nothing concerning the cultivation which has produced it.

We shall take the liberty of speaking more fully of Mr. Weller's case, because it is one of peculiar interest. He settled himself on a piece of miserably poor land, and with very little prospect, as his neighbors thought, to make a bare subsistence from its products. He has devoted himself principally to vine and multicaulis culture. Some notices of his useful services to agriculture, in the former department, have been heretofore given in this publication. Of the latter, the principal circumstances are as follows: Five or six years ago, being then, and long before, a regular reader of the American Farmer, he was induced by its recommendations (all of which we owe to its former editor, Gideon B. Smith,) to begin the cultivation of the multicaulis. He bought of J. J. Hitchcock, of Baltimore, a plant of about a foot in height, for which he paid a dollar; and 25 cents more for getting it to his residence. From this small beginning, all his stock, and many other, now large stocks, bought from him, have grown. Mr. Weller's sales of plants, before this season of speculation and high prices had commenced, amounted to about $2000; and, this fall, to $8000 more, though made at 6 cents the foot, and before the rise to half the present current prices—besides reserving enough stock to double or treble his crop next year.

Let it not be supposed from these or any other statements of enormous profits from raising multicaulis plants, that we design to have inferred as our opinion, that we expect them to continue. The greater part of the present price of multicaulis is undoubtedly a bubble, blown up by speculation; and that part must burst, sooner or later, (when, we cannot predict;) but the *intrinsic* value of the plant will remain; and if silk-culture should be really undertaken by only one farmer in every hundred, and the demand thereby created should maintain, for two seasons, the plants and buds to one-eighth (or perhaps one-sixteenth) part of their present exorbitant prices, the cultivation will still be highly profitable to all who plant even at the present high prices. If there should be *no demand* of purchasers, and *no design of the cultivator to raise silk-worms*, then of course he will lose his whole outlay. Of these, or of better chances, every adventurer must judge for himself.

We proceed to give extracts from our friend Pleasants' letters. *He* will not confine his efforts to merely raising mulberry plants for sale, but will feed silk-worms the next season, on a considerable scale. For this purpose, he has acquired possession of the Bellona Arsenal, in Chesterfield, which will be converted from its late warlike name and purpose, to a laboratory for the peaceful and useful labors of silk-culture, under the direction of its present worthy occupant.

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"On the subject of *one-bud cuttings* of multicaulis, I can give thee my experience this year, which perhaps may be of some value. It is probably known to thee, that with scarcely any exceptions, there was a great failure in getting cuttings to start last spring. John Carter is the only cultivator I know who has succeeded well. Next to him, I place myself—but at a considerable distance in the rear. To the north, not more than one in 15 or 20 grew. The failure was owing to a most peculiar season, for I never saw cuttings start better than mine did. An excessive drought, at the time the plants began to root, dried them up. In preparing my cuttings, out of some of the strongest and best wood, I cut 10,000 or 15,000 with one bud. The remainder had two buds. The one-bud cuttings I planted to themselves in the same sort of ground with the others; and they were all subsequently treated alike. Taking the piece at large, they stand as well as the best spot of two-bud cuttings, and much better than the greater part of them. They come up with great regularity, and have grown off very evenly.

"If the season is propitious, there is no reason why a cutting with one bud should not grow as well as one with two buds. A large one may be stuck deeper in the ground, and in a drought, it may be longer under the influence of moisture. But with *early planting*, I have no hesitation in relying upon any good one-bud cutting; and early planting, by the way, is more or less important to the success of every mode. I have never taken up my multicaulis plants so early in the spring, but what I found the buds started, and the little rootlets in the act of being thrown out. The growth must therefore be checked by exposure to the air, and transplanting. From my observation, the conditions which I would recommend, (and which I rely on so fully that I intend to practice them,) in order to insure success to one-buds, are as follows: Preserve the plants during winter in a cool place, not exposed to the sun. Let the ground be prepared, so that the planting may be commenced as early as the season will permit; if in February the better—at any rate, early in March. The soil should not be so light or sandy as to become thirsty very soon. Let the cuttings be prepared by separating midway between the joints, and stick them deep enough for the bud to be covered from an inch to an inch and a half, according to the texture of the soil. The bottom of the slip will then be about $2\frac{1}{2}$ inches beneath the surface—a depth to which the ground seldom becomes entirely dry in the early part of the spring—and if there be any choice of ground in the lot, select for single buds that part which lies the lowest, as being likely to retain moisture the longest. With these precautions, and above all, *early* planting, no failure can, in my opinion, ensue; but I would advise thee to consult other cultivators on the subject. By a strong cutting, I mean one taken from the larger part of the main stem of a vigorous plant, and those near the base of thrifty lateral branches. Some days ago, I removed the earth from a number of my single-bud plants, for the purpose of examining them carefully. I found some smaller than I intended to plant; but the trees were as large as those from the largest cuttings. * * * * *

"My plants will this year yield *per cutting* about 40 buds, on the average—perhaps more; and the most of them grow on a thin, shallow soil, that never was manured." * * * * * *

"It is the opinion of many men of judgment, with whom I have conversed and corresponded, that the present prices will be nearly or quite sustained another year. The stock of mulberries is not so large as one might suppose. There are very few in New England. A friend in Baltimore informs me that G. B. Smith estimates the number in the United States at two and a half millions. Robt. Sinclair (perhaps in conjunction with Smith,) states the same number; and a friend of mine, who has taken great pains to inform himself, has arrived at precisely the same conclusion. I cannot help thinking there are more; but my information on the subject is not extensive. In regard to the demand, I may say that, in addition to that indicated by the present high prices, Judge Comstock, editor of the Silk Culturist, told me he did not think there were more in the United States than would supply the state of Connecticut, at fair prices, if they were all sent there. And a gentleman of Burlington informed me that there were not more than enough in New Jersey to supply the present demand in the county of Burlington in the same manner.

"I intended to have said a word about sprouting cuttings in a hot bed, as recommended by G. B. Smith. I have only tried it once, and then on a small scale; but I did not succeed very well. The objection is, that the plants become chilled and stunted by removal from such comfortable quarters, to be exposed to the inclemencies of the month of May. But in any event, great skill and attention are requisite in the management of a hot bed.

"It may be very familiar to thee, but it will do no harm to add, that the most convenient instrument in preparing the cuttings, is a pair of pruning scissors—such as are used by vine dressers."

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"I had intended to supply an omission made in regard to the preparation of cuttings; and the remark I would make, applies especially to cuttings of single buds. It is the main stem that I recommended to be cut into single buds, and it is the strongest part of the stem that throws out the lateral branches. As every lateral starts out, there is no bud (at least none that will readily grow,) remaining at the joint; and it is therefore necessary, in preparing the cuttings, that the lowest bud on the lateral should be left to the main stem. I lost many plants last spring by not attending to this. And the sellers of mulberries, who supply *trimmed* plants, should always prune in this way; otherwise, the best portion of the wood on the whole plant will be of little value.

"I have almost determined to plant a portion of our cuttings *this fall;* say about the last of Nov. or 1st of December. The slightest covering of earth, I have always found to be sufficient to protect them during winter. If thou hast noticed the plants in the spring, when they are uncovered for the purpose of planting, especially if it be not very early, thou hast no doubt observed that every good bud has sprung. By exposure to the dry air, many of them perish before they are planted. Had they remained under a proper depth of soil, every bud, starting as they do at the same time, would have shown itself above the ground. Why cannot they be protected in the field equally as well, without being subjected to spring handling and removal? It would be an easy matter to cover the stems in the furrows 2 or 3, or even 4 inches deep, and remove the covering in the spring, which would be a good working. I have been thinking all the summer I would plant a portion of my crop in this way; but I should be afraid to recommend it strongly to others, lest there might be a failure. If, however, it should succeed as well as I am convinced it would, almost every bud would produce a tree; and by vegetating earlier, it would produce a much finer tree than by the common mode. I perceive that Cheney, who is a very experienced cultivator, recommends that *layers* should be planted in the fall. At all events, I know from experience that the earliest spring planting is much to be preferred to deferring it until the ground becomes somewhat warm. Like grains of early planted corn, the cuttings are throwing out roots, though the germ may not appear above ground, much sooner than the late planting. Unless the ground was clean, there might be danger from the field mice. Please to give me thy views on this subject.

"Wilt thou take it amiss, if I venture to assign one or two reasons why thou shouldst not offer thy plants of 1839 for $12\frac{1}{2}$ cents, as thou didst propose doing some time ago? I would not deter thee from doing so, for the purpose of keeping up the price. If they do not sell for more than 9d. I shall be perfectly satisfied. It is enough for them. But can any one individual reduce the market price by offering his crop at reduced rates, or even by giving them away? Perhaps thou mayest grow a million. If there be a brisk demand for 20 millions, which will probably be the extent of the supply next year, a million more or less will have very little effect upon prices. By contracting now to receive much less than they will probably command, thy efforts to reduce the prices will be unavailing, and thou wilt be voluntarily depriving thyself of the profits to be derived from the culture. Speculators, also, might buy up thy whole crop, and retail it at greatly advanced rates. Indeed it is only the speculator, perhaps, that would now contract to receive plants to be delivered a year hence. So that I see no probability of thy effecting thy object by this course. It is however very possible that by another year, public feeling on the subject may be more rational, and that prices may correspond with the actual value of the plant for the purpose for which it was designed by nature. We are now going through the paroxysm of the fever; in due time it will abate, health will be restored, and reason resume her empire. Let us wait patiently for it, and do all we can to promote the culture of silk, until the question is settled whether or not it can be introduced into this country as a profitable branch of agriculture."

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"I think I have obtained some valuable information respecting the action of bone manure in growing mulberries. When I was at the north, I inquired particularly about its general value, at Boston, Philadelphia and Baltimore. At Boston, there is a very large manufactory. At all three places, the price for crushed bones is 35 cts. per bushel. I purchased 200 or 300 bushels in Baltimore; but it was not until after I left there, that I heard of its good effects on mulberries. A grower in Burlington had applied some to a small lot of ground; and the effect was so beneficial, that I heard the trees spoken of as being the finest in the whole country. They had tried to keep the knowledge of it a secret there, for their own advantage; but I intend that it shall be known. I am promised the result of another experiment. I am fully convinced that with the use of \$5 worth of bone manure to the acre, our highest and driest, and poorest lands may be made to produce trees 5 or 6, or 7 feet high.

"Please inform me what was Sydney Weller's mode of saving his immature cuttings. I heard thee detail it, but perhaps I have forgotten some part."

In answer to the foregoing inquiry, and for the benefit of all others of our readers, the information derived from Mr. Weller's statement of his practice will here be given.

All who have observed the morus multicaulis, know that the plants of one year's growth have a large proportion of the latest formed stem and branches so green and tender as to be unfit to withstand severe frosts. This part of the plants, (with all the buds thereon, though frequently amounting to one-fifth, or more, of the whole number on the plant,) has, until lately, been deemed worthless, and taken no account of in sales, or in planting. But in our own small practice, it was observed last spring, when the plants were taken out of the earth under which they had been kept through winter, that the unripe buds, to the very extremities of the twigs, had begun to start in growth, and of course that they possessed enough vital power to produce plants, if properly managed. The proportion of unripe wood this year is unusually great, owing to the early and continued drought of summer having been followed by abundant late rains. After the first year, there is very little of the wood left unripe, as the branches generally ripen to the ends.

Mr. Weller had earlier learned the vital power and value of these unripe buds, and has practised with success the following manner of saving them separately. As soon as there has been frost enough for the leaves to fall off, and before any more severe cold weather follows, all the unripe ends of branches and stems are cut off, including about an inch, or one bud, of the adjoining ripe wood below. These are laid in a shallow pit or trench, or even on the cleanly scraped surface of the earth, so as not to be more than four inches thick; and then are covered over with clean and friable soil, (sand would be better,) which is to fill up all vacancies between the twigs, as well as to cover them. Then, any kind of earth may be heaped on, so as to cover the twigs 12 or 18 inches deep, if freezing is feared; though a few inches depth has always proved sufficient. As in all other cases of winter-pits or trenches to contain multicaulis plants, the access of too much water from rains should be prevented, by choosing an elevated spot, or surrounding it with a ditch. Mr. Pleasants' views and advice as to choosing a *cold* situation, to prevent the too early springing of the buds, are likely to give still greater value to this practice of saving and using unripe buds. Mr. Weller relies on his unripe buds, saved as above, to be nearly as certain as the ripest, to vegetate and produce well; and this information may be worth several hundreds of dollars, this year, to every one who has as much as an acre in multicaulis plants. It is highly necessary to avoid having any vegetable matter in contact with the buried twigs; as mouldiness and rotting will be produced, and perhaps may spread beyond the twigs first affected.

As to the capacity of the unripe buds to germinate and to produce good plants, if preserved properly through winter, (without being cut from the plants,) we knew it likewise from the information of John E. Meade, esq., of Prince George, who availed of the knowledge so well that he has now as many growing trees as he bought cuttings last spring—the unripe buds, which were not charged, having fully made up for all the failures of the ripe. By the way, the cuttings bought by Mr. Meade last spring, cost him (at an unusually low price) $10, and the crop from them is worth $1000, at the present enormous prices and ready sales.

We saw Mr. Weller's nursery, (in Halifax county, N. C.,) on October 16th. Tender plants, (such as sweet potato vines,) had then been partly killed by frost, but his mulberries were barely touched, on some of the youngest top leaves, and may grow, or ripen, much more yet. He had worked the ground as late as in August; and that, (as we think, improperly late cultivation,) as well as the late rains, had caused a very late growth, and an unusually large proportion of unripe wood and buds. He does not trouble himself to cut down and cover, or to use any other means to protect in winter, any of his plants, except the unripe extremities of branches. He considers all the ripe wood as perfectly safe. This is a most important advantage of the climate of North Carolina and Virginia. But though cutting down the entire plant is unnecessary to protect the ripe wood from cold, still as it will be done at any rate, for cuttings, while the great demand lasts, it will be better to cut off and bury the entire stems and tops, to better protect the unripe buds.

Mr. Weller's nursery ground is quite sandy, and it had been very poor, and most of it is now far from rich. Yet his one-year's plants are generally four and sometimes six feet high; showing the great advantage of using the lightest soil. At Gaston, on the rich as well as light soil of the Roanoke low-grounds, a small patch, belonging to W. W. Wilkins, esq., would average certainly 150 good buds, (and he thinks 200) on the plants of this year's growth. It is certainly the finest growth we have seen. These plants, from buds planted last spring, in seven months thereafter would readily sell for $3 a-piece—perhaps for $5, at the present prices. Some waste building lime had been given to this spot. We had been before inclined to believe that calcareous manures are peculiarly adapted to the mulberry, from having observed the usual locations, and degree of luxuriance, of the native growth. Mr. Weller has found very decided benefit from sprinkling the rubbish of old mortar, (from demolished brick-work,) in his rows of multicaulis cuttings. The great value, too, of bone-manure, (though bones are of phosphate of lime,) as stated by Mr. Pleasants, is a valuable fact, and helping to confirm the opinion of the demand of this plant for lime in some of its forms of combination.

Mr. Weller plants at any time in winter or spring, when he has the time. He has no objection to, or fear of, fall planting, but has no spare labor at that season. He cuts up, generally, into single-bud cuttings, and drops the bits into the furrow, with no care as to their position, and about seven or eight inches apart, (rows three feet) and covers carefully. We think a better mode would be to stick the lower end of the cutting into the soft mould, perpendicularly, and to cover the bud not more than an inch, if near the time to sprout. The lower extremities, where the roots form, in this case would be as low as possible, and so much the more likely to keep moist; and the bud be very near, as it ought to be, to the air. These objects will be still the better answered, by cutting the branches as close *above* each bud as is safe, and of course giving as much length as possible of each cutting *below* the bud.

Besides the rapid mode of propagation from single-bud cuttings, when they are allowed to have the growth of an entire season, there is another process which may be added, and by which the product may be still more and greatly multiplied. This is by *summer layers;* which mode is extensively practised by some of the largest dealers and nurserymen, and which is certainly an admirable means of making profit by imposing on distant and ignorant purchasers, still more than to obtain the legitimate gain of the actual increase of the stock of plants. As described to us, the following is the most approved and productive plan of raising from layers. Early in July, or as soon as the young shoots are 10 to 15 inches high, let each be bent down and laid on the earth, and confined there by a forked stick, and a little earth be laid on one of the buds near the extremity. The leaves of the buried buds should be cut off. From there roots soon strike out, and each extremity runs up rapidly into what northern nurserymen call "a tree." Soon after the first operation, every alternate bud, of the stem laid down, should be covered with earth in like manner; and from each of the intermediate buds, left uncovered, there will be thrown up other upright shoots, of which the connecting original stem may be cut apart, before the growing season is over, and thus form so many of what are termed "rooted and *untrimmed* trees," and sold as such, formerly at 25 to 38, and now at 60 cents or more, a-piece. In this manner, in a good season, and during rapid growth, we are informed that sometimes six, or eight, and even ten "rooted trees," may be raised in a year from a single bud planted the same season. This is a very useful practice to increase a small stock rapidly; as these secondary, though very inferior plants, if well preserved through winter, will furnish a greatly increased stock of buds and roots for the next year's planting. But *to sell* these plants, of half a season's growth, to distant purchasers, as "rooted trees," without explanation, is a gross fraud, which has been most extensively practised already, and by which hundreds of thousands of dollars have been, and will be, unrighteously gained. From this description many purchasers of plants will now understand the manner in which their supplies were produced. For plants from layers must necessarily be of small height, the growth late, and a large proportion of the stem unripe—and always without branches, (though sold perhaps at nearly double price for being "*untrimmed*"—) and the roots, consisting of a small horizontal bit of the original stem converted to root, with merely a few thread-like rootlets extending therefrom. Purchasers should guard against receiving the products of layers as "rooted trees," whether sold as "untrimmed" or not.

Cuttings, also, may be separated from young plants in any wet season, during summer, and, if set out immediately, will live, and form separate rooted-plants. We are inclined to believe that the *topping* of young plants, for this object, in July, would be useful, by causing more extension of side-branches, and better maturing the buds on the extremities.

Among the great and unexpected products from this year's growth of mulberry plants, there will be an abundant harvest of law-suits. We know of several having been already commenced; and hundreds of others will follow. There will be many novel points of agricultural law for the courts to decide, which will be curious; and not a little amusing to all except the litigant parties. All persons who make contracts, should be very cautious as to the other party with whom they deal, and the manner of fixing the conditions.

We will close these scraps of information with some arithmetical calculations and estimates, which perhaps may be of service to readers who design either to buy or to sell, or who are in possession of multicaulis plants. We have had reason to be surprised to find, in sundry cases, how little had been done, even by dealers to large amounts of money, in the way of estimating arithmetically, the present or prospective amounts, or market prices of their possessions or purchases. It is, therefore, that we have thought that these *mulberry statistics*, and estimates, trifling and humble as they are, may not be useless.

On page 592, vol. II, of Farmers' Register, and in the appendix to the 'Essay on Calcareous Manures,' (pp. 103, 104,) there is a table of the number of plants, or rectangular spaces, in an acre, at every distance that can be desired. This will be found far more convenient for reference to show the number of mulberry plants to an acre, than for the other purposes for which the table was originally designed.

According to this table, an acre of land planted with cuttings at the distance of three feet by one, would take 14520 plants. This allows abundant space for the first year's growth. At three feet by eleven and a half inches, there would be 15125 plants; and therefore, for round numbers, 15000 may be taken as the number of cuttings proper for an acre, and which, if not growing unusually large, would not be too thick, even if all were to live. Upon this ground, the cost and returns (and *conjectural* profits) will be estimated.

Cost.

15000 single-bud cuttings, bought November, 1838, at $2\frac{1}{2}$ cents each, make the cost for an acre, - - -	$375
Interest on $375 for a year, - -	22
Keeping cuttings through winter and cultivation in 1839, - - -	25
Rent of land, - - - - -	18
Total cost, - -	$440

Profit.

Suppose of 15000 cuttings, 6000 to fail, and only 9000 trees to grow, and these to average only thirty good buds each—and these buds to sell in November, 1839, at but half a cent each; then the product will be,

9000 plants, $\times$ 30=270,000 buds $\times$ $\frac{1}{2}$ cent, - - - - -	$1350
9000 roots, at three cents each, -	270
Gross product, -	$1620
Deduct cost, - -	440
Leaves, upon these data, clear profit, -	$1180

This profit, or even half as much, ought surely to satisfy the most eager; and as every expense is charged full high, and the failures allowed are far too many, for an average season, (and even if such unusual loss should occur, the vacant spaces might be filled by summer layers,) there is nothing wanting to almost insure the full profit, except *this one datum, that buds next fall shall be worth half a cent each.* Of this chance, we leave each one to judge or conjecture for himself. If, as most persons now believe, the price should be much higher than the above-stated, there would be more than a proportional increase of net profit, as no more expense will have to be paid; and if the present enormous prices of the cuttings and roots should be maintained in the next crop, (say $2\frac{1}{2}$ cents the bud, or 15 cents the foot,) then the gross product of the acre would rise to the almost incredible amount of - - $8100

And, deducting expenses, -	440
The net profit would be, -	$7660

Enormous as is this statement of profit, it is believed that it has been actually equalled this season in sundry cases. The most remarkable example, in which it is believed that these profits have been fully equalled, is in the large nursery near Richmond, cultivated by William Kenrick, a nurseryman of Newton, near Boston; though under all the disadvantages of cultivating by agents, and on rented land, so many hundred miles from his residence.

SOME ACCOUNT OF THE INTRODUCTION OF THE MORUS MULTICAULIS INTO THE UNITED STATES, AND THE DIFFUSION OF THE KNOWLEDGE OF ITS PECULIAR VALUE, AS FOOD FOR SILK-WORMS.

In the foregoing article, it was stated, that the profits of cultivating the morus multicaulis, (not meaning the profits of speculation,) have generally fallen to individuals who are the most disposed to read, and to pay respect to the information of, books or other publications on farming; and who are the most ready to try the experiments and new improvements therein proposed, or made known. But, to this general rule there is one remarkable exception, which it is our purpose to present, and in the hope that a proper sense of gratitude and justice will prevent this exception remaining much longer in existence.

To Gideon B. Smith of Baltimore, more than to any and to every other individual in this country, are the country at large, and the fortunate individual cultivators in particular, indebted for the possession and enjoyment of the value of the morus multicaulis. He was one of the earliest possessors—the very earliest, to investigate, and to learn its value, from foreign publications and from his own experiments; and while most other persons were either ignorant or careless of the value, or, when better informed, cultivated the plant solely for self-interest, Mr. Smith was, and has continued to this day, without reward, or any hope of remuneration, the zealous and unwearied advocate for the dissemination and use of this tree. He has gained, in pecuniary reward, no more than he expected—that is, *nothing*; and it would seem, that efforts have been made to take from him even the credit of his voluntary and gratuitous labors, and to assume the merit not only of superior intelligence in this respect, but of *disinterestedness*, and *public spirit*, of which the claimants have never had the slightest conception.

It is not the *market value* of this article which Mr. Smith has had any agency in establishing or increasing, except so far as this factitious and speculative appreciation is certainly founded on a real intrinsic value. He has had no hand in stimulating the present rage for speculation and, on the contrary, has done what he could to allay it, and prevent the greatest excess of the mania. And he has gained as little by the speculation, and its high prices, as he had by the cultivation. He still owns the oldest tree in the country, from which so many entire and large stocks of trees in the south have been derived; and that is very nearly all that he possesses of the growth. He has sold, or advertised to sell, multicaulis trees; but it was as agent for another, one of whom has made a princely fortune from this source, and who did not even leave to the agent the promised compensation. This circumstance we have heard from another source, and not a hint of it from Mr. Smith. But most of the following particular facts, in relation to the introduction and establishment of the value of the multicaulis, have been obtained from him, in answer to our recent and special inquiries, but without his having been informed, or having any ground to suspect, the object to which we designed to apply the information. Delicacy did not permit any such disclosure; and we fear that he may think that delicacy should also forbid the manner in which it is now made, to himself and the public together. But if so, we hope that the mode may be pardoned in consideration of the object. He knows nothing of this piece, nor of its special or main design; nor will he know, until, by its publication, it must necessarily reach him. It was only as to particulars that it was necessary to direct our inquiries; because we before knew well, in common with most of the readers of agricultural papers, the general fact of the services, in this respect, which Mr. Smith had performed; and suspected that they had been rendered without compensation in any form.

Before proceeding with the statement of facts, we will quote some passages from recent publications, because in some slight degree bearing on the subject of these remarks. In the Richmond Enquirer of October 12th, there appeared a communication (signed J. W.,) on the culture and sales of the morus multicaulis, containing the following paragraphs:

"To the Editor of the Enquirer.

"At your request, I communicate the following views in reference to the introduction, mode of propagation, rise and progress of prices, and the re-production of the 'morus multicaulis' or Chinese mulberry.

"1*st. Introduction.*—I believe we are indebted to our worthy fellow-citizen, Dr. Norton, for the introduction and gratuitous dissemination of the morus multicaulis in this country.

"2*d. Cultivation.*—The cultivation was commenced in this vicinity by Dr. Norton, about the year 1828; by Mr. John Carter about the year 1830, and by a few other gentlemen in 1832 and 1833."

* * * * * *

"Other gentlemen may have imported into this country the morus multicaulis, and its dissemination may have been enlarged from other sources; but I am of opinion, that from the nurseries in this vicinity, were the supplies principally, if not altogether derived."

The balance of the communication relates to the propagation, sales, and present profits of the trees, and has no bearing on our subject. The Richmond Compiler of the 13th, re-published the entire article, with additional comments, from which the following sentences are copied:

"In our article a few days since, on the subject of silk-culture, we stated, that our vicinity had done its full share towards the introduction into this country, of the morus multicaulis or Chinese mulberry, so useful in the raising and support of silk-worms. We stated that our worthy citizen, Dr. Norton, was among the first, if not the very first, to cultivate it. These opinions of ours are sustained by a letter in the last Enquirer, addressed to its editor, in reply to certain queries connected with the silk-culture. We are glad to find that we were correct; and that to Virginia belongs the credit of having been foremost in a matter, which is to confer a lasting and important benefit upon the nation." * * * * *

"The cultivation of the morus multicaulis with us is a source of great profit, owing to the better adaptation of our climate and soil to it than any north of us; and we owe Dr. Norton many thanks for having introduced the cultivation of it here." * *

Now, though we have resided for years within no great distance from Dr. Norton, (besides our intimate acquaintance with, and frequent presence in, Richmond,) and though we are anxious at all times to give due credit to benefactors to agriculture, and especially to render all due honor to the improvers of Virginian agriculture, we had never before heard of this claim to the merit of having introduced the culture of the morus multicaulis. It is very true, that neither of these articles is *written* by Dr. Norton, (nor the still earlier one referred to above. which escaped our notice,) and therefore, no matter how incorrect, he cannot be held responsible for their *first appearance*. Neither can the anonymous writer in the Enquirer, nor the editor of the Compiler, be blamed for giving to *him* the credit, which they deemed, on report doubtless made to them, to be his just due. *But this we maintain*—that no contradiction, or explanation, or waiving of the undeserved honor, having been published by Dr. N., even to this day, he has, indirectly, but most fully, sanctioned the claims made for him in both these publications.

In our letter of inquiry to Mr. Smith, we directed his attention to these publications. The tone of his answer is, naturally enough, somewhat *tempered*, by the very unexpected discovery of a new competitor for the only reward which he thought he had earned—the honor of bringing the multicaulis into notice and extensive use, and *possibly*, also, some feeling of gratitude from the individuals who are growing rich from having known better than himself how to profit by its pecuniary and trading value. Under such circumstances, his tone may well be excused.

The answer of Mr. Smith, (dated October 16th,) says—

"The history of the introduction of the morus multicaulis is as follows. When Congress passed the resolution instructing the Secretary of the Treasury to collect information on the subject of silk culture, Wm. Prince & Sons, of New York, wrote immediately to Marseilles, in France, to their agent, ordering all the books on the subject, and specimens of all the mulberry trees known there in use for silk, to be sent them. This was in the year 1826, and the plants arrived January 7th, 1827. Among the trees received, one variety was called the *Philippine Island mulberry*. Messrs. Prince immediately sent me one tree of each of the kinds they received, amounting, I believe, to 15 kinds. The Philippine Island mulberry, proved to be the tree subsequently named the morus multicaulis. A year or two after I received these trees from Prince, the French papers published notices of the valuable qualities of the morus multicaulis, a tree just introduced by the enterprising Perottet, describing its characters minutely. On reading those descriptions, I immediately discovered that our Philippine Island mulberry was described as the multicaulis, and wrote to Mr. Prince to that effect, and at the same time informing him that I had used it for feeding silk-worms, and found it to be every thing the French writers had described it to be. Prince concurred with me, and propagated the tree for sale, and has done so every year since, besides importing from France more trees each year than ever were produced in Virginia altogether, until the present year. Dr. Pascalis, of N. York, in the spring of 1830, received three trees from France, one of which he gave to my old friend Parmentier, then of Long Island, one to Dr. Hosack of New York, and one to some one unknown to me. The above is a circumstantial and true account of the introduction of this tree into this country, and of the discovery of its valuable properties. Messrs. Prince's old tree occupied a place in their nursery till the fall of 1837, as an old stool for layers; my old tree yet remains in my garden, where it will continue while I live, as it is the oldest, and was one of the first trees in America. So soon as I discovered the valuable qualities of the tree, I commenced propagating it and distributing to every one whom I could persuade to take it. I gave it to every nurseryman in Baltimore; sent it to the south and west, and indeed every where, where I could induce people to take it. I can say freely, that were I paid down for all I then gave away, at the present prices, I should have money in my purse, instead of being, as I am, out of pocket no small sum, on account of my efforts to introduce it into the country at large. I never kept any memorandum of the trees I gave away, nor of the persons to whom I gave them; but I can adduce the testimony of every nurseryman in Baltimore, (and of the country at large, I might say,) to prove, that the celebrity of the tree is due to me, and that, for six or seven years, I was *alone* in the effort to introduce it. I gave trees to Mr. Samuel Feast, Mr. John Feast, Mr. Robert Sinclair, Mr. James Wilkes, Mr. Bastien, and numerous others, all regular nurserymen, in 1829, or 1830, with urgent recommendations to propagate them extensively, "for the time will come when you will make your fortune by them"—my invariable remark to all. I was laughed at by all; and, from all quarters, was called "the mulberry madman," "the silk-worm maniac," and all that sort of thing, for my pains; but still I persevered until I waked up the sleeping lion effectually." * * * * * * *

Mr. Smith, as editor of the American Farmer for several years, and, indeed, for several years before, (as far back as 1826,) had been urging the value of silk-culture, and the propriety of propagating the mulberry. His editorial influence, (which, for this purpose, was used before he was ostensibly an editor of an agricultural journal,) gave him the greatest facilities for disseminating his opinions on the general subject; and as soon as he had learned the value of the multicaulis, all his zeal was enlisted in aid of spreading the plant itself, and a knowledge of its value, throughout the United States, and even beyond the limits of this country. Another passage of his letter says,

"When I had satisfied myself of its qualities, I began to publish my opinions, and they will be found in the American Farmer, from 1831 to 1834 inclusive, as well as in almost every other agricultural journal in the country. My public writings, however, did not comprise one hundredth part of my labors in the cause. It was by private correspondence I did the great amount. I was incessantly plied with letters from all parts of the union, making inquiries in relation to the best kinds of mulberry trees for silk-worms; and in answer to them all, I invariably recommended the morus multicaulis, *when there was not another man in the country*, except Mr. Prince, Dr. Pascalis, (who merely adopted the opinions of his friends in France, having no experience of his own,) and Mr. Parmentier of New York, who agreed with me. From the summer of 1830, to the present time, I must have written some thousands of such letters. Great numbers of these answers have been published in the local newspapers, where they were received, and of course multiplied greatly the number of inquirers. I have often had five to ten letters a day, from that time to this, to answer on this subject—for, be it known, the present mania has not lessened, but, on the contrary, materially increased my correspondence on this subject. The great burden of my labors has therefore been unseen by the public; but still, the public has seen enough in the public prints, besides all this, to award to me the credit of being *the* promoter of the culture of morus multicaulis in this country. So universal is the opinion that this credit belongs to me, that strangers, whom I never saw nor heard of before, have frequently called on me to inspect the leaves of my trees, fearing they had not obtained the right kind, and supposing that I was the original importer of the tree. Many persons have come to me from a distance, to get trees from me, to be certain of getting the genuine ones, when they could have got them at their own doors for far less expense. I have sent the trees to South America, to Cuba, Jamaica, and to several places on the Mississippi river, all gratuitously; for having been applied to for information on the subject of silk, and the best kind of trees, from those places, my recommendation of the multicaulis was always accompanied, when a conveyance offered and the season admitted, with at least one tree, or cuttings.

"Another point. The facility of cultivating, and particularly of propagating the tree, was discovered by me. When I received my first tree, an accident befel it that was nearly fatal. It was growing in my garden with 15 other kinds, and I was feeding silk-worms with every spare leaf I could get from it. In 1829, I believe, about the first of July, I discovered one morning, that the leaves were all turning yellow. Knowing its value, I was considerably frightened, and immediately wrote to Messrs. Prince to send me another tree, as mine was dead. Late in the season as it was, they did send me one, that was growing in a flower pot with an oleander; I presume they had put a small cutting there accidentally. But, as soon as I had written to them, I went to the garden and examined the tree carefully, and found that a nest of ants had surrounded the tree and perforated the trunk at the ground, through and through, and that it was dead 5 or 6 inches from the ground, but that the whole top was yet sound. I took a spade and dug a trench south of the tree, intending to layer it; in the hope that I might make it take root again, and thus save it. On bending it down, it broke short off near the ground. On this occurrence, my wife and other persons looking on, observed that I *"turned as pale as a sheet;"* I mention this to show how much I then thought of it. I, however, covered up the tree, turning up the end of each branch just above the earth, watered it well, and never looked at it again for two or three weeks—I never can bear to look at my misfortunes, it hurts my feelings—and then I was led to it by accident. When I did visit the spot, I was astonished to find the ends of all the branches I had turned up had made considerable growth. That fall I had 8 young trees, larger than the original plant. That gave me my first idea of the facility with which it can be propagated. I afterwards adopted the single-bud system of propagating, with which you are well acquainted, and practised it for two years before the public knew any thing about it. I did not publish this mode of propagation for several years, thinking to make something out of it for myself, but communicated freely *privately* to others, and before I knew what I was about, they had got all the advantage of it, and one of them even claimed the credit of its discovery in the public papers, just as another person now claims credit even for introducing the multicaulis into this country!

"In conclusion—it is to *Wm. Prince & Sons*, of Flushing, N. Y., that the credit is due of first introducing this valuable plant to the country; to whom the credit is due for discovering its valuable qualities, the great facility with which it may be propagated, and bringing it into general notice, indeed making it what it now is, I leave you to judge.

"I must now apologize for this long answer to your inquiries, filled as it is with selfishness and egotism. On reflecting on what I have written, I feel ashamed of my answer. Why should I attribute any importance to the thing? Do I not know that there never was a pioneer in any thing that got any thing but his labor for his pains? Look at Whitney with his cotton gin, Fulton with his steamboat, and all others of the same genus. I must therefore be content to have labored for the public, and let others receive the credit of it, as well as the pecuniary consideration.

* * * * * *

"One more explanation. I have intimated that I have never made any thing by morus multicaulis. I mean to be understood as saying, that I have never made as much as it has cost me. I am a loser by it. I do not wish to be understood as never having sold trees. I have sold a few every year for four or five years past. The largest lot I ever sold of my own raising, was 150, and the largest number in any one year of my own was 150. I have also made, as agent for others, $400 to $500 altogether, in commissions on sales."

And now to recapitulate, and to conclude.

To the intelligence, zeal, and untiring efforts of Gideon B. Smith, the people of the United States are mainly indebted for now possessing, and knowing the intrinsic value of, the morus multicaulis; and for the greatly increased facilities which its possession offers for making this a silk-producing country. If rewards were given in this country by government, (state or federal,) for distinguished services rendered to agriculture, then might a strong claim to honor and reward for this individual be made on the gratitude of his country, to be responded to by its government. But such not being our system, he, like the greater and more distinguished national benefactors whom he mentions, as well as all other pioneers in agricultural and mechanical improvement, must alike go without national rewards. But, in this case, there is another rich source, and which ought to be as liberal as it is rich, from which something may be hoped to be drawn. In the present strange condition of things, every cultivator or owner of a multicaulis nursery has suddenly found himself made richer by some thousands of dollars. Many persons, within a few months, have thus gained their thousands—some few their hundreds of thousands. If all, or if even the more liberal half of the many individuals thus benefited, would contribute to a joint fund only *one dollar in each hundred of their clear gain* so made, by the increased market value of their multicaulis plants, it would constitute a reward for the man who has been the chief agent in producing their good fortune, both large in amount as a pecuniary compensation, and still more precious as an honorary distinction. Let all such persons, then, who approve the plan, unite with us in making up such a fund. We offer to receive, and to be accountable for contributions in payment for any such debts of gratitude, and to dispose of the amount, under the direction of a committee of the principal and most accessible contributors, in such manner as may be supposod will render the reward most acceptable to the receiver, and most useful to the public. We have already proposed this plan, verbally, to several of the fortunate persons concerned; and all have approved the object, and most of them will aid in carrying through the plan. We invite all the fortunate possessors of multicaulis, and speculators in sales, to contribute to the fund, and to place their names, and the amounts subscribed, as speedily as convenient, at our disposal. To commence the list, we will subscribe $100: and whatever may be the degree of success, the plan will be executed to the extent of the subscriptions which may be offered and paid.

In advance of a more general publication, a copy of this appeal will be sent to every known and large recent possessor of multicaulis plants. From many of them, and of the far greater number unknown, whom it may reach accidentally hereafter, early and generous responses are hoped to be received. The names of the subscribers, and the amount of their subscriptions, will be announced in each successive publication of the Farmers' Register; and a suitable disposition of, and accounting for, the whole amount subscribed and paid in, will be made, as soon as may be directed by the committee chosen for that purpose, in the manner stated above.

The most appropriate disposition of such a fund, in our opinion, would be the following: Let a snug and productive little farm be bought, some acres of it planted with multicaulis cuttings, and a good cocoonery erected, as well as the other fixtures necessary for a silk farm; and when all the essential arrangements are made, let the farm, (for which "Gratitude" would be a suitable name—) be given to Gideon B. Smith. If, when thus provided with the means, it should suit his wishes and convenience to devote his labor and time to silk-culture for his own benefit, with even half the zeal and perseverance with which he has long been laboring to introduce and establish it for the public interest, he will be still farther, and greatly, serving the public weal, by furnishing example, and practical instruction, in this new branch of industry, to the region in which the farm will be situated.

Ed. Far. Reg.

From the Genesee Farmer.

IMPROVEMENT IN THE MANUFACTURE OF FLAX.

The August number of the Journal of the American Institute—a work we most cordially recommend to the patronage of our readers—contains a letter from J. F. Schermerhorn to the commissioner of patents at Washington, describing a new mode of manufacturing flax, or rather so preparing it for manufacture that it can be spun on the common spinning jenny as easy as cotton, and converted into cloth with the greatest facility. Mr. S. Olcott of New Hope, Pa., is the inventor of the process, and should further tests and trials but realise a small part of the benefits indicated, it will prove a discovery of immense value to the north and west. The flax, as we understand the letter, is by a short and simple process, and with the aid of machinery, converted into what Mr. Olcott calls his short staple flax; is deprived of its gluten and coloring matter, and bleached, and is then ready for spinning.

Specimens of the thread made from the prepared flax, as well as samples of the flax itself, were left at the office of the Institute, and attracted much notice from their beauty and strength. The only objections started, were that by being made into short staple, the thread lost the smooth silk-like appearance belonging to the unbroken fibre, and appeared more as if made of bleached tow, or rather of floss silk. When we reflect, however, on the smooth thread made from cotton, a material still shorter in fibre, and far inferior in strength, there can be no reasonable doubt that in the process of manufacturing linen cloth from prepared flax, methods of obviating this and other difficulties will be easily found. In the language of the Journal, this improvement, "must produce a wonderful advance of productive industry in our portion of the union. In the west it will open mines of wealth. If flax can be produced and prepared for the spinning jenny as cheap as cotton, and converted into cloth as readily, then the northern and middle states can avail themselves of a great staple that will vie with the south; and this may be done at once, for we already know how to spin. It is not like silk, which is sure to succeed eventually, but progressively. The mulberries must have time to grow; and the knowledge requisite for managing the silk-worms, taking care of the cocoons, reeling, &c. will require time to be generally adopted and understood."

Mr. Schermerhorn makes some interesting estimates of the profits that must ensue from the production and manufacture of flax. We have room for only the following:

"1. Estimate for buildings and machinery to manufacture 1000 tons of short staple flax, $30,000
The actual expense of preparing 1,000 tons of fine flax; including the raw material, at $250 a ton, - - 250,000

$280,000

Now if we estimate this short staple flax worth fifty cents per pound, which will not be deemed an extravagant price when it is remembered that every pound of such fine flax will make between four and five yards of fine linen, say four yards, and this can be made into fine linen at about four cents per yard: then 1,000 tons being 2,000,000 pounds will be worth at 50 cts. per lb. - $1,000,000
Now deduct from this as above for buildings, machinery, raw material, and expense of manufacturing the fine flax, at 250 dollars a ton, - 280,000

Which leaves a profit after paying for buildings, and washing, &c., &c., - - $720,000

2. Estimate for manufacturing the fine short staple flax into fine linen. * * To manufacture 2,000,000 pounds, which will make 8,000,000 yards of linen, you must have in operation about 850 looms, at an expense of one thousand dollars each, - - - - - - - $850,000
Spinning 2,000,000 lbs. at 8 cts. per lb. 160,000
Weaving and putting up 8,000,000 yards, at 2 cents per yard, - - - 160,000
2,000,000 lbs. of fine staple flax at 50 cents per lb. - - - - - 1,000,000

$2,170,000

If we estimate this fine linen at fifty cents per yard, then the value of 8,000,000 yards will be - - - - - - $4,000,000
From which deduct as before, for buildings, machinery, stock and labor 2,170,000,

and a net profit is left of $1,830,000

Mr. Olcott, at his flax establishment at New Hope, works up at present, about three thousand tons of flax in the stem per year. This produces about 430 tons of fine short staple flax, ready for manufacture; from which it seems that it takes about 7 tons of stem to produce one ton of short staple flax. From Mr. S.'s letter we gather, that the lands in Penn. and N. Jersey, in the vicinity of New Hope, as an average crop, yield one ton of stem to the acre, for which Mr. Olcott pays at his factory twelve dollars a ton; and it is fair to conclude that the average yield of flax seed will be worth at least as much more from an acre, which will give the farmer 24 dollars per acre, as the avails of his flax crop, and this must be considered a good business. It is in the rich and beautiful prairies of the west, however, that we think the manufacture of flax will be carried to the greatest extent, and most profit. Should the flax noticed in our sketch of Mr. Parker's travels, as growing wild in the valleys beyond the Rocky Mountains, and being perennial like our grasses, be introduced into the western states, and succeed as we trust it may, it can then be mown like grass, and gathered year after year without a second sowing; and even the common flax cannot fail to yield a rich harvest to the industry of the fertile west.

From the Huntington Gazette.

RATS IN GRAIN.

How to prevent the ravages of rats in grain after it is housed, has been an inquiry of long standing. We can never exterminate them to such a degree as not to apprehend their incursions, for a horde of these troublesome visiters will often make their appearance when we least expect them. Instinct points the way where that provision best suited to their nature is found most plentiful. We have often found, when we went to thrash, our oats cut and cleaned by them, and the straw rendered unfit for any purpose whatever, except the subservient one of litter.

But every evil has a cure: and I have found "common elder" to be a common preventive, and have tested its properties as an anti-rat application. When the grain is to be packed away, I scatter a few of the young branches over every layer of bundles, being mindful to have them in greatest abundance on the edges of the pile. The drying of the twigs will give the grain an odor not relished by the vermin—which scent in no wise detracts from the quality of the straw for horses, as it makes no sort of difference with them. I have tried it successfully, a number of years, in wheat, oats and corn.

For the Farmers' Register.

GENUINE MORUS MULTICAULIS. NOT EXEMPT FROM THE DEPREDATIONS OF INSECTS.

"*October* 18*th*, 1838.

As Mr. Gideon B. Smith seems to be considered, by yourself and others, the best authority in regard to the multicaulis mulberry, there are two assertions in his communication in your last Register, which induce me to fear that I, who am one of the humbugged class, may have been buying the wrong sort. Mr. Smith says, "the leaves, when full grown on the vigorous wood, are 12 to 15 inches in length, and 10 to 13 wide." Now, after inspecting many hundred bushes of the kind I have purchased, which had all the appearance of vigorous growth, I have seen no leaf much, if any more than half that size. It is true, I did not apply my rule, but my eyes could not so far deceive me.

Again—Mr. Smith asserts, as "a remarkable fact, that all the species and varieties of mulberry tree are exempt from the depredations of all insects, except the silk-worm." He farther states, that, "during ten years that he had been a close and daily observer of the morus multicaulis particularly, he never saw an insect of any kind upon it." Since I know, from many years' observation, that he is mistaken in what he assumes to be a fact—at least so far as our native varieties, and the English mulberry, cultivated in our gardens, are concerned—I hope he is so in regard to the multicaulis, also. If he is not, then have I an additional reason to fear, that my purchase is not of the genuine kind: for, the few plants saved of a small trial made last spring, have their stems and many of their leaves now nearly covered with numerous small, greenish-colored bugs, that seem quite as much at home as if they were in their native domicil. We have been dosing them with soap-suds to kill or drive them off: but have not yet ascertained how the physic will work. It is probable, however, that it will be effectual; for these little depredators appear to be the same species which often infest our rose-bushes, and which are easily destroyed or driven away, either by soap-suds, or soot and water. This last mixture, by the way, is an excellent thing, if not made too strong, for accelerating the growth of all garden-vegetables, especially where the ground has not been fully manured. I remain,

Your friend and constant reader, J. M. G."

An editorial note, attached to the passage referred to above, stated another exception to the general rule which Mr. Smith had given as the result of his experience. That note drew from him the following passage of one of his private letters:

"I am much surprised at your note, [page 431, No. 7,] relative to the caterpillars devouring the multicaulis, and thank you for it. It is the first instance I ever heard of, and I fear it is the forerunner of a terrible calamity to the cause of the silk-culture in this country. I never heard of these insects touching any species of mulberry before; and as they never quit any kind of trees after they once begin upon them, I much fear they will extend their depredations to the mulberry generally; and if they do, it will be a sad drawback upon the business. But five years ago, our elms, [in Baltimore,] that had stood untouched by any insect for ages, were first observed to be infected by a small caterpillar; the insects increased every year, until in the last two years, our once stately and, as ornamental trees, entirely unequalled elms, have been entirely stripped of foliage, as though a deadly blast of fire had passed through them. Last year, the beautiful lindens were first visited by the same insect, and now we expect them also to share the fate of the elms."

We presume, that our friend, J. M. G., need not distrust the *genuine* character of his plants, merely because of the smaller size of the leaves. The sizes spoken of by Mr. Smith, were the largest, and not meant as usually found, on any but very luxuriant growth. No one who has once noticed the multicaulis, can mistake it for any other kind of mulberry tree; and, therefore, the person who furnished to our correspondent his original stock, could not have given a wrong kind, unless wilfully, and by designed deception.—Ed. Far. Reg.

INQUIRIES IN REGARD TO KEEPING SWEET POTATOES.

To the Editor of the Farmers' Register.

Can you inform us through your November No. how to preserve sweet potatoes through the winter? Should they be gathered before a single frost, or after one has fallen to kill the vines? I am inclined to think that the error is in suffering them to remain in the earth until a frost; and hence the difficulty of keeping them has arisen with us. Some of your correspondents in the lower districts, could inform you, as I have often seen large supplies from them in the spring, in a very perfect state. C. H. M.

SOAKING SEED CORN IN SALTPETRE WATER.

To the Editor of the Farmers' Register.

I am utterly astonished at the *simple fact*—"truly *simple*, in one sense of the word," stated in your last No. by Mr. Massey, of New York, as "one of the greatest discoveries of modern times" that corn soaked in a solution of saltpetre, and planted under equal circumstances, with this exception alone, produced 500 per cent. more than corn not so prepared.

A few years ago, for protection against the worm alone, I used this solution on my seed corn—alternating throughout, a large space of the field with, and without it, every twelve rows. The second year I also tried it for the same purpose, and *for no other*—the result was, in both, absolute futility in all respects. J. E. Muse.

Dorchester, Md.

[Our comments on this remarkable "*fact,*" were given at p. 434 of the succeeding number, to which the reader is referred.—Ed. Far. Reg.]

From the Maine Farmer.

PIG TROUGH.

A writer in the Genesee Farmer, a few years ago, described a method of making this article, which we copied into the Maine Farmer, and which we have also practised, and find to be a great improvement.

It is simply this. Take two pieces of board or plank of the length that you wish your trough; put two of their edges together at right angles, thus V, and nail them strong. Then take two pieces something longer than the trough is wide and nail upon the ends. Then take some clay mortar and fill up the chinks to prevent its leaking, and it is done. The food settles down in the angle at the bottom of the trough, and the pig will *fay* his sharp under jaw into it completely, while the long ends prevent its being upset so easily as the old kind. Any body who can saw a board off, and drive a nail, can make one. If you have no trough for your pig, just try your hand at making one on this plan.

From the Cultivator.

SUBSTITUTE FOR SPAYING. ANOTHER WITNESS.

Ivanhoe, Campbell Co. Aug. 18, 1838.

Dear Sir—I have been for some time an attentive reader of your valuable paper; from each page information is to be gained. In your last number, you instruct us how to perform the operation of caponing cocks, before which I knew not. And it is the above which prompts me to give you the following information:

The old method of gelding sows is not only very cruel, but quite disagreeable to the operator, as well as dangerous to fat animals. Now, sir, the modus operandi in this neighborhood as practised by myself lately, but much longer by others, is simply this: For convenience use a common goose quill as a tube, cutting off smoothly the small end, the other shaped as for a tooth-pick, to be used as a handle; then pass the small end down the vagina two inches or more, (according to the size of the animal,) through which drop six or seven shot, say No. 3, and your work is complete. Nothing can be more simple, innocent, or efficacious.

Should you think the above worth making known, you can publish it.

Very respectfully, your ob't. serv't.

Edward B. Withers.

From the Tennessee Farmer.

LOIN DISTEMPER IN HOGS.

By this I mean the loss of the strength of the hinder parts. One of my best hogs was found the other day unable to walk, from falling behind; and as I never saved one thus diseased, I gave him up for lost. I, however, separated him from the herd, and concluded I would nurse him until he might die, as is my practice—being opposed to killing any of my animals that may chance to sicken or get wounded.

Now, as the treatment, or something else, has relieved him, I annex it. I poured warm tar upon his loin; when this dried, I repeated it—pulling out the hair adjacent. Simultaneously with this, I mixed one tea-spoonful of arsenic in corn meal dough, which he ate freely. He is now on his feet and doing well. Whether my hog recovered in consequence of the treatment, or in spite of it, I cannot tell; but one thing I know—all that had it before died, and this one lives. I do not wish to get the people to poisoning their hogs with arsenic; but as it is a gone case any how, those who may venture upon the practice, I hope may have the same good luck.

Parvus Agricola.

July 28, 1838.

From the Farmville Journal.

THE MORUS MULTICAULIS.

As many persons in your vicinity are interested in the culture of the mulberry I send you a few remarks upon an article in the last Farmers' Register. Mr. Ruffin there advises farmers who have any idea of going into the raising of silk "not to buy them (the Chinese mulberry) or at least very few of them at the exorbitant prices, which the always easily gulled public have heretofore paid, and which are now threatened to be advanced." In a subsequent editorial, advising present holders not to sell, he says, "and therefore at half a cent or even a quarter cent the bud, the stock of 1839 will yield a much greater sum, than the present growing stock at two cents the bud or 25 or 30 cents the rooted plant." We will not dwell on the slight inconsistency of advising purchasers not buy and sellers not to sell, as our object is simply to examine the question whether it is for the interest of those who are intending to engage in the silk business to purchase the morus multicaulis now at present prices, or to purchase two years hence at greatly reduced prices. Mr. Ruffin says, that buds are regularly and readily sold at two dollars per hundred, and that he is preparing to come into the market with trees and cuttings as soon as he can furnish them at one-fourth the present price. We infer, therefore, that he considers one-fourth the present price, or half a cent a bud, a fair price, or the probable price a year or two to come, when the mania has subsided. But to put our calculations out of the reach of cavil, we will suppose the price of multicaulis buds two years hence to be one-eighth of a cent each, only one-sixteenth of the present price, and we think we can demonstrate from Mr. Ruffin's own data, that a person who intends engaging in the business, had better give 100 cents a bud *now* than one-eighth of a cent for a bud two years hence. We take Mr. Ruffin's own data. "Every single bud planted next spring and well taken care of, will produce from 10 to 70 buds, say not less than 30 on an average." One bud then set out in the spring of 1839 will produce 30 in the fall, which set out again in the spring of 1840 will produce in the fall 900 buds, and the original bud will produce the second year 100 buds, making in the fall of 1840 1000 buds, besides 31 roots. The roots will be a fair compensation for labor, rent of land and interest. The 1000 buds at one-eighth of a cent would be one dollar and twenty-five cents. That is, a bud for which 2 cents is now thought an exorbitant price, will in two years produce buds worth $1,25 at one-eighth of a cent each. It will be seen then that an individual, who intends engaging in the business at all may as well give $1,25 *now* for a bud as one-eighth of a cent for a bud two years hence, according to Mr. Ruffin's data. We think, however, his calculations are rather too high for ordinary country cultivation. Twenty buds for one will be found nearer the truth in most cases, though we have no doubt with great care, 30 may be realized. One bud would then produce 20 the first fall, the 20 would produce 400 the second fall. Add 100 buds for the produce of the first bud the second year, and we should have 500 buds the second fall. At one-eighth of a cent, 500 buds would bring 65½ cents. The roots paying for cultivation, &c. According to this, a person had better give 50 cents now for a single cutting than one-eighth of a cent in 1840—besides the pleasure of a comfortable hobby to ride for two seasons. We offer these calculations for the benefit of those who have trees to sell as well as those who wish to buy, and have shown, we think, that if cuttings are worth one-eighth of a cent in the fall of 1840, present owners had better keep their cuttings than to sell them for 10, 20, 30, or even 50 cents a bud, to say nothing of 2 cents, and that purchasers would, of course, do better to buy now at 20 times the present exorbitant price, than at one-eighth of a cent in the fall of 1840.

MULTICAULIS.

[We are always willing to receive correction, and submit to censure properly applied, whenever our editorial errors require either; and the republication of the foregoing piece, from another print, is evidence that we do not, in this case, wish to conceal the censure, or keep out of sight the alleged inconsistency, by which it has been elicited. But we do not admit the inconsistency charged; nor would our censor have made the charge, if he had more carefully read, and correctly quoted our expressions. The advice in the first piece, "not to buy at the then exorbitant prices," was limited in its bearing to the purchasing of *plants in large quantities*. It was not meant for speculators, but for farmers who desired to commence the silk business; and the advice was founded upon estimates then submitted, and very similar to those made (and very correctly made,) by our censor, and both of which show clearly, that a very few plants bought now, would, in a few years, suffice to furnish an abundant stock of trees. The question, then, for those having no view to the selling of trees, was this: "Is it better to buy 2000 trees now, or only 50 or 100, and be but a year later, in obtaining a stock equally large?" If most buyers had decided upon the latter course, it would have moderated the violence of the speculating fever; and if purchasers generally were to choose the former and quicker course, it is manifest that the bubble of speculation would be distended to a hundred-fold its then, or even its present magnitude, and that market prices would be as much advanced above the intrinsic value of the plants—great as that intrinsic value certainly is. Our remarks then, and our course since, were designed and calculated to repress the enormous excess, the madness of speculation, as much as to urge proper attention to mulberry and silk-culture. As we first advised intended culturists not to buy *many* at exorbitant prices, so six weeks after, (for that time elapsed between the printing of the two pieces, as was stated and explained,) when the prices were still more exorbitant, we advised the cultivators "not to sell any *to speculators*, lower than at the highest [existing] prices." This is very different from advising simply those who wanted, "not to buy," and those who held, "not to sell," alone and without limitation, with which inconsistency we are charged above. The fact was, that northern speculators had been sending all over Virginia, and, before the holders were aware of the great advance of prices, had bought up many nurseries at less even than the intrinsic value, and at less than a sixth of what they would now sell for. One individual, as we are informed, has in this way made $150,000, within the last few months. Our warning, though late, was in time to save thousands of dollars to some of the cultivators.

But though we deny the inconsistency charged above, we are far from denying great changes of opinion on this subject, within less time than elapsed between the writing of these two pieces. Indeed, if any man has thought precisely alike, made similar calculations of profit and loss, and would have pursued the same course, at any two periods six weeks apart, during the time of the rapid growth of this mulberry mania, we readily admit that he has far more wisdom, and especially more foresight, than we can boast of possessing. No man could have foreseen the extent and rapid growth of this mania, nor can we pretend to do so at this later time.

Our former intimation that we were preparing to come into the mulberry market when we could contract at one-fourth of current prices, was not meant otherwise than to express the certainty of the then high prices being short-lived. We certainly did not mean to propose that any person should wait to obtain his stock from us, on such terms. But the intimation, then given in joke, we are very ready to execute in earnest, by now contracting to deliver plants next autumn, at one-fourth of the prices current at the time of making the contract. Nor is this offer made at any risk; for where the crop is as sure, and the growth and increase as great, as in lower Virginia, any one may safely buy stock at the highest prices yet heard of, if he can sell the product, on previous contract, at one-fourth of that price.—Ed. Far. Reg.

WELL SPRINGS.

To the Editor of the American Farmer.

Newbury, S. C., July 5, 1824.

Sir—Permit me to communicate to you a new method of digging wells, which in a hilly country makes them, in my opinion, superior to springs.

The method occurred to me some years ago, and I have often spoken of it as practicable, but I never heard of its being reduced to practice until lately. Mr. John Rhoden, of Chester, I am informed has in the course of the last year made the attempt, and completely succeeded.

Mr. Rhoden had a well on the side of a steep hill, the cleaning and repairing of which had cost him much trouble and expense, to little purpose. At length it occurred to him that if he could make a horizontal opening into it from the side of the hill, on a level with the vein, that he might thus be enabled to procure a running stream from the well, such as is found at springs, and gain an easy access to it, for the purpose of cleaning it out whenever it might become necessary. When the work was set about, it was accomplished in a few days, and he has now, out of his well, an excellent spring; easy to be cleaned out, with a very convenient milk-house.

The plan which had previously suggested itself to me, and which I still think is even superior to Mr. Rhoden's, is this—select a steep hill, (whose declivity should be, if possible, 45 degrees,) and dig down, opening out as you go in the form of a ditch, from the inner wall of the well, to the side of the hill, and wheeling off the dirt in a barrow, until you come to the vein. Or make, in the first place, a horizontal opening, such as Mr. Rhoden did, into the vein, instead of digging perpendicularly as is usual.

The first method proposed may at first view appear to involve a great deal of labor; but I am certain that on a hill declining at the rate of 45, or even 50 or 60 degrees, a well can be sooner dug, with less labor, with greater facilities for blowing rock, greater security against damp, and more certainty of finding a vein than a common well.

It can be sooner dug and with less labour, for in the first place the dirt to be removed is but about three times as great, as will be procured by only making a diagram of the hill; and in the second place, instead of having to haul up the dirt by a windlass, at the great risk of the well digger, and with much labor and loss of time, it can be wheeled off along the level of the ditch, by a common hand as fast as it is dug.

As to this method affording greater facilities for blowing rocks and greater security against noxious damps, than the common method; this is so apparent as to require no proof.

It is attended with a greater certainty of finding water, because in the common method unless a vein is found within the diameter of your well, you may continue to dig without success, although numerous veins may be running within a small distance of you. But in the method I propose you will have a chance for every vein which runs from the outside of the hill to the inside of the well, for your ditch must traverse the whole of them.

I believe the second method I have proposed has nearly as many advantages as the first, and some others; but these must suggest themselves at the first view, and require no elucidation.

An excellent milk-house may be easily made in the excavation, under either method.

I will not dilate upon the advantages of this method of digging wells. Allow me only to reiterate the superior facilities it affords for keeping them in order.

Many tracts of land, whereon there are no springs, lose half their value; because few would be willing to settle them, and undergo the trouble and inconvenience of watering their whole stock from a well. But my method (or rather Mr. Rhoden's) would afford a running stream from the well for that purpose.

Yours, most respectfully,

Job Johnston.

From the Penny Magazine.

CHANGE OF THE WATER LEVEL IN THE BALTIC.

In Mr. Greenough's address to the Geological Society, as reported in the 'Philosophical Magazine,' it is stated that, as early as the time of Swedenberg, who wrote in 1715, it was observed that the level of the Baltic and German Ocean was on the decline. About the middle of the last century an animated and long-continued discussion took place in Sweden, first as to the cause of this phenomenon, and then as to its reality. Hellant of Tornea, who had been assured of the fact by his father, an old boatman, and who afterwards witnessed it himself, bequeathed all he had to the Academy of Sciences, on condition that they should proceed with the investigation; the sum was small, but the bequest answered the purpose. Some of the members of the Academy made marks on exposed cliffs and in sheltered bays, recording the day on which the marks were made, and their then height above the water. The Baltic affords great facility to those who conduct such experiments, as there is no tide, nor any other circumstance to affect its level, except unequal pressure of the atmosphere on its surface and on that of the ocean; this produces a variation, which is curiously exemplified at the Lake Malar, near Stockholm. As the barometer rises or falls, the Baltic will flow into the lake or the lake into the Baltic. The variation resulting from the inequality of atmospheric pressure, however, is trifling. In sheltered spots mosses and lichens grow down to the water's edge, and thus form a natural register of its level. Upon this line of vegetation marks were fixed, which now stand in many places two feet above the level of the water. In the years 1820-21, Bruncrona visited the old marks, measured the height of each above the line of vegetation, fixed new marks, and made a report to the Academy. With this report has been published an Appendix by Halestrom, containing an account of measurements made by himself and others along the coast of Bothnia. From these documents it would appear—1st, that along the whole coast of the Baltic the water is lower in respect to the land than it used to be; 2dly, that the amount of variation is not uniform. Hence it follows, that either the sea and land have both undergone a change of level, or the land only; a change of level in the sea only will not explain the phenomenon. A quarter of a century has now elapsed since Mr. Von Buch declared his conviction that the surface of Sweden was slowly rising all the way from Frederickshall to Abo, and added, that the rise might probably extend into Russia. Of the truth of that doctrine, the presumption is so strong, as to demand that similar experiments and observations should be instituted and continued for a series of years in other countries, with a view to determine whether any change of level is slowly taking place in those also. The British Association for the Advancement of Science has already obeyed the call. A committee has been appointed to procure satisfactory data to determine the question as far as relates to the coasts of Great Britain and Ireland; and it is to be hoped that similar investigations will also be set on foot along the coasts of France and Italy, and eventually be extended to many of our colonial possessions.

From the Southern Agriculturist.

CAUSE, AND PREVENTION OF FEVERS.

September 28th, 1838.

Mr. Editor.--The many and various observations made upon the change of climate, increase of sickness, and the annual abandonment of our plantations, you are no doubt as familiar with as I am. Time was, when people could remain on, and enjoy their estates all the year round, and with proper management, I think we may in a few years do it again. A writer in your journal, (I believe it was) some time ago, ascribed the comparative frequency of freshets to clearing of the land, and justly in my opinion—but he overlooked a more important consequence, the effect upon the health of the country. I am of opinion, a little reflection will show the change of climate is identical, and has kept pace with, that in the surface of the earth. While in possession of the aborigines, our whole country was comparatively pure and healthy, and Dr. Rush states, that so late as 1782, "some country people of Bedford county, Pennsylvania, travelled twenty miles to see whether it were possible for a German girl, who labored under an intermittent, to be hot and cold at the same time." In former times, fevers were confined to the banks of rivers, creeks and ponds, but the clearings have opened just so many passages for swamp or marsh effluvia, and we find fevers prevailing in the interior, where they were formerly unknown. This will always be the consequence of clearing, without cultivating the ground. While opening the country makes it sickly, as I have already mentioned, *cultivation*, that is, draining swamps, destroying weeds, burning brush, and exhaling the superfluous moisture of the earth, by growing frequent crops of grain, and vegetables of all kinds, renders it healthy. There are other causes of sickness, which never can be entirely overcome, because man has no control over the seasons; the healthiness or unhealthines of a country, depending much on the cold or heat, the dryness or wetness of particular periods. While rivers and creeks, are, from uniformity of seasons, confined to steady bounds, there will be little or no exhalation of febrile maismata from their shores. But when swelled beyond their natural heights by a wet winter and spring, they fall, and leave a very extensive surface of ground completely saturated with water, exposed to the action of the sun, and of course to the generation of, and exhalation of febrile miasmata. A country is always free from fevers during the overflow of its rivers—but subject to them after subsidence of the waters. It may be remarked, that a wet season is often healthy in the low, while it is sickly in the hill country, and I think the reason obvious. In the former, the rains cover all the moist ground entirely, while in the latter, they fall only in a sufficient quantity, to produce those degrees of moisture which favor febrile exhalations. The rains which fall in summer, are rendered harmless only by covering the whole surface of the ground. Frequent, and heavy rains after the middle of September, are favorable to health, diluting, and thus destroying as they do, the febrile miasmata that were produced by the heat, and moisture of the preceding summer. Man can do but little towards preventing the evil effects of drought upon the health of a country, but he can do much to avoid, or mitigate that which results from excess of moisture; by good culture of the earth, and draining the low grounds. I beg leave to suggest a few hints for obviating and preventing fevers. For this purpose, I would recommend that all trees between settlements, and the quarters or points, from which the summer and autumnal winds blow, be suffered to remain, and become as dense as possible, particularly if a river, creek, pond, or moist expanse of country be to windward of them. If the settlements have no forest defence, cultivate one of the trees which will soonest attain their growth, and not too far from the house or settlement. The trees about each house, should not be so close as to prevent a due evaporation of redundant moisture from the ground. If a reservoir or pond be near, allow the growth in it, and on its borders to continue, and if necessary, set around it additional trees. Trees to leeward of rivers, creeks, and ponds, can never be too numerous, or thick. Around a pond, they act in a small degree, mechanically. By sheltering it from the action of the sun, they lessen the exhalation, as well as obstruct the passage of the vapors that are raised, to the adjacent parts. But trees act likewise chemically. It has been demonstrated, that they absorb unhealthy air, and discharge it in a highly purified state, in the form of diphlogisticated air. The willow tree has been proved to purify the air more rapidly than any other. The rapidity of its growth, its early verdure, and the late fall of its leaf, all seem to designate it, as highly proper for this purpose. A second method of preventing fevers, is to let the cultivation always keep pace with the clearing of our lands. Nature has, in this instance, connected our duty, interest, and health together. Let every spot covered with moisture, from which the wood has been cut, be carefully drained, and then ploughed and sowed with grass-seed; let weeds of all kinds be destroyed, and let the waters be so directed as to prevent their stagnating in any part of their course. These are the two principal means of extirpating fevers from our country; but as they are slow in their operation, I will suggest a few preventives, till the above remedies can take effect.

Whether the matter which produces fevers, be of an organic or inorganic nature, I do not pretend to determine: but it is certain that fire, or the smoke or heat from fire, destroys the effect of swamp or marsh miasmata upon the human body; from this cause, we find cities more healthy than country places, and commonly, the centre of cities more healthy than their suburbs, in the sickly months. Where it can be done, I would advise large fires to be made every evening, between the spots from whence the exhalations are derived and the house, as near the latter as is safe, and not troublesome. This practice should be continued till the appearance of two or three frosts, for frosts, as well as heavy autumnal rains, never fail to put a stop to the progress of intermittents. During the sickly season, fires should be likewise kept in every room in the dwelling-house, even when the heat of the weather makes it necessary to have the doors and windows open.

Let me advise all in sickly situations to prefer woollen and cotton clothes, to linen in the summer and autumnal months. Great confidence may be placed in woollen and cotton clothes, in raw, wet weather, as preventives of fever, but most in woollen.

The diet in the sickly months should be generous. Wine and beer should be the drinks of this season, instead of spirits and water. Fruits and vegetables are not unwholesome; but as the season of the year produces languor and weakness, a larger quantity of animal food than usual, is best calculated to oppose fevers. Salted meat, for this reason, is preferable to fresh meat. Food of all kinds, eaten during the sickly months, should be well seasoned.

The evening air should be avoided as much as possible. Before breathing the morning air, the body should be fortified with a little solid aliment, or a glass of bitters. These bitters should be made of centaury, wormwood, camomile, or the bark of the willow or dog-wood tree, infused in water. Bitters made with spirits, or even wine, cannot be taken in a sufficient quantity to do service, without producing intoxication, or the deadly habit of loving and drinking spirituous liquors.

The person should be bathed or washed frequently, and those who have not access to the sea, will find that adding salt to water, renders it powerful in preventing diseases. Preserve cleanliness in every species of apparel. Offal matters, should be removed from the neighborhood of dwellings. The excrements of domestic animals may be excepted, for nature has kindly prevented any inconvenience from them. More than this, she has endowed their dung with a power of destroying the effects of swamp, or marsh exhalations, and of preventing fevers. The cottagers of Europe, who live under the same roof, and even under the same roof with their cattle, are almost always healthy. These counsellings, are founded on practice and observation. Yours, respectfully,

A Patron.

From the American Farmer.

AN EXPEDITIOUS METHOD OF MOVING HAY.

Culpepper county, Va. July 7th, 1838.

Mr. Skinner.—In the last number of your American Farmer one of your correspondents has described an expeditious mode of drawing hay to stacks, in use in Hardy county, Virginia. The same method was formerly adopted by some farmers in this county; but that now most generally used here, seems to be so much more easy and expeditious, that perhaps a description of the mode may deserve a place in your useful paper. So slow is the progress of even small improvements in agriculture, and labor-saving operations, that it is probable many of your readers have never seen this practised.

The hay being cocked, and the stacking about to be commenced, a hickory pole ten or twelve feet long, is procured, and the knots all well trimmed off. The larger end of the pole should have a hole bored in it, to admit a clivis pin, and to which the swingle tree of the horses in gear, is to be attached by means of the clivis. The smaller end of the pole should be brought to a smooth point, so as to admit its being run under the cocks of hay, and a leading line should be attached to the large end, about where the clivis goes through. A boy, holding this pole in one hand, thus fixed to the horse, and guiding the horse with the other, comes to the cock of hay. The pole is immediately disengaged, by taking out the clivis pin—the boy then runs the pole under the cock, till the sharp end has passed a little distance, say two or three feet on the other side: he then throws the line attached to the large end of the pole, across the top of the cock, and by a slight bow knot fastens it to the pole on the other side, taking care to have the rope placed exactly over the middle of the cock—the horse is then attached to the pole by fixing in the clivis; just as the horse sets off, it is necessary to take hold of the pole just behind the place where the rope is tied to it, to prevent its slipping, until the cock moves, when there is no longer any danger. After getting with the cock to the stack, without its being necessary even for the horse to stop, the knot is slipped, and the horse goes on with the pole, leaving the cock in nearly as good a situation as when it was first touched. There is less work for the hand-rake after the cocks thus drawn, than in the mode described by your correspondent, and the draft is much less. One horse will draw, with ease, cocks of three hundred weight, and as fast as two can pitch up to one stacker. The draft is less, in consequence of the hay next the horse being somewhat raised from the ground, and the friction against the ground greatly reduced.

Your constant reader,

A Young Farmer.

RABBIT, CUNICULIS, IN ZOOLOGY.

Interesting and authentic account of some of its curious habits.

[This little animal affords a remarkable instance in the variety of its colors, of the effect of *domestication.* In its wild state, it is uniformly of a brown cast; when tamed, its color ranges through every shade, from raven black, to the whiteness of mountain snow.

They begin to breed at a year old, sometimes sooner; and multiply five, six and seven times a year, having from four to eight at a litter. thus increasing so rapidly, that to say that "she breeds like a rabbit," is to express, proverbially, the idea of great fecundity.

When the buck approaches the doe, he first beats and stamps very hard with his feet, and after embracing her, falls backwards and lies motionless, as it were in a trance; in this state he may be readily taken, but he soon recovers from it.

The extent of rabbit warrens in England, where, in some districts, many hundred acres in a body are appropriated to the raising of rabbits for sale, would appear surprising to those who had never adverted to the subject. As inquiries have been made by correspondents relative to the proper construction of rabbit warrens, and their management, we give sketches from English authorities, which follow the interesting and curious remarks of Mr. Hardin, on the habits of that animal.—[Ed. Am. Far.

To the Editor of the American Farmer.

Near Shelbyville, Ky., 6th March, 1824.

Dear Sir—When we become subscribers to the American Farmer, I consider it a tacit admission, that we belong to the same social compact, and that our general experience is a kind of common property, upon which you have a right to draw whenever you may think it beneficial to its members.

And should any speculative theory appear in your columns, it is then either of us (whose experience conflicts with such theory) is substantially called on to contribute his mite. Under this impression (and not from a spirit of contradiction I assure you, sir,) do I give you some of the habits of the rabbit; which at once overturns the theory of Doctor Macaulay, in your 40th No. of Vol. 5, wherein he concludes that "the male rabbit destroys the young, for the sole purpose of enticing "the embraces of the mother."

While I resided in Frankfort, I procured the white, the black, the gray, and the blue rabbits, and after a few years, some of the offspring turned out entirely yellow, or copperas-colored. As they were a rarity with us, I was not inattentive to their habits, and all that I relate of them is from *personal* observation. From the entire level of my lot, there was no bank, or hill side for them to burrow in, of course their cells were frequently deluged by rains, and their young drowned; to protect them from this casualty, I frequently dug down to the extremity of the hole, and fixed an inverted box over the place, so that the young might be placed in the box during hard rains. I castrated most of the males when young, so that at all seasons of the year, they were fit for table use: to distinguish the stags, I always split one of their ears, so that I might not be mistaken in catching them. Although I have never had a hundred at a time, yet I have had upwards of ninety. Like all domestic animals, they may be taught to come to food by any particular sound—I chose a a peculiar kind of whistle between the hands, and by shelling corn around me, could take by the ears any one of them without disturbing the rest. I would advise a southern hill side for a warren, and the only way I could prevent their burrowing out, was to place a row of bricks, laying them flat with their ends against the wall, and sunk only level with the surface, so as to form a nine inch pavement all around the warren; the rabbit will commence immediately at the wall to burrow out, the brick pavement prevents it. Some few days before parturition, the female burrows her hole from four to six or eight feet, and carries grass, hay, or whatever litter is most convenient, and forms her bed; she then closes the mouth of the hole by returning to it part of the dirt, and pressing it down with her fore feet, so as to leave no appearance of the hole. Just before parturition, she opens the hole and lines this bed with her own fur, and immediately after parturition she comes out, securely covers the hole, and runs in search of the buck, and *in less than ten minutes receives a new impregnation.* She does not visit her young but once in twenty-four hours, unless it is in the night, which I do not believe. I have seen them open the hole, go in, and uniformly *in two minutes by the watch* return, close the hole securely and leave it. I have then, by removing the box and examining the young, found them quite full. In about three weeks she leaves a small opening at the mouth of the hole, the young then occasionally come out, in a few days more she closes the hole when then are out, and when they are thirty days old she has a new litter. When I have wanted to use the young for broiling, I have at the time of parturition, and for some time after, kept the mother secluded from the buck, so that she might suckle them a few weeks longer. If these statements be true, Doctor Macaulay's supposition is without foundation. So much for facts, take my conclusions for what they are worth—my own conclusion has been, and still is, that at parturition, the mother leaves with the bed of young exactly the kind of odor, which accompanies her to the buck, after the first caresses she plays the coquet and hides from him; in his search for her, if he comes to the bed of young, (to which he is guided by the scent, unless they are very secure) he scratches them to pieces, not from motives of destruction to them, but to drive the doe (which he believes there hid) from her lurking place.

This too may be speculative theory, and I can have no objection to its being put down by one more plausible, tested by experience, and carrying with it more of the rational.

Respectfully, yours,

Mark Hardin.

P. S. You may think strange that I have gone so much into detail. This is my apology—long since some of your subscribers called for information respecting warrens, and I have never seen an answer to it, of course if he is not better supplied, what I have said is intended for his benefit.

M. H.

"The food of the tame rabbits may be cole wort and cabbage leaves, carrots, parsnips, apple rinds, green corn, and vetches, in the time of the year; also vine leaves, grass, fruits, oats, and oatmeal, milk-thistles, sow-thistles, and the like; but with these moist foods they must always have a proportionable quantity of the dry foods, as hay, bread, oats, bran, and the like, otherwise they will grow pot-bellied and die. Bran and grains mixed together have been also found to be very good food. In winter they will eat hay, oats, and chaff; and these may be given three times a day, but when they eat green things, it must be observed, that they are not to drink at all, for it would throw them into a dropsy. At all other times, a very little drink serves their turn, but that must always be fresh."

"Rabbits are subject to two principal infirmities. First, the rot, which is caused by the giving them too large a quantity of greens, or from the giving them fresh-gathered, with the dew or rain hanging in drops upon them. It is excess of moisture that always causes this disease; the greens, therefore, are always to be given dry, and a sufficient quantity of hay, or other dry food, intermixed with them to take up the abundant moisture of their juices. On this account, the very best food that can be given them is the shortest and sweetest hay that can be got, of which one load will serve two hundred couples a year; and out of this stock two hundred may be eat in the family, two hundred sold to the markets, and a sufficient number kept in case of accidents.

"The other general disease of these creatures is a sort of madness: this may be known by their wallowing and tumbling about with their heels upwards, and hopping in an odd manner into their boxes. This distemper is supposed to be owing to the rankness of their feeding; and the general cure is the keeping them low, and giving them the prickly herb, called *tare-thistle*, to eat."

"The general computation of males and females is, that one buck rabbit will serve for nine does; some allow ten to one buck; but those who go beyond this always suffer for it in their breed."

[The estimate of the warren, on the estate of Thorseway, in England, of 1700 acres, as given by the tenant, Mr. Holgate, with the silver sort of rabbits is this:]

	£.	s.	d.
"Labor, three regular warreners, with extra assistants at killing,	85	0	0
Fences, - - - -	42	10	0
Winter food, - - - -	42	10	0
Nets, traps, &c. &c. - -	14	3	4
Delivery, - - - -	21	5	0
Rent is said to be 7*s*. an acre,	595	0	0
The capital employed is the above with the addition of stock paid for: suppose this as stated about three couple an acre at 2*s*. 4*d*.	595	0	0
	1395	8	4
Interest on that sum one year at 5 *per cent.*	69	15	5
	1465	3	9

Annual Account.

	£.	s.	d.
Expenses as above, - -	800	8	4
Interest, - - - -	69	15	5
	870	3	9
Produce 10,000 couple, at 2*s*. 4*d*.	1166	13	4
Expenses, - - - -	870	3	9
Profit, - - - -	296	9	7

Or about 22*l*. *per cent.* (the 5 *per cent.* included) on capital employed. This the writer observes is very great, reckoned on the capital, but small reckoned by rent, as it amounts to only half a rent. But suppose the gross produce of 1500, which he takes to be nearer the fact; then the account will stand thus:

	£.	s.	d.
Produce, - - - -	1500	0	0
Expenses, - - - -	870	3	9
Profit, - - - -	629	16	3

or 45 *per cent.* on the capital."

"It is remarked, that the author of the Treatise on Agriculture and Gardening, has bred these animals with much success and ornamental effect in a small artificial warren, in a lawn in the garden, made in the following manner.

"Pare off the turf of a circle, about forty feet diameter, and lay it on the outside; then dig a ditch within this circle, the outside perpendicular, the inner sloping, and throw earth sufficient into the middle to form a little hill, two or three feet higher than the level of the lawn; the rest must be carried away. Then lay down the turf on the hill, and beat it well to settle. The ditch at bottom should be about three feet wide, and three and a half deep, with two or three drains at the bottom, covered with an iron grate, or a stone with holes, to carry off the hasty rains, in order to keep the rabbits dry. In the outside bank should be six alcoves, the sides and top supported, either by boards or brick work, to give the rabbits their dry food in; by their different situations, some will always be dry; six boxes, or old tea-chests, let into the bank, will do very well. If the ground be very light, the outside circle should have a wall built round it, or some stakes driven into the ground, and boards or hurdles nailed to them, within a foot of the bottom, to prevent the bank from falling in. The entrance must be either by a board to turn occasionally across the ditch, or by a ladder. The turf being settled, and the grass beginning to grow, turn in the rabbits, and they will immediately go to work to make themselves burrows in the sides, and in the hill. By way of inducing them rather to build in the sides, to keep the turf the nearer, make a score of holes about a foot deep, and they will finish them to their own mind; and if there be a brick-wall round it, it should be built on pillars, with an arch from each, to leave a vacancy for a burrow." But there is, he says, another way that may be practised, which is, "to dig the ditch only about two feet deep, which will yield about earth enough to make the hill; put some pales, about a foot high, on the outside, for that will be a sufficient height to keep the rabbits in. Feed them as other tame rabbits are fed; and in wet weather sprinkle saw dust at the bottom, by which means the quantity of manure will be increased; once a week is often enough to take it way: the quantity will be surprising, nor will the smell be in the least offensive, even though it be quite close to the house. In a very large lawn, two or three of these hills, with the rabbits feeding on the tops, will not be unpleasing objects. If the bucks happen to be mischievous in killing the young ones, they must be chained in an alcove; or else have their liberty as in a warren. After a great snow they will want some assistance early next morning; because the ditch will be nearly filled, and perhaps the alcove, where the hay is, will be blocked up."

He adds, that "it is a great improvement to castrate the young bucks, and keep them till they are full grown, before you kill them; the flesh will be amazingly finer, whiter, and tenderer. But then it will be best to take them away, and keep them in another warren, lest they should be too numerous, and disturb the breeding does; or else have a few hutches in the alcove to fatten them in."

SEASON AND STATE OF CROPS IN HALIFAX.

To the Editor of the Farmers' Register.

Halifax, Va., Sept. 15th, 1838.

Since I wrote you, about the 12th of August, the drought has continued to prevail almost without a shower. We have not had rain enough to more than moisten the lightest land to the depth of 1 or 1½ inches since the 6th day of July. The effect of so long continued dry and such excessive hot weather as we have had, can perhaps be better imagined than described. The corn crop which, up to the 20th or 25th July, was the most promising I ever recollect to have seen in this county, is now certainly the worst, much the worst I ever saw any where. Many fields will yield but little if any more than the seed, and that of very inferior quality. In addition to the destructive effect of heat and drought, the chinch bug has fallen aboard of many fields and parts of fields, and nearly or quite finished the work of destruction. Many of our farmers seemed never to find that the the bug was injuring their corn until they commenced gathering the few blades that were left worth gathering. I am satisfied from what I have seen and heard from good authority, that there cannot be but little, if any more than ⅓ of a corn crop made in this county. Pittsylvania and Campbell certainly not more than half a crop.

Tobacco is, if possible, less promising than corn. We are generally, at this season, busily engaged, all hands cutting and curing tobacco, now we are almost without employment of any kind on the crop. Until yesterday, I had not seen a single plant of tobacco cut this season, and much the larger part will not be worth cutting at all, should we have early killing frost. We once hoped, on finding our corn crops failing, that we should certainly have rain in time to sow and raise a great many turnips to help us through the winter with our stock, that hope seems now almost gone. I have sowed, and know many of my neighbours that have, but what few came up, has all or very near all perished for want of moisture; in fact, I don't think *I* have one living. A PLANTER.

[The foregoing letter, though dated September 15th, was post-marked the 30th, and of course arrived after the last No. had been printed and issued. It is necessary that communications, to be inserted, should be in hand by the 25th of the month, at latest.]

SEASON AND STATE OF CROPS IN OCTOBER.

We have heard very little from correspondents, in October, of the state of crops, and therefore infer that the corn crop is no where *worse* than appeared from our last month's report, and that in the locations not there mentioned, it is *better*. On the fine Gloucester low-grounds there is a good crop made; and in King William, not a bad one. We hope that much of the corn-producing part of lower Virginia has so far escaped the general calamity, as to be able to furnish some surplus corn for the wants of the other parts of the country.

Since the last week in September, the rains have been superabundant, so as to make bad and slow work in sowing wheat. This, added to the small amount of fallow land prepared, (on account of the drought, in August and September,) will affect injuriously the product of the next crop.

After very early frost, in September, which hurt some tobacco in the upper counties, and which so alarmed many planters as to induce them to cut their crops too green, there has followed, and still continues, an unusual length of mild weather, in which every green crop could continue to improve in growth, or in maturity.

October 29, 1838.

PRINCEANA.

To the Editor of the Farmer's Register.

In several newspapers I have observed the following advertisement, of which I request a republication in the Farmers' Register, together with my comments thereon:

"*Competition.*—Much has been said lately about the superior growth of the morus multicaulis in Virginia, and the greater maturity of the wood for cuttings, &c. We now offer to exhibit one, two, three or more thousands of our trees with any plantation of one year's growth of the same kind existing in Maryland or Virginia; and if ours are not superior in the growth of the wood to any other parcel of similar extent, we will pay to the owner of the other parcel one thousand dollars, or one thousand of the trees, he agreeing to a similar forfeit if the reverse is the case. The truth is, their growth is as great in Connecticut and Rhode Island as in Virginia, and trees of two and three years old, are here found to be as hardy as an apple tree. WM. PRINCE & SONS, *Flushing, New York.*"

It is an old and approved saying, that "a wager is a fool's argument." But though Mr. Prince is no fool—and, on the contrary, no man is *sharper* in his vocation of selling plants, *to the best advantage*, still the saying is not the less true, applicable in a different sense; for though the wager is not offered *by* one, it is meant for the use *of fools*, or to make fools and dupes by its operation. This seeming offer to bet on the *superior growth* of his multicaulis trees, is simply a specimen of the "puff boastful;" a mere trick of Mr. Prince's trade, which he will abandon just as soon as any Virginian attempts to pin him to his wager, and make him responsible for it. To do this, Mr. Prince will be at no loss; for his advertisement offers plenty of "holes to creep through," and for him so to escape from the consequences of his blustering challenge. "The truth is," that Mr. Prince has far too much sense to stick to any such bet as he *seems* here to offer. But if he dares to maintain his offer, in good faith, and will put it *in precise and definite terms*, so as to permit fair trial, comparison, and "competition," and so as to clear up fairly the point in question, (the superior growth and maturity of the wood, in open or naturally exposed culture, in Virginia and in New York,) then he can have the bet taken up much sooner than he wishes, and for a much larger amount than he here *pretends* to put at hazard.

The concluding assertion, that "*the truth is*, their growth is as great in Rhode Island and Connecticut as in Virginia," is so grossly and manifestly false, that it does not deserve any other than this mode of reply. I should as soon attempt seriously to disprove, what would be an equivalent assertion, that the climate of New England was as warm as that of Virginia, and the summers as long.

The numerous purchasers of the plants and seeds of the Messrs. Prince, have submitted, silently, long enough to their mode of dealing; and for them, in addition, to have also such gross imposition as this attempted—such insult offered to their understanding, is pressing too heavily, and perhaps dangerously, upon their forbearance.

The Messrs. Prince will not dare to repeat the offer of their bet in precise terms, and on fair conditions; or make themselves responsible for an issue so made up. ANTI-PUFF.

MONTHLY COMMERCIAL REPORT.

The grain and flour markets have been in a fluctuating state during the present month. Prices advanced in England, until the average of wheat reached 73 per quarter, when the duty being reduced to its minimum, all that was in bond, or that arrived at the moment, was entered for consumption, amounting to a million quarters, or 9,333,000 bushels of 60 pounds. The averages of the succeeding weeks were progressively lower, so that the duty gradually advanced, and this has prevented shipments of flour from the United States. The price of wheat in our markets has been $1 55 to $1 75. Of flour $8 to 8 50—supplies have not been large, except at New York, where receipts by way of the Erie Canal, &c., reach 4,000 to 11,000 bbls. daily. The seeding of wheat in Virginia is unusually late—excessive drought, succeeded by rains almost as excessive, having prevented the farmers from preparing their land.

The crops of wheat on the continent of Europe, are reported to be much below an average.

The price of tobacco has advanced in all European markets, and is fully supported on this side—ranging from $6 50 to $13 50 for lugs and leaf. The crop now preparing for market is variously estimated from 20,000 to 30,000, and that of Kentucky at 20,000 to 25,000 hhds. The quantity inspected in Virginia, for the year ending 1st inst., was 41,800, and the export to Europe 21,000 hhds. The receipts in New Orleans to same period, were 38,100, and the export 37,100, of which a large portion was shipped coastwise. The stocks in Europe are very moderate. The quantity manufactured in Virginia is 18,000 to 20,000 hhds. exclusive of 7000 hhds. leaf converted into stemmed.

The receipts of cotton are thus stated:

	1837.	1838.	
N. Orleans and Natches,	601,014	731,256	bales.
Mobile, - -	232,243	309,807	do.
Florida, - -	83,703	106,171	do.
Georgia, - -	262,971	304,210	do.
S. Carolina, -	196,377	294,334	do.
N. Carolina, -	18,004	21,439	do.
Virginia, - -	28,618	32,000	do.
At Northern ports inland,	-	2,280	do.
	1422,930	1801,497	

A considerable quantity of old cotton remained in the country in October 1837, so that the relative production of the two years may be stated at 1,560,000 and 1,660,000 bales.

The exports to Foreign ports were:

	1837.	1838.	
To Great Britain,	850,786	1,165,155	bales.
France, -	260,722	321,480	do.
South of Europe	30,480	25,895	do.
North do -	26,437	63,099	do.
	1,168,525	1,575,629	

The quantity consumed in the United States, (not including the factories south and west of Virginia,) was, in 1837, 222,540—in 1838, 246,063 bales. These estimates are all made from October to October.

The stocks in all our ports October 1837, were 75,820 and October 1838, 40,300 bales.

The crop of the present year is supposed to be smaller than that of the last, particularly in the Atlantic States. In North Carolina and Virginia, it is not only much less in quantity, but inferior in quality. The price in Petersburg is 11 to 12 cents, being ½ cent below that of old, the stock of which is nearly exhausted. The mills at this place are all in active operation, and the erection of new ones proposed.

The attention of some of our most enterprising farmers is now directed to the culture of silk, for which preparations are making, and no doubt is entertained of its success. Speculations in the *morus multicaulis* are carried to a surprising extent in every part of the country, and fortunes have been made from the reproduction of a few twigs.

The extension of the great line of railroads is now about to be undertaken, from Raleigh to Columbia, S. C., which will nearly complete the chain from Maine to Alabama—what, with steam ships and locomotives, space will be annihilated.

Oct. 29th, 1838. X.

Our correspondent, T. S. Pleasants, having seen the sheet (after the printing was finished,) containing the extracts of his private letters, deemed it necessary, to prevent the appearance of his having assumed too much, that it should be stated, that T. M. Randolph, esq., first suggested the scheme, and obtained from the government the lease of the Bellona Arsenal, for silk-culture; and that Pleasants became, by subsequent arrangement, one of the joint tenants and occupants of the property.

From Lawrence on the Horse.

DESCRIPTION OF A WELL FORMED HORSE.

The head of a horse should be void of flesh, and for length and size appear to hold fair proportion with the size of his body; his eye full, and somewhat prominent; eye-lids thin and dry; ears thin, narrow, erect, of middling length, and not distant from each other; forehead flat, not too large or square and running nearly in a straight line to the muzzle, which should be small and fine; nostrils capacious; lips thin; mouth of sufficient depth, and the tongue not too large; the jaw-bones wide at top, where they join the neck; the head not abruptly affixed to the extremity of the neck, but with a moderate curve and tapering of the latter.

The neck must be of moderate, not too great length, nor too thick and gross on the upper part, nor too large and deep, but rising from the withers or forehand, and afterwards declining and tapering at the extremity, it will form somewhat of an arch; underneath, the neck should be straight from the chest, and by no means convex or bellying out.

The shoulders capacious, and of large extent, so as to appear the most conspicuous part of the body, but without being loaded with flesh; they should reach fairly to the top of the withers, which must be well raised; the chest should be sufficiently full, not narrow or pinched.

The body deep and substantial; back, a plane of good width, but handsomely rounded; backbone, straight, or with a trifling inclination, and not too short; loins wide, and the muscles of the reins, or fillets, full and swelling on each side of the backbone; the space sufficient between the ribs and hip bones, the bones themselves round, and the buttocks deep and oval; the rump level with, or not too much elevated above the height of the withers; the croup must have reasonable space, and not sink too suddenly, in which case, the tail would be set on too low, which ought to be nearly on a level with the back.

The hinder quarters should spread to a wider extent than the fore-parts, and the hind-feet stand farther asunder than those before; the thighs should be straight, large, muscular, and of considerable length; the hock wide and clean; the shank not too long but flat, and of sufficient substance, its sinew large and distinct, the fetlocks long; the hocks should form an angle of such extent as to place the feet immediately under the flanks. The fore-arms, like the thighs, should be large, muscular, and of good length, the elbows not turning outwards; the knees large and lean; the shank or cannon-bone, flat, strong, and not too long; the tendon large; the fore-arm and shank must form nearly a straight line; fetlock-joints large and clean; pastern inclining to a certain degree, not too long, but large in proportion to their length; the coronary rings not thick or swelled, but clean, dry, and hairy; the feet neither too high nor too flat, and of size apparently a sufficient base for the weight they have to sustain; hoofs, of color dark and shining, without seams or wrinkles, tough and strong, not hard like oak; foot internally concave, soal hard, but not shrunk, heels wide, and of middling height; frog not too large or fleshy, but tough and sound; the feet of equal size, should stand exactly parallel, so that the front or toe incline neither inward nor outward; the fore-feet should stand perpendicular to the chest, not too much under it, and they should be less wide apart that the fore-arms; the legs should not be loaded with hair.

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THE FARMERS' REGISTER.

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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

TREATISE ON THE CULTURE OF SILK.

BY GIDEON B. SMITH.

[Supplemental to No. 2, published in the November number.]

After the cocoons have been properly cured, as described, either by baking or the application of heat in any other way, they should be spread out in a dry airy room, that the moisture of the chrysalis may evaporate, and should be thus kept till wanted for reeling or transportation. I have known cocoons to be ruined by the moisture of the chrysalis, when merely thrown into barrels and boxes. When intended for transportation, or to be sent to any distance, after they have been thoroughly dried, they may be put into barrels, boxes, or baskets, but must not be packed so as to *indent* the cocoons. The best way is, to fill the vessel, and gently settle them down, by shaking and slight pressure. If the cocoons are indented, they are very difficult to reel, and if flattened, they cannot be reeled at all; and, of course, are worthless, except for carding. In very damp weather, the room in which the cocoons are kept, ought to have a fire made in it to dry the air, and the cocoons should be stirred up, once a day, during the continuance of such weather; as they are very apt to absorb moisture from the atmosphere.

No. 3.

Reeling, twisting, bleaching, &c.

We have now arrived at the most difficult part of the whole business of silk-making, that of reeling the cocoons--without which all the previous operations will have been worthless. It is at this point that thousands of persons who have begun the culture of silk, under high hopes and expectations, have been arrested in their progress by what they called insurmountable difficulties, and abandoned the business in despair—there being, heretofore, no market for the sale of cocoons. In vain, have they been exhorted to persevere in the trial with patience and industry for a few days—in vain have they been told, that the devotion of one week's time and half a dozen pounds of cocoons, would be sufficient to teach them the art. The process seems so tedious, the result so trifling, that, after a few hours' trial, they give it up, and thus ends their career in the culture of silk. More than one thousand such instances have come under my immediate notice—I might, I am sure, say several thousands, including all with whom I have had intercourse personally, or by letter. Among them all, not more than one in twenty, have been induced to persevere, until they learned to reel at all, and not probably one in fifty until they learned to reel well. But for the encouragement of those who wish to learn to reel, I can and do assure them, that, when any intelligent persons have persevered for one week, they have invariably become expert reelers in that time, and many of them even in less time. Any person, therefore, that will devote one week, and five or six pounds of cocoons, steadily and perseveringly to the object, will be certain of accomplishing it. It requires almost Job-like patience, but patience was never better paid for. Let this be an invariable rule with all who would learn to reel: Take five or six pounds of cocoons, and set apart one week of time, with a determination to *waste* all the cocoons, if necessary, and to allow of no interruption, during the time, and then go a-head. If in two or three hours you find yourself making a good thread, all the better; but don't be discouraged if you presently find that thread becoming worthless from some cause or other, but take it off the reel, and begin anew. Who ever heard of a young woman learning to spin cotton, wool, or flax, even in one week's trial? Why, then, expect to perform a much nicer operation by *intuition?* Persevere, then, and you will learn. Perseverance, in a learner of reeling, is the great thing needful; and it is sure of its reward. Let me, for further encouragement, inform young beginners, that I have taught many persons to reel by writing one letter to them, describing the process. Many persons now maintain themselves by making sewing-silk, who never had any other instructions than these letters.

The REEL, most proper for the purpose, has heretofore been the one established by the Italian government, called the Piedmontese reel. Its construction is peculiar; and it secures several points deemed important in raw silk. By a peculiar vibration of a particular part, it lays the threads cross-ways in such manner as to prevent adhesion by means of the still wet gum. It reels two threads at a time, and they are so wound around each other in passing up to the bars of the reel, that they compress each other into a perfectly cylindrical wiry thread, without twisting—which is important, as the raw silk can then be used as flax, or twisted more or less to suit the various purposes for which it may be wanted. Our countrymen, however, seem to have abandoned, or rather rejected (for they have never used them much) these reels, and are using various kinds of new construction. Almost every person that has done any thing at all in making silk, has invented "a new reel"—a "new silk-reeler and twister;" a "machine to reel and twist silk at the same time," &c., &c. I am, however, very much inclined to the opinion, that for all commercial purposes, the silk must be reeled in a manner similar to that produced by the Piedmontese reel, and that, or some reel producing the same result, must ultimately be adopted by us. All staple articles of commerce must have some fixed character as a standard, all deviations from which deteriorate its quality. Silk reeled by the newly constructed machines will do well enough, and as well as any, for sewing silk, and for other manufactures at home, and in our own looms; but in the markets of the world at large, it must be of a character and quality to meet the expectations, and to conform to the customs of the manufacturers there. Why does the raw silk of China sell in Europe so much lower than that of Piedmont?

simply because it is not reeled like the latter. I make these remarks, here, merely for the purpose of recording my opinion on this point, fully believing that the time will come, when all other reels and machines than that of Piedmont, or those producing the same results, will be abandoned in this country, except for domestic use, for which the newly invented machines are admirably adapted. The best I have examined is BROOKS'. They cost about $40, and can be obtained of the inventor, Adam Brooks, South Scituate, Massachusetts. Reels of the Piedmontese construction, can be obtained in Philadelphia, but I am not in possession of the address of the person who makes them at this time. They cost $15 to $20.

PREPARATIONS FOR REELING.—A small portable furnace, with some burning charcoal, is very useful for keeping the water hot, and should always be used. On this, place a copper or tin vessel, broad and flat, say six inches deep, 18 inches long, and 12 inches wide. Fill the vessel with hot water, not quite boiling, and put into the water two or three dozen cocoons, from which all the loose tow has been taken. With a small wisp of broom-straw, stir the cocoons about, occasionally raising the wisp to see if the end of a fibre has attached itself to it, and if such is the case, take the fibre in the left hand, and proceed again, as before, stirring the cocoons with the wisp, and securing the fibres in the left hand, until you have got fifteen or twenty; then attach them to the bar of the reel, and let an attendant turn the reel rapidly. Watch the cocoons carefully, so that you may observe if they *run* or unwind well. If you observe any of them drawn up out of the water, the water is not hot enough; if the fibres come off the cocoons in burs or clusters, the water is too hot. In the former case you must increase the heat of the water by pouring into the pan some boiling water; in the latter case you must cool it, by putting in cold water. The great difficulty, in reeling, consists in ascertaining the proper degree of heat of the water, required for different parcels of cocoons. Some cocoons require the water to be only of blood-heat; and others of all degrees from blood-heat to near the boiling point. But a little experience will teach the degree of heat required, so that the reeler will know in a moment whether the water is of a proper temperature.

When you have got as many fibres running on the reel as you require, you must still sit at the pan with the wisp, catching other fibres; for if the reel is turned with the proper rapidity, it will require you to be constantly attaching new fibres to supply the place of those that have broken, or exhausted cocoons. The fibres are readily attached to the thread as it is running, by merely throwing the ends of them on the running thread, which immediately adhere by means of the gum.

THE NUMBER OF FIBRES in the thread depends upon the purpose for which the silk is intended. For sewing-silk of ordinary quality, about fifty fibres may be reeled together; and then the threads will require to be doubled, so that from one hundred and fifty to two hundred fibres are contained in an ordinary thread of sewing-silk. For coarse broad goods, the same number may be reeled; but for the finer goods, gauzes, &c., five to ten fibres only, or for the finest, only two fibres are reeled together.

If the learner has followed the above instructions, he has probably been able to get quite a skein or hank of raw silk on his reel. I am sorry to disappoint him, but must tell him, it is good for nothing. I was desirous of enabling him to get the *knack* of catching the fibres; attaching them to the running thread; of learning the proper temperature of the water; and giving him a little experience in nearly *winding off* a parcel of cocoons, that he might become acquainted with the outlines of the art, and get the *use of his tools*. As said before, the silk reeled *merely* as above, will generally be worthless—it requires more care.

If the Piedmontese reel be used, two threads, of ten to twenty or thirty fibres each, are attached to the reel at the same time, and kept constantly of the same number of fibres. The proper number of fibres is obtained as before directed; brought together, drawn through the hand to clear them of motes and filth, and then drawn out to see that they run well; then pass them through the eye of the plate, pass the two threads three or four times round each other, separate them and pass them through the eyes on the vibrating bar, thence to the bar of the reel; as soon as they are attached to the latter, let the attendant turn the reel rapidly, and the reeler return to the pan to provide fibres for those cocoons that become detached or exhausted.

It will keep the reeler pretty busily employed in catching fibres, and dexterously throwing the ends upon the thread as it passes up, to keep the proper number of cocoons running in both threads. Keep a basket of cocoons by your side, and put in fresh ones to supply the place of those already in the basin, from time to time, as they are exhausted. Take care that there be not too many in the basin at the same time, nor too few; as in the former case, some of them will become too loose, and in the latter, the reel must stop till the fresh ones are soaked enough to run freely. Observe the following rules strictly: Whatever be the number of fibres you begin with, keep that number steadily in the thread, that it may be uniform and even; change the water as often as it becomes foul, and always use perfectly clear rain or river water, letting it stand for a time before use, that the sand, if any be in it, may settle before putting it into the pan. Well or spring water is generally too hard for the purpose. Avoid all carelessness and slovenliness—and remember that, CARE IS MONEY, in reeling silk. Let it be borne in mind, that the value of silk is increased or diminished by the manner in which it is reeled, very materially. One reeler will make his day's work in reeling worth five or six dollars, while another will only be worth two or three dollars, both reeling the same quantity of cocoons. Hence the value of care and attention. Attention to SMALL MATTERS, too, is here of the utmost importance. Indeed, the whole process is but a series of small, *very* small matters, no one of which can be neglected but at the expense of a material reduction in the quality of the silk. For example, if the water be too hot, the thread will be knotty, from the kinks or burs of the fibre that run up; if it be foul, from allowing the shells of the chrysalids to remain in it, the silk will be covered with motes; and if the number of fibres be not constantly kept the same, the thread will be uneven; all which deteriorate the quality of the silk, and therefore reduce materially the profit of the day's labor; but all which can be obviated without difficulty, by strict attention. I need not harp upon this subject longer, I am sure. Those who will take the above advice will profit by it; those who will not, will be forced to adopt it by experience.

After an ordinary sized skein is wound upon the bars of the reel, it is to be taken off, hung up, and another skein commenced in the same manner. The reel generally has two or more sets of arms, and when a skein is full, the arms or running part of the reel is taken off the frame and set aside to dry the silk, after which it is taken from the bars, placed upon a *swift*, and wound on to bobbins; when any number of the bobbins may be combined, called doubling, and twisted together on a common spinning wheel, to make sewing silk.

If it be intended for sale in the state of raw silk, the skeins are to be carefully twisted and doubled, and thus brought into a compact form, tied with a string, and thus packed up for market.

For SEWING SILK, a sufficient number of bobbins are to be combined to make one thread of sewing silk, twisted on a common wheel, reeled off into hanks, the latter twisted partially, and folded by taking two or three turns, as in preparing common yarn for dying, put into some perfectly clear rain or river water, in which a quarter of a pound of good country soap to the gallon of water has been dissolved, and *simmered* over the fire three or four hours, or until the silk is perfectly freed of its gum, and becomes white. It must then be taken out, rinsed in hot rain or river water, and then in cold water. In this operation great care must be observed to dip it gently, drawing it to and fro in the water, so as not to get the silk tangled, or in a snarl. It is then to be hung up to dry; after which it may be doubled and twisted into sewing silk. It should never be put up into large skeins, as it is apt to get tangled. One hundred threads is a good sized skein. If the whole work has been properly done, the silk will be beautifully white, with a rich gloss.

Before the last twisting for sewing silk, if to be colored, it may be dyed of the desired color, and then twisted.

The above directions will apply to all kinds of reels generally. The only difference consists in the following particulars. With Brooks' and other reels of American construction, the silk is run directly upon bobbins, two or more bobbins are combined, and the thread produced passes through fliers and is thus twisted; it is then wound upon a common reel into hanks, and folded for bleaching by boiling, as above described.

Brooks' machine is said to reel double and twist at the same time; but it does not do it strictly speaking. The thread first passes on to the bobbins partially twisted; when the bobbins are full, the thread from two or more of them is combined, and passed through the machine again, when it is twisted into sewing silk. There are four fliers to this machine, two are used for reeling and the other two for doubling and twisting the silk that has before passed through the other fliers. I think it were better to use all the fliers for reeling; and after reeling as much as is desired, then to use all the fliers for doubling and twisting. For domestic family purposes, this machine is admirably adapted. It makes excellent sewing silk and thread for knitting. Large establishments will of course not need instruction as to the machinery to be used, from me.

WASTE SILK, perforated and imperfect cocoons, may be easily converted to useful purposes. The cocoons are to be cut open with scissors, the shell of the chrysalis taken out, and the cocoon, together with all other waste silk, put into water, and the gum extracted as above. It is then to be rinsed, dried, picked fine, carded and spun like flax-tow, and makes most beautiful and durable stockings and gloves. The better method is, after the gum has been extracted, to take the mass of fibre, stretch it out, and cut the whole into pieces five or six inches long, like cutting a skein of yarn. The fibres are then not too long for the operation of carding.

Concluding Remarks.

I have now given all the instruction necessary to a complete domestic silk establishment; such as will enable every farmer's family to pursue the business in a domestic way, and to make it the most profitable *pin-money* affair to which the young ladies can possibly turn their attention. Indeed all they make from it will be so much clear gain; for none but otherwise idle hours need be appropriated to it, except in the reeling, and in most cases not even in that. A young lady in any farmer's family, can thus make five to ten pounds of sewing silk or knitting silk, or raw silk for sale; and not only not work hard, but do scarcely more than occupy hours that would otherwise hang heavily on her hands.

I feel called upon by the peculiar situation I occupy, to make a few remarks in relation to the profits and prospects of the silk-culture in the United States. I have said before, that we shall become a great silk producing country; that ere long we shall supply the factories of Europe with the most valuable part of their raw silk, as we do now with cotton. This I conceive nothing can prevent. That we shall also, in the course of no very long time, become the manufacturers and exporters of finished silk goods, is clearly inferrible from the first proposition. From this it will of course be inferred that I consider the production of silk, in all its branches, a profitable business; and I do so consider it. My experiments for twelve years past have clearly satisfied my mind upon this point. But I do not consider it as profitable as many of the ardent friends of the cause would make us believe. I do not consider it sufficiently profitable to authorize farmers, mechanics, lawyers, doctors, and merchants, universally to abandon their old and well understood pursuits, to enter into this, which they do not understand. It is undoubtedly a safe and a lucrative business, when well understood and well pursued; but that *any body* can give up his ordinary occupation, step into this, and make his fortune by it, like the drawing of a prize in a lottery, must not be expected. We often see calculations made of the amount of money that can be made from an acre of ground. All such are clearly fallacious. No dependence can be placed upon them, simply because the business has not been sufficiently practised in this country to afford any good grounds for them. And then, again, as *labor* with us is more costly than land, it is more proper to inquire how much *each hand* can make, especially as more than nine-tenths of the value of the silk is derived from the labor expended in its production. But no estimate can be made even of the profits of labor in consequence of our want of experience. But that we shall ever realize the great profits from this business that we are continually told we shall, seems improbable from the very nature of things. Why, if such great profits can be made from the culture of silk as $1000 to $2000, from an acre of ground, and that too, as we are told, with very little labor, and to the extent of as many acres as we please, why, I ask, are not France and Italy, nay all the south of Europe, where silk has been made for ages, universally engaged in the business? Why are they continually purchasing the raw silks of the east for their factories? Will any people import an article for consumption that they can produce at home at less cost? Labor is cheaper there than here, and consequently one would suppose they could make as much profit by the silk culture as we can. It is true we have several important advantages over every other country. We have a climate better adapted to it; our people are more enterprising and industrious; we can use the morus multicaulis, (which they cannot, on account of the difficulty of getting over ancient prejudices, and of substituting it for their already established trees of other kinds.) But we have also our disadvantages, the principal of which is the cost of labor. We cannot expect to do much more with our advantages than to make them offset the disadvantage of the cost of our labor. Suppose, however, we do realize double the profits that they do; even then we shall not make any thing like the profit we are told we shall. If the silk-growers of Europe made any thing more than a good living business of it, every body there would immediately go into it; for there, as well as here, and every where else, all very profitable professions, or trades, are sure to be immediately filled with occupants, and thus overdone. Another view. If the business was so very profitable, the prices of the article would speedily be reduced by competition, until it afforded a fair profit merely. It is so in all other branches of trade—why not in this? The French and Italians are surely as capable of estimating the value of things as we are. If silk can be made for four dollars a pound, and it costs six dollars to import it, we may be sure that it will be made, not purchased. These remarks are not made to discourage persons from going into the culture of silk; but rather to prevent disappointment in those who are led astray by over sanguine estimates. I find myself placed in a singular predicament. For many years past I have been urging this business upon public attention, and doing all I could to induce our people to go into it; now, on the contrary, I feel called upon to restrain the spirit I have heretofore spurred to action. In this I anticipate that I shall be accused of inconsistency. But, if I am properly understood, no such fault will be discovered. Now, as heretofore, I urge upon farmers every where to introduce the business into their domestic affairs. Let the people of the *poor-land districts* of the old states introduce it there. It will be as profitable, if not more so, than the cotton crops, and grain crops of other and more favored districts, and will thus serve to equalize the productions of all parts of our country. The old worn-out lands of Maryland, Virginia, North Carolina, &c., cannot by any possibility be put to a more profitable use. But neither in this nor in any other case where it is made an exclusive business, must it be expected that enormous profits are to be made. It must be remembered, that *great profits* cannot be made in any business for any great length of time, simply because every body will go into it, overdo it, and thus reduce its profits to a mere living rate. With these remarks I take leave of the subject.

GIDEON B. SMITH.

From the American Farmer.

ON BUILDING AND FILLING ICE-HOUSES.

Latitude 39°
October 15, 1823.

Sir—I would not give one solid ounce of experience for a whole ton of theory. I have an ice-house, the pit of which is 6½ feet, the earth thrown out raised a good mound 2½ feet more, making 9 feet to the bottom, which is a tolerably dry sand. It was for many years a pit with a pen inside, made of flat pieces of mauled oak—the earth came to the back of the logs. In the centre of the bottom there was what was called a dry well—that is, a round hole a foot deep, of which I have never perceived the advantage. The same kind of mauled pieces laid on the bottom, formed the floor—the pen was about 11 feet square in the clear, with a capacity of about one thousand cubic feet. A thatch of corn tops on poles, formed the roof and cover, with a door of entrance into the north end. This house used to hold about from 30 to 35 common sized ox-cart-loads; the ice pounded from the size of a walnut to a brick.—It generally kept ice till the middle of August, and then left us more disagreeably off, than if we had not enjoyed it at all. It was near the poultry yard, and the blame was laid on the poor hens, which, fond of a cool place to nest in midsummer, used to scratch holes in the bottom of the thatch, and let in the rain water. This was often one cause of the loss of the ice, but not the only one. The fact was too well established, the ice seldom reached September—and I became fully convinced that the principal reason of the early loss was, that the mass of ice was too small. The rats also plagued us very much in the chief use of a country ice-house, the preservation of fresh provision.

I determined to endeavour to remedy all the faults. With this view, the old work, now much out of repair, was broken up—the pit enlarged to 16 feet by 24, in which a 9 inch brick wall was run up to 6 inches above the ground, and the floor was paved two bricks thick—the pit was then 14½ feet by 22½ feet in the clear; and 8½ feet deep to the surface of the earth. On the pavement I laid four sills, on which I raised a frame, 11 feet by 19 feet in the clear, with sleepers 6 inches deep, resting on the pavement. The top of the frame even with the brick work.—A tight floor of good plank was laid, and the frame planked up tight on the inside.

This plank pen, or pit, is 11 feet by 19 in the clear. There is of course, a space of about 20 inches all round, between the plank and the brick work.

The design in making the pit oblong, was to take off 7 feet of one end, and appropriate it to milk in the summer season—but having a cool dairy which keeps milk pretty well, this was never done; and the whole pit containing upwards of 1500 cubic feet, has been used for ice.

Above ground, upon the brick work, there is a frame house 24 feet, by 16 feet and 5 or 6 feet pitch. This house is but half boxed, and the air is freely admitted between the main and false plates. There is an upper floor laid on the joists, except a space about 2 feet by 6 in the centre. Directly over this space there is an aperture 6 feet by 6 or 8 inches, in the ridge of the roof, over which aperture there is a bonnet to keep the rain out. The sides and the ends from the aperture in the floor, to that in the roof, are planked, so as to prevent any opening between the loft and this centre ventilator. By these contrivances, the loft is kept stowed full of straw to produce more than the coolness of a thatched roof, and yet the air has an uninterrupted passage in at the eaves, and out at the ridge. There are a few narrow strips of plank nailed a foot apart on the innersides of the studs--and the space between the weather-boarding and the strips is also filled with straw.

On the south side of this house there are trees, which break the rays of the mid-day sun from the roof. The body of the house is kept white and sometimes the roof.

When first used, the space between the bricks and planks was kept clear; with the idea that the air would prevent the damp from the earth and bricks going to the planks—but experience has fully proved in this latitude, that from the last of February the air should be kept as far from your mass of ice as possible. For several years this space has been kept well filled with dry straw. We have ice in this house, at this time, and since it has been packed in the manner now pursued, it has not been unusual to have ice, till ice has again returned.

The mode of putting the ice up, is considered very material, and is as follows. The space between the bricks and planks is examined, and seen to be well packed with dry straw—the plank pit is made perfectly clean. The ice is brought in as large cakes as can be conveniently handled, and in as regular squares or oblongs, as they can be conveniently cut and broken by the eye and axe. These cakes are laid upon the naked plank floor of the pit, leaving as small joints and crevices between as possible. A trough or old canoe is placed near the door of the house—into this the small pieces and broken bits are put and pulverised quite fine, and the crevices between the layer of cakes is well filled with it; the surface of the cakes being kept clean.—A second layer of cakes is than laid down, and the crevices filled as before—and this simple method is continued till the pit is full. A very little care will keep the surface of each layer level, and the whole will go in as solid as a piece of stone-mason's work.

No straw is put on the floor under the ice; because experience has proved it is not necessary, and because if it should become wet, and need to be removed ever so much, it cannot be got at. Nor is there any put between the side planks of the pit and the ice at the time of packing, because it is not then necessary, nor can it be well done at that time.—With all possible care the straw will mix with the ice and be put in irregularly.—Whereas if the pit be filled solidly and entirely with ice, as soon as the ice begins to shrink from and leave the sides of the pit, this regular vacancy can be well crammed with dry straw, and if this straw get damp, it can be easily taken out and changed. But if the straw had been put in the ice, it would take up more space, and from its irregular stuffing, would be found much more difficult to remove, should it become damp or mouldy.

About the last of February, the mass of ice is covered over with dry straw, not less than three feet thick, and if straw is plenty, the house from the ice to the joist is filled with it. It is considered very necessary to keep it wrapped under a thick coat of straw, sedge or dry leaves. Should the straw next the ice become damp, be careful not to expose the ice to the air, but begin at one end, and let the damp straw be pulled out—and the next straw above, which is not only dry, but cool, be suffered to settle down on the ice. If you have more dry straw, let as much as was taken out wet be brought and put on the top of the straw in the house—or let the damp straw be dried and sunned, and then returned on the top of the straw in the house. Never think of changing the whole mass of straw on the ice at one time, by bringing fresh straw from the barn yard, for this dry straw from the barn-yard will always be of a much warmer temperature than your ice, and will be sure to melt it very much.

The advantages of packing ice in the above mode, over the common method of pounding into small lumps, are many, and striking. In the first place, if the ice be three inches thick, or more, it can be stowed quicker with the same hands. Again, you can pack much more ice in the same space—my house that used to be filled with forty-eight ox-cart-loads of ice when pounded, has often taken in seventy of the same sized loads, when packed in the whole cake—and this will not appear at all surprising upon a moment's reflection. By pounding, you do not pack it; but infinitely multiply the pores and crevices—any miller knows, that a bushel of corn when pulverized, or ground into fine meal, will measure out not far short of a bushel and a half. Any wood-cutter knows, that a cord of round logs, say a foot diameter, with the insterstices filled with small round wood, if the logs be split or mauled into marketable wood, will measure near a cord and a half fair measure. But, sir, I will give you an example exactly in point, and which, at least, any countryman can try. Recollect, *pounding* ice is very far from *packing* it. It is not compressible like flour in a barrel under the action of the packer. Take an ear of corn, roll it in half a sheet of paper—let the paper come just even with the but, or large end of the ear, and an inch or two beyond the small end—twist the paper at the small end, and tie it with a string all round so that when the ear is drawn out, the paper will form the exact case of it. Draw the ear, shell it, and return the grains into the paper case. If the ear is of the gourd seed, or of a kind having long grains and a small cob, the grains which will lay packed exactly like the slippery hard-pounded ice, will be found nearly to fill the paper case, notwithstanding the whole cob has been withdrawn.

If, sir, you are not now convinced that seventy loads of ice can be packed where forty-eight only will stow when pounded—nothing need be said to attempt to convince you that a mass containing the greater number of loads, will keep longer than one containing only the less number. But this is not all—when the ice comes into use, that which was packed is easily raised in large, native, solid, brilliant lumps, which will last more than twice as long, after being brought to the cooler, &c. as that which has been pounded.

I thought I would have given you the size and plan of a good cheap ice-house, I have already trespassed too far with the long story of my experience. Your obedient servant,

CRŒSINUS.

From the Penny Magazine.

THE FORESTS OF AMERICA.

Those who have never explored the primeval forests of America, can form but a very imperfect conception of the depth of the gloom and solemnity which every-where prevades them. Save on some of the south-western ridges, such as intersect the great valley of the Ohio for instance, where, beneath the outspreading branches of the oak, the chestnut, the walnut, and the sycamore, you find spots of luxuriant herbage, and myriads of bright and beautiful flowers, all the rest of the interminable woods that I ever, in my devious rambles, have explored, are wholly destitute of herbage, yielding neither grass nor flowers. Wherever you tread, the surface of the ground is thickly strewn with decayed and decaying leaves; and dead branches, of various shapes and sizes, are daily toppling down from the lofty stems to which they have belonged. And though the winds may rage, and the storm may beat, in the tops of the tall forest-trees, yet there reigns an everlasting stillness near the surface of the earth; not a breath of air is there to stir the light and withered leaves: where they fall, there they are suffered to moulder and decay. The boundless covering of crisp and brown leaves becomes partially enlivened by the green of the young seedlings, which spring up by thousands during the summer season; but as the all-vivifying influence of the glorious orb of "light and life" cannot reach their lowly condition, for the most part they pine and die, their places being supplied with another crop of these "annuals" each succeeding summer.

It would be tedious to enumerate all the varieties of timber-trees found in the vast wildernesses of America; yet there is, in almost every section of the country, some predominant species, from which the woods acquire their appropriate name and character. The chief of these may be comprised in the four following, namely,—oak-woods, beech-woods, pine-woods, and cedar-swamps, or barrens. All these forests are gloomy, but they have their comparative degrees of depth of shade: the oak-woods being the least dark, because of the trees standing further apart; the beech-woods in the next degree; and then comes the sullen pine; and, lastly, the sombre cedar. When the sun is in its meridional summer splendor, a quiet, chaste and mellow light is admitted through the veil of pale green and semi-transparent foliage of the oak and beech woods. At that season, too, a few, but only a very few, summer-birds frequent forests of this character; and whose song, if song they have, is wild, monotonous, and melancholy. Occasionally, the ear is startled by the loud tapping of some industrious but unmusical woodpecker; and even in the depth of winter, its rapid hammering may be heard from afar,—for some of the more hardy varieties of the woodpecker tribe do not migrate at the approach of the most inclement seasons. Besides the few birds that usually frequent these forests, they are inhabited also by playful squirrels, of three or four varieties; their haunts, however, being generally confined to those tracts of country where mast and nuts are in the greatest abundance; for in all the northern regions of America they have to store up provisions during the summer and autumn, on which they have to depend for a subsistence through a long and rigorous winter. I have already enumerated all of animated nature that tends to lessen the gloom and loneliness of the oak and beech woods; for the larger animals which are found there are but rarely seen: and from their wild and savage habits and dispositions, the heart of man can derive no pleasurable sympathies or feelings.

I have described these forests as they appear to him who explores them during the sunny season of summer; but when the early frosts have seared the foliage of the oak and the beech,—and the autumnal tempests have scattered the leaves of the walnut, the ash, and the maple,—the light of day is more freely admitted through the lofty branches of the forest trees. But the birds of summer are gone; and should the season be pretty far advanced, the nimble-footed squirrels will have retreated to their holes and cavities in their favorite trees, no more to be seen sporting and frolicking until the warm and congenial suns of the ensuing spring shall awake them to renewed life and activity. Even the larger wild animals will have become more scarce by the time that winter has fairly set in, for some of them will have gone into their retreat, and have become torpid; and those that remain, being now able to discover man's approach at a greater distance, in consequence of the foliage no longer impeding the view, seldom suffer themselves to be closely approached. The winter snows lie smooth and unruffled in the wilderness, save where is seen the trail of some stalking deer, or the track of some prowling fox or wolf. In the mountainous districts, you occasionally come upon the footprints of the American panther; and in some of the western regions, the traveller will have an opportunity of remarking upon the trails of small herds of elk that have crossed his forest-path.

I come next to speak of the pine woods, and although they are not so common as the "green woods," as those already described are familiarly called,—yet there are millions of acres of forest, where pine, of two or three sorts, is the only, or at all events the generally prevailing timber. When the summer sun is in its full power and splendor, the light, if light it may be called, in the pine woods resembles faint and dubious twilight. This greater degree of obscurity is caused, partly by the darker and more impervious nature of the foliage, and partly in consequence of the pine-trees growing closer to each other than other forest trees generally do. Neither is there any season in the year in which the trees are bare;

much of the winter snow lodges on their branches, and that which finds a passage to the earth seems to have been deprived of all its native purity in the gloom of the recesses where it reposes. As regards the loneliness and melancholy of these regions, summer and winter are nearly alike; for during the season that rejoices all other parts of the creation, no summer bird resorts to the pine-clad regions to build its solitary nest, or chant its simple song of happiness and love. Scarcely a busy woodpecker is to be heard, (seeing one is out of the question); and as for squirrels, they find no business there; except in their migratory excursions instinct should happen to guide them through some section of a pine forest. The bird most commonly found there, is the New England partridge, or the Virginia pheasant; but even these are scarcer than they are in the more cheerful "green woods" of various parts of the country. It may be observed, that the pine forests are considerably taller than any of the rest; probably 160 feet would be below their average height; and although so very tall, the trees are seldom more than two feet in diameter, in consequence of their growing in such close vicinity. In the green, or summer woods, you frequently fall in with a few straggling pine trees, growing up amongst the light green foliage to the height of 60 or 70 feet above all the surrounding forest trees; standing like sentinels set to watch over all the silent wilderness. And when one has an opportunity of looking down upon the surrounding woods from some lofty and abrupt eminence, the whole country appears covered with brushwood or shrubbery, with here and there a pine tree of moderate size, shooting up from the midst of it. The white pine forests are the most general, as well as extensive, in the northern regions of America.

The cedar-woods are commonly confined to swamps; but they occasionally intervene on mountain ridges, where the soil is miserably poor: and, the trees attaining but a small size, such situations are called cedar-barrens. There are also oak, as well as pine barrens, in various parts of the country. The pine woods, as already stated, are dark and gloomy; but the cedar-swamps are still more dismal. Although they are seldom of great extent, to be under the necessity of traversing a few miles of these swamps is no ordinary undertaking; for, in many situations, the cedars grow so close to each other, that there is barely space for a man's body to squeeze through between them. And, taking into the account the nature of their dark-green foliage, some idea may be formed of the gloom and melancholy which for ever pervade the cedar swamps. Some of them are of so boggy a nature, that it is with extreme difficulty they are explored by man; and as the heavens are entirely shut out, the compass is absolutely necessary to direct the wanderer in the right way; and even this can hardly be trusted to as a sure guide, for there is not sufficient light upon all occasions to enable him to ascertain the quarter to which the needle points. One of the most extensive cedar-swamps known at present, is the Dismal Swamp, in Virginia; the length of which is upwards of thirty miles. In the interior of Canada, these swamps abound more than they do in any other section of the country with which I am acquainted; and notwithstanding the contiguous lands may be of the very best quality of soil, at the present day these swamps are utterly worthless. It is mostly the white cedar that grows in them, but the trees do not attain a great elevation, neither are they bulky, since very few of them exceed twelve or fifteen inches in diameter. Were other sorts of timber more scarce, white cedar would be in greater demand: at present, where it can be got to market at a moderate expense, it is used for laths, staves, and shingles. There is, if possible, a smaller portion of animal existence in these dreary regions, than in the desolate pine woods; for if we except the millions of mosquitoes that these swamps give birth to, scarcely is there aught that "lives and breathes" within the dark precincts of the cedar-woods.

There are some remarkable natural phenomena in the forests of America, two or three of which I will briefly notice; but as I have never heard what I consider satisfactory arguments advanced to account for their existence, I shall forbear hazarding any opinions of my own. In journeying through the interior of the country, where the forest has been little, or not at all, encroached upon by the axe of the woodman, you will often, after travelling for two or three days through regular pine woods, suddenly and unexpectedly find yourself in woods of a perfectly distinct and dissimilar character. This, in itself, is nothing extraordinary; but if you will take the trouble to examine a little into the matter, you will then find that there is no visible natural reason for this change; since, for all that you can discover, the soil, and all that is therewith connected, is precisely of the same character and quality on both sides the line which marks the change of timber. At other times, a small and insignificant stream will form the line of demarcation, but if you examine you will find that there is not any change or new arrangement in the mineral kingdom between one side of the stream and the other. These changes, when they do occur, are seldom of small extent, for you often find them running directly through regions of country for scores or hundreds of miles, every where showing the division line with a remarkable distinctness. And in those changes it is not only the leading character of timber which gives place to some other equally distinctive and prevailing: but the few inferior trees and shrubs are superseded by another set of secondary trees and shrubs, of a perfectly distinct order and character. Often from some lofty acclivity, have I stood gazing upon these dividing lines of the vast and wonderful timber-crops of the American primeval forests! when I could trace the divisions as accurately and distinctly as I could in my own grain-field, where a single furrow was the line of division between a crop of full-eared wheat on the one hand, and of the more plebeian oats on the other. In this case, I knew the cause; for I had said there shall be wheat here, and oats there, and it was so; because the proper and necessary seed was committed to the ground, and the respective crops sprang up accordingly.

In the new settlements, my agricultural pursuits have sometimes led me to witness changes which seemed altogether, to me, inexplicable. I will mention one of the instances to which I allude; and having related what I myself witnessed, and made a few observations respecting the situation where it took place, I will then leave the matter to be accounted for and explained by the learned in Nature's secrets—if they can. During the winter season the whole of the timber was cut down upon a piece of ground containing about twenty acres. This was in what was generally called the beech woods, from the major part of the timber being beech; but where there were also small quantities of maple, birch, ash, &c. During the following summer, fire was applied to this "chopped fallow," as the prostrate timber is called; and in the course of an hour all the dead leaves, the decayed timber, and the smaller branches of that which had been standing the previous year, were entirely consumed. Circumstances occurred which prevented the remaining trunks of the trees from being rolled together, in the usual way, and burned; so that in the condition described, this twenty-acre field was permitted to remain for several years. After the lapse of a year or two, the whole field became a plantation of young wild cherry-trees, although I am not aware that a single cherry tree was growing on the spot, or near it, at the time the timber was cut down. Some few of this species of cherry tree were to be met with in various parts of the surrounding woods; but it was altogether an exceedingly scarce sort of timber. During the first and second year of the growth of this young cherry plantation, I took considerable pains in searching for the cherry stones, (if such there were, or ever had been,) by pulling the seedlings up by the roots, and then examining the soil as minutely and carefully as possible. But for all my labor and research, I was not rewarded by the discovery of a single seed or stone! Had the young trees been left unmolested, here was a piece of ground, containing twenty acres, that would, in the course of forty or fifty years, (for this species of cherry is of rapid growth) have become a perfect forest of cherry-trees to that extent. Now, permit me to ask, is it probable that birds—for I have previously stated that very few inhabit the wilderness—should have brought hither all the cherry stones from which so many thousand seedlings, (I have no other name by which to designate them) sprung up in this identical spot? Or is it possible that all those young trees should have sprung up without there being any seed (cherry stones) in the ground at all? And supposing they were there, from whence, or when did they come?

On other occasions I have known oaks and hickories, and maples cut down, and instead of their places becoming supplied by a new generation of their own particular species, after the ground has been left uncultivated for a few years, a general and full crop of young pine trees has sprung up. Now here again, who or what could have brought the cones of some distant pine tree to this particular spot? And if they had been brought, was it by mere accident that they were strewn so regularly over the whole surface?

Far into the interior of the continent of America, in the midst of immense tracts of forest, you sometimes fall in with small openings,—patches of ground from which the Indians, or the early fur-traders, have taken away the timber, or perhaps consumed it on the spot. In some instances, these places will be overgrown with immense briers and brambles; but occasionally grass will have sprung up, and there you may find as luxuriant plants of the common white clover as are to be met with in any part of our own island, or even in the rich pastures of Holland. Here again is a dilemma. Either birds or beasts (and none but wild ones have ever been there!) must have brought the seed, or else it must have lain dormant in the soil, for I know not how many centuries, or the soil must have produced it spontaneously. I have stated these things precisely as they are; and all that I shall advance upon the subject, is, that I know them to be facts.

When trees tumble down in the forests through absolute age and decay, their places are generally supplied by saplings, that have long been struggling in the shade near them, either of their own or some other species. But when a chestnut tree falls its place is commonly filled by one of its own kind; for a number of sprouts shoot up from the root of the parent while it is still standing, one of which taking the lead of the rest, grows up in due time into a forest tree; while the rest of them droop and die for want of proper aliment. I have been able to trace distinctly three or four generations of the chestnut; for, owing to its decaying so slowly, the old fallen trees do not wholly disappear until their children and grand-children have grown up, flourished, languished in old age, and at last fallen beside them.

INDIA RUBBER, OR CAOUTCHOUC,

Is slightly analogous to silk. It is a remarkable fact, that all the plants the silk-worm feeds on contain a larger or smaller quantity of caoutchouc such as the lettuce, dandelion, mulberry tree, &c. In the Brazils, and more particularly in those parts where the India rubber tree (Ficus elastica) abounds, large moths, of from 2 inches to 3 inches in length, producing excellent silk, in large quantities, are very common. From the variety of useful purposes, to which India rubber is applicable, (from a lady's watch-guard or stay-lace, to a ship's cable,) a great demand has been created for this article, which has induced the mercantile world to bend its attention to it, as a valuable remittance. It is a singular fact, that, wherever the teak tree flourishes, there the India rubber plant may be found in abundance, namely, 20° north and south of the equator.—*Eng. Newspaper.*

From Loudon's Gardeners' Magazine.

ANTISEPTIC PROPERTY OF HONEY.

The best mode of conveying grafts of trees, cuttings of vines, &c., to a distance, is to place them in a tin case or cylinder filled with honey. The honey hermetically excludes the air; and cuttings so preserved will vegetate many months after they have been packed.—[Melons, and various fruits, are preserved in this way in Italy.—*Cond.*]

From Loudon's Gardeners' Magazine.

NOTICE OF MR. JOYCE'S APPARATUS FOR HEATING BY STEAM.

In the first week of June last, we called on Mr. Joyce, at his market-garden, in Camberwell, New Road, in order to see a mode of heating by steam which he has invented, and for which, he informs us, he has taken out a patent. According to this mode, a charcoal fire is made in the centre of the boiler of water, and the vapour from the charcoal is conveyed away in the same tube which carries the steam from the water round the house. The steam condenses in the tube, and the condensed water is all returned to the boiler; while the vapour of the charcoal is allowed to escape at the extreme end of the tube. The boiler, which is portable, and made of copper, occupies a very small space; and being placed within the house, and isolated, none of the heat generated by the fuel can, by any possibility, be lost; for even the heat that escapes at the farther extremity of the tube, along with the vapor, is still given off to the atmosphere of the house; and, however deleterious it might be for human beings, if allowed to accumulate, it certainly appears to produce no bad effects on plants, for a more luxuriant crop of strawberries than that in Mr. Joyce's forcing-house, we have never seen. * * * * * *

THE UNFITNESS OF THE NORTHERN STATES FOR THE MORUS MULTICAULIS.

The following extract from an editorial article, in the last Cultivator, strongly confirms the views which we have presented in several former articles in the Farmers' Register, as to the superior advantage of the climate of the southern states, for raising this valuable plant. There can be no higher authority than that of the editor of the Cultivator on this subject, as to the latitude of his residence, (Albany, N. Y.,) and of course, for all the more northern regions of the United States.

"In regard to the culture of this mulberry in our latitude, we have only to repeat the opinion we have often expressed, that the *tree* will not stand our winters, except, perhaps, upon a poor dry soil, when the growth ceases, and the wood hardens, before the occurrence of severe frosts. Indeed this is now virtually conceded by the growers; for we believe it is the general practice to secure seedlings in the cellar, or to bury them in the ground, and to cut down the trees, cover the stumps, and secure the tops and branches for propagation. Cutting down at autumn is recommended as the best mode of increasing the foliage, and as facilitating the gathering of the leaves; as many sprouts spring from the stump in the spring, and the leaves of which may be gathered without climbing."

In addition, we will here refer to a late and full statement in the Genesee Farmer, which was made to show the enormous increase *of about one hundred per cent.*, by the purchase of the cuttings, &c., and a year's culture of multicaulis, and the sales, or estimated value, at the late high prices in western New York. Now, though one hundred per cent. per annum is indeed a great profit, in a regular business, with prices of seed and crop nearly the same, yet in the late and present state of the multicaulis sales and speculation, a profit of one hundred per cent. is not worth mentioning, in comparison with the usual returns in Virginia and North Carolina; and any crop here which brought no more than one hundred per cent. of profit, or increase, this year, would not be worth making in ordinary years. An increase of forty-fold (in kind) is no rare product here; and if profits are counted in money prices, (as was done in the statement of the Genesee Farmer,) sundry cases might be adduced of actual profits being one hundred fold, or an increase of ten thousand per cent. in one year's cultivation. Yet this would be no more proof of ordinary annual profits here, than the statement of one hundred per cent. profit, made *this year* in western New York, is proof that the morus multicaulis can be profitably raised in that region, every year. We have no doubt but that all nurserymen and salesmen of the multicaulis plants, near navigable waters north of Sandy Hook, can more cheaply buy or raise their stock in lower Virginia, than they can furnish themselves at home. The expense of rent, agency, and transportation, would not by any means equal the disadvantages of the uncertain vegetation, dwarfish growth, and immature wood, of these plants raised at home.

SOME OF THE BLESSINGS OF EMIGRATING TO THE NORTH-WESTERN STATES.

Many of the people of Virginia have been long accustomed to consider and discuss, as well as to try, the advantages and disadvantages of emigrating to the new south-western states; but few, comparatively, have paid attention to those of the north-western states and territories. The known circumstances and supposed advantages of the latter were not such as greatly to tempt southrons. But still, the great natural advantages of this extensive and fertile region were universally admitted; and among these advantages, few of us would not have admitted, without question, the almost certain and exuberant productiveness of the rich lands, and the general healthiness of the residents, in so high a northern latitude. And these supposed and unquestioned advantages *have* operated to tempt a portion of southern emigrants to encounter the known disadvantages of that region, one of the greatest of which is the cold of winter, so long and so intense as to benumb the faculties, bodily and mental, for one-third of the year. But it seems that we have been too ready to admit the advantages of the north-west, in regard to health, and the abundant and sure production of the necessaries of life. In proof of grounds for this doubt, we annex several articles which have recently appeared in the several publications from which they are copied.

The first is from the Bangor Whig, and from the pen of the editor, who was then travelling in the north-western states.

"I cannot say I am so well pleased with what I have seen in the western country as I anticipated, but I am but ill qualified to judge as yet. One thing is certain, this part of the country, if it ever arrives at the greatness predicted, must do so through the deprivations and sufferings of the present generation. The present settlers are working hard for posterity—will posterity reward them? The common comforts and conveniences of life are given up,—people merely stay, dragging out an existence; toiling and sweating for the improvement of a country which it will take years to bring to a state of civilization, if one may so term it. The cities of the west are comfortable compared to the interior settlements, but even those are at present miserable places for men to live in, but yet they are inhabited. Chicago, for instance, on Lake Michigan, is below the level of the water in some places, and no where above it. No cellars can be dug because of water. Here lurk bilious and intermittent fevers and agues.

"The past summer, throughout the whole country, as you are aware, has been remarkable for its intense heat, and great drought—through the west this has been the case in a most extraordinary degree. The consequences are now being experienced, and they are indeed awful. A wide spread pestilence extending from the Ohio to the far west, is sweeping many to their graves, and causing an immensity of suffering. Places have been deserted, and the cattle turned in the unreaped fields. Whole towns have been sick—six or eight patients to a family—none have escaped, far and near this disease has stricken the weak and the strong. It is a bilious fever, not very fatal, it is true, but exceedingly distressing. I have scarcely seen a good looking countenance since I left Detroit. This fever is natural to this new country, and always prevails during the latter part of the summer in some places, and to some degree, but it has never before made the sick tremble and the well man turn pale. The fever will undoubtedly stop as soon as cold weather approaches."

"*Health of Iowa and Wisconsin.*—The Galena Advertiser and Gazette of the 10th ult., [Oct.] says:—'We have distressing accounts of sickness from almost every quarter of the inhabited parts of the territories of Wisconsin and Iowa, as well as many portions of Illinois. The motality, generally, we are happy to learn, in this affliction, bears but a small proportion to the number of attacks. The chief causes, according to all accounts, are bilious fevers, and fever and ague."

The next is from the Cultivator of November.

"*Sickness in the West.—The Land Sales.*—The citizens of northern Indiana have addressed a petition to the president of the United States, asking a postponement of the sales of the public lands in that section. They give as their reasons for making this request, that "there is now prevailing throughout all that section an unparalleled epidemic, that is carrying hundreds to their graves, and thousands to their sick beds, while their crops are rotting in the fields unharvested; amid such universal distress that it renders it impossible for the settlers to make the necessary exertions to obtain the means of purchasing their humble homes."

The next is a letter to the editor of the Cincinnati Gazette.

"*Lake C. H., Ia.* 13*th Oct.*, 1838.

"To the Editor of the Cincinnati Daily Gazette.

"Dear Sir.—The unparalleled drought still continues with unabated intensity. Scarcely rain enough has fallen in this section of the country to lay the dust, since the fore part of June. Wells, ponds, springs and streams, that had every mark of 'living water,' are gone, no one knows whither. Many have their water, for family use, to haul miles. Cattle are turned out upon the broad commons to seek their daily drink. Even the muskrats, that abound in such immense numbers around the head of Lake Michigan, are wandering far and wide over the dry prairies in search of their natural element.

"'The Eclipse' and the Equinox have passed, a dry storm of wind. No frost as yet has been sufficient to kill vegetation, and yet it is dried up and ready for the spreading fires that annually sweep over the prairies, the smoke of which now fills the air, and darkens the sun. A cool dry atmosphere, with high winds, has slightly improved the health of the country, but much suffering still exists.

"A most singular and remarkable fact is worthy of notice. While all the waters around have fallen, Lake Michigan has risen. The Indian tradition, long doubted, is likely to be verified, of a septennial tide in the northern lakes. It would appear as though all the surplus waters of the land had been conducted by some mysterious agency into the lake, until it is so swelled that its waves sweep with unrelenting fury over the fair fortune of many a rich owner of city property, whose thousands are permanently invested in 'Water lots.'

"A gentleman now present, whose word cannot be doubted, informs me that on a recent trip from Detroit to Chicago, he saw numerous deserted habitations upon the shores of the lakes, in some of which the water was two feet deep. And at Milwaukie, that many a lot was more suitable to sailing than walking.

"A hard fate seems to await numerous 'fine flourishing towns' in these parts. Some are submerged, and some are dried up with the great drought until they have 'not a local habitation,' though none lack a name, and some a very great one—in sound."

From the New England Farmer.

AGRICULTURAL SOCIETIES AND CATTLE SHOWS.

The cattle shows and exhibitions of manufactures in our states having closed for the season, we propose now to say a few words, of their utility, and the modes of managing them; and to suggest such measures as in our opinion would increase the advantages of our agricultural societies, and render their influence more effectual to agricultural enterprise and improvement.

We have not at hand the means of ascertaining with precision the dates in the case; but, as well as we can recollect, the first cattle show in the United States was held about twenty-four years since, under the spirited exertions of some intelligent gentlemen at Pittsfield, Mass., at the head of whom was Elkanah Watson, Esq., then of that town. The Berkshire Agricultural Society took the lead in the case, and a ploughing match was connected with their cattle show. This intelligent and highly enterprising society have continued their cattle show and exhibitions from that time to the present, with unabated zeal; and with beneficial effects of a decided and permanent character upon the agriculture of that district. Perhaps no better evidence of this can be given than in the fact, that the interest taken in this institution by the farmers of Berkshire universally was never stronger than at this time; and the exhibitions of the society, as we have been informed, were never more numerously attended nor better sustained than the current year.

The Massachusetts Agricultural Society, instituted as early as the year 1791, soon followed the lead of the Berkshire Society; and for more than twenty years, with the exception of three or four intermissions, held cattle shows and exhibitions of domestic manufactures at Brighton, open to the competition of farmers from every part of the commonwealth. Here too ploughing and drawing matches were held, which, by the liberality of their premiums, brought competitors oftentimes from a distance of fifty miles. These shows were held and managed under the direction and personal superintendence of gentlemen of the highest standing in professional and political life; and went off with spirit and effect.

These movements were soon followed by the formation of county societies in the several counties of Essex, Worcester, Middlesex, Hampshire, Hampden, and Franklin, and Bristol and Plymouth. These societies were encouraged by liberal grants from the legislature, giving to every agricultural society, formed in a county containing not less than 25,000 inhabitants, for every thousand dollars, which they should raise and permanently invest for the benefit of that society, the interest of which should be yearly appropriated to purposes of agricultural improvement, the annual sum of two hundred dollars, to be applied in premiums under the direction of the trustees of the society; provided, however, that in no case should any society receive annually more than six hundred dollars. Under these provisions a sum of upwards of four thousand dollars has been yearly given by the state to these different societies to be disbursed in agricultural premiums. This being added to the amount furnished by their own funds had formed a considerable aggregate: the sums actually offered by the Mass. Agricultural Society in premiums the current year exceeding in amount twelve hundred dollars. These county societies are now all of them in the practice of holding cattle shows and exhibitions in their respective counties. We have had the pleasure of attending as many of these as was practicable. As far as our observation extends, the bounty of the state could not have been applied to a more worthy object, nor with more success as concerns the public wealth, and the general improvement. The agricultural improvements in the state within the last twenty-five years have been immense. The plough itself has become a new instrument, in form, in lightness of draft, in ease in handling, in ease of repairs, in the execution of its work, and in the neatness of its construction. The potato-hoe, the drill seed-sower, the seed-harrow, the cultivator, the roller, the cradle, the horse-rake, the corn-planter, the thrashing-machine, the double mould board plough, the side hill plough, owe their origin and general diffusion to agricultural societies and agricultural publications. The introduction of new seeds, of most valuable fruits, of excellent esculent vegetables, of improved varieties of Indian corn, wheat, barley, and oats, this likewise is to be attributed in a great measure to the same source. The introduction likewise and diffusion of improved breeds of live stock, of the fine-woolled sheep, the long-woolled sheep, the mutton breeds, the several improved varieties of swine, the beef and dairy stock, the Devon, the Holderness, the Alderney, the Ayrshire, the improved Durham short horns, and of horses of an improved kind for the saddle and for draft, are all more or less to be ascribed to the spirit of public enterprise and improvement awakened and kept alive by these agricultural societies, exhibitions, and publications. It is indeed impossible to estimate by any exact measure what has been effected in the short space of a quarter of a century; but it meets the observing and experienced eye every where in the improved and well furnished houses, ornamental fences and embellishments, smooth and well cultivated fields, commodious barns, substantial wagons and carriages, which are to be found every where in profusion among our agricultural population. It is important to keep this spirit of enterprise and public improvement awake and active; to press the steam to the utmost limits of safety; "to speed the plough;" and to relax no efforts to advance the cause of agricultural improvement; to diffuse agricultural intelligence; to raise the character and the profession of the farmer; and thus to extend the power and the means, and quicken the spirit and enterprise by which the treasures of the earth shall be developed, the fund of human subsistence become constantly enlarged; and the comforts and reasonable luxuries of life diffused among all without stint.

The agricultural societies hold the power of doing immense good; and, as the gentlemen who have the direction of the funds of these societies have no private views to answer, but are laboring in the most disinterested manner, solely for the public good, we know them too well to fear giving offence by any suggestions, which have no other object than the public good; and which will not be submitted without a perfect respect for their public spirit and superior judgment.

We have the highest opinion of the utility of cattle shows, ploughing matches and the exhibition of agricultural products and household manufactures. They excite an emulation, which engenders no bitterness of feeling, and which prompts to the most spirited improvements. They gratify a laudable ambition to exhibit to others, what we have accomplished. They extend the knowledge of what has been done far beyond what it could be by any other means. They are the only opportunities which many farmers enjoy of seeing samples of the improved stock in the country; and of comparing it with what they have themselves. They bring farmers together to interchange friendly sympathies, and to communicate their mutual experiences. They bring men of different professions and conditions together, the professional, the literary, the commercial, the manufacturing and the agricultural on common ground, and where no jarrings of religious or political party ought to intermingle; where those who labor with the head are made to feel their dependence on those who labor with the hand; and those who labor with the hands recognize their obligations to science, to commerce, and to the mechanic arts, and find their own profession exalted and their self-respect increased by this unrestrained and mutual intercourse. These cattle shows have been the means of inducing the importation of all the valuable animals, which have been brought into our state through the liberality of gentlemen of large capital and large minds, in order to improve the stock of domestic animals in our own state. Especially, they keep the great subject of agriculture before the public mind in the light of its intrinsic, permanent, and universal importance. The well-known custom of the emperor of China at the return of every spring, to show his respect for the cultivators of the earth and thus honoring their great art by holding the plough himself in the presence of the dignitaries of the realm and of assembled thousands of his subjects, is well known. Its favorable influence upon the agricultural classes may easily be inferred; and our cattle shows, bringing together as they do gentlemen of all professions, have the same beneficial effects.

It has been, therefore, to us matter of much regret, that the Massachusetts Society has now for two or three years suspended its annual and accustomed show at Brighton. We know that it is attended with great labor to the gentlemen of the board of trustees, to get up and superintend a matter so foreign to their accustomed pursuits and habits; perhaps it is a labor we ought not to ask of them; but we believe that sixty or a hundred dollars would furnish them three or five practical men, who would gladly take all the drudgery of the management off of their hands, and get it up and carry it through in a manner honorable to the board and entirely satisfactory to the public. We know the labor is considerable, and in such case ought to be compensated; and we do not know how some portion of their funds could be more properly applied. H. C.

From Silliman's Journal.

CURSORY REMARKS UPON EAST FLORIDA, IN 1838.

By Maj. Henry Whiting, U. S. Army.

Public attention has most naturally been turned towards Florida for the last two or three years. That peninsula has been the scene of a contest of remarkable character, awakening a curiosity respecting its topography, resources, &c. which has found but scanty means of gratification. Although the first portion of the United States to be permanently occupied, (St. Augustine having been founded in 1564,) and early signalized by political revolutions, military events, and romantic enterprises, yet its history, both statistical and natural, has been but imperfectly understood by us. The Spaniards no doubt had a tolerably accurate knowledge of the interior, which was formerly somewhat extensively occupied by them. Their settlements, however, were much broken up during the insurrectionary movements which immediately preceded the transfer of jurisdiction to the United States, and the majority of them, when that transfer took place, were abandoned, under the influence of strong national prejudices, which led to a distrust or dislike of a new and dissimilar government. Much local information was thus withdrawn. St. Augustine in the east, and Pensacola in the west, with some few subsidiary plantations, were all the settlements that came into our possession. The rest was nearly an unoccupied waste. Even a knowledge of the St. John's, the grand artery of the country, had nearly passed away; so much so, that at the commencement of the present campaign (1837-8) the form, extent, and depth of its upper waters were unascertained.

The war which has lately been carried on with the Florida Indians has opened the country generally to observation, and its character will hereafter be better, if not well understood. Our troops have traversed it in almost every direction; nearly all parts have been explored, excepting the interior of the lower parts of the peninsula south of the Okachobee Lake. From the 26th degree of latitude northward, the geography may be laid down with general accuracy. Indeed, United States maps of this character are already in the hands of some of our officers, which will no doubt soon be lithographed.

The river St. John's was early entered into both by the French and the Spaniards, the rise and fall of whose establishments there form an interesting and sanguinary portion of history. At the present time (1838) there is scarcely a dwelling occupied on either of its banks fifty miles above its mouth, though many evidences of former occupancy, such as falling buildings, or fields bearing the marks of having been cultivated, are seen some hundred miles higher up. Many of these farms or plantations were abandoned by the Spaniards, at the change of jurisdiction; others were the work of Americans at a later date. But all had shared a common fate at the opening of the present contest. The Indians burnt all the buildings and plundered and massacred all the inhabitants that were not defended by a garrison, and desolation is now seen, where, a few months since, were sugar fields, cotton fields, orange groves, and many other proofs of a thriving population.

This river (St. John's) is in most respects of a remarkable character. It is unlike most if not all of the rivers in North America, having little current at any point of its course, and passing through a country, from its very source, so level in its surface, as scarcely to warrant the expectation of any stream at all. At low stages of the water there is no visible current even in the upper parts of the river, though at high stages it is visible, having perhaps a movement of one mile an hour. Below Lake George, which is more than two hundred miles from its mouth, the tides have a slight effect, and vary the current accordingly, modified, however, by strong winds. Still, the waters have not any where a stagnant appearance, and if unpalatable, they are so from causes independent of their want of proper agitation. They are uniformly of a dark color, like that of tolerably strong coffee, the bottom scarcely being discoverable even in the shoal parts. The origin of this tint may be various; decomposition of vegetable matter can contribute but little to affect a body of water so large, particularly when a considerable portion of the banks are either savannas or pine bluffs, neither likely to have much agency in this way. Lake Monroe may furnish a chalybeate tincture, as its shores abound in chalybeate earths. The lakes above may bear the same character. The waters do not lose their color when suffered to stand in a vessel and to make deposite of such particles as may be afloat in them.

The St. John's is a large river for some hundred and fifty miles from its mouth, being from three miles to a mile wide nearly as high as Lake George. Thus far it has the appearance of an arm of the sea, and in fact feels the influence of the tides. From Lake George upwards it is comparatively narrow, excepting where it dilates into lakes, and very winding, running perhaps several miles in one mile of a straight line. Lake George has been long known, and Lake Monroe, about sixty miles above, was occupied by our troops the first campaign of the present war. Thence upwards the river was to be explored at the commencement of the present campaign. It was soon penetrated through Lake Jesup to Lake Harvey, and afterwards to Lake Poinsett, about a hundred miles above Lake Monroe.

Charleston and Savannah steamboats ascended with army supplies without difficulty, at the high stage of the waters, to Lake Harvey, which supplies were sent thence by row-barges to Lake Poinsett, where the river ceased to be subservient to the purposes of transportation. This high stage was in the fall; as the winter months set in, the larger boats could ascend no higher than Lake Monroe, until spring rains again raised the level of the waters.

The banks of the river as high as Pilatka, or more than one hundred miles from its mouth, are generally elevated several feet above the water. From that point to Lake George they are comparatively low, and are probably mostly submerged at high stages of the water. Between Lake George and Lake Monroe the banks are generally high enough to be dry, excepting where savannas prevail. Wherever the pine-barrens strike upon the river, the banks are eight or ten feet high, with a substratum of shelly soil or rock. To Lake Monroe they are for the most part clothed with a growth of wood—chiefly live oak, pines, and cypress, as high as Lake George; the palmetto or cabbage tree, being largely intermixed thence upwards.

The gray moss clothes nearly all the trees upon the river, excepting the pine and palmetto. These are respected or avoided by this general associate of the trees, from some want of affinity which may not be understood. This moss is a most singular production, having a rank luxuriance little according with its kindred species. It hangs from every bough many yards in length, and wears the appearance at a distance of dingy muslin thrown with a careless grace over every part of the tree, waving to and fro in the breeze and forming a most striking embellishment of the scene; and the effect is not diminished by the presence of the tall and symmetrical palmetto, which rises up some forty or fifty feet perpendicular, like a perfectly wrought column, surmounted by a capital of most appropriate beauty. The moss never throws its foldings over this handsome tree; as we have before remarked, the pine is equally avoided by it. This capricious forbearance with respect to these two kinds of trees, introduces a beautiful variety into the river scene. Where the banks are high and sandy, the pine prevails; where they are low and wet, the cypress—"the melancholy cypress." The live oak, and other miscellaneous trees, prefer the banks of an intermediate character, as also the palmetto. The cypress seems to exclude all associations; no other trees mingle with it, or if they happen to start up along side they are soon overshadowed above by the spreading tops, or crowded out by the cone-like bases below, which last leave only room for the thousand "knees," or sharp excrescences, from one to several feet high, which shoot up like so many dwarf pinnacles.

Ascending the river, which is constantly winding and shifting the point of view, wherever the cypress permits, there the moss is seen in all its sweeping luxuriance. As these trees spring from nearly a water level, and grow to about an equal height, their flat and spreading tops present nearly a horizontal line, where the green appears in all its depth and freshness. Thence, however, to within a few yards of the ground, the folds of moss, like ample curtains, conceal nearly all from view, leaving the trunks exposed below, which are covered with a whitish bark. This aspect may prevail for half a mile, when the banks may rise and become covered with the live oak, whose angular and scraggy arms give a new appearance to the moss, which is still as luxuriant as on the cypress. But the outline above is far different here. Palmettos perhaps raise their graceful heads above the oaks in striking contrast with their associates; or perhaps the pine may show in the barren beyond; while over all is the clear azure of the sky, always in Florida

"So purely dark, and darkly pure."

These changeful beauties, combined with the occasional sight of a wild orange-grove, with its golden fruit bespangling the foliage, altogether render a trip up the St. John's delightful in a high degree.

The ash, poplar, swamp oak, &c., which line the banks of a part of the upper St. John's, drop their leaves during the winter months, unlike all the other trees to which we have been alluding. But these trees would seem to be deciduous, to exhibit more plainly the verdant parasite which attaches itself to most of their branches. In passing up the river for the first time, the uninstructed gazer is surprised and puzzled to see on all these trees a tuft of evergreen, while the branches in general are stripped of their foliage, until informed that it is the mistletoe, which, having attached itself thus to a foreign stock, continues to smile in verdure, while its supporter is standing in gloomy nakedness. The mistletoe bough is always of a rounded form, varying in size from a few inches to thirty or more in diameter. The seeds, which are said to be winged, have a gluten surrounding them, which enables them to attach themselves where they alight and at once to draw forth nourishment as if fixed to a parent stem. The *nullius filius* of the forest, it is adopted by the first tree to which it flies for protection and sustenance.*

Sulphur springs are very abundant on the upper parts of the St. John's. They bubble up like *jets d'eau.* In passing up to Lake Monroe, there is one a few miles below, which attracted, among others, the notice of Bartram. An inlet on the right bank is seen, nearly of the width of the river, which at once attracts the eye, by the contrast between the color of its waters and that of the river. Two pieces of lumber, placed at right angles with each other, one of mahogany and the other of yellow pine, could not be more dissimilar. And the liquid line of separation is almost as distinct as it would be in the supposed case. The St. John's has here, as elsewhere, its coffee-like hue, while the waters of the sulphureous inlet are as transparent as the air, the fishes swimming in them being nearly as discernible as the birds flying over their surface. The alligators, diving, as usual, at the approach of a boat, when they happen to take refuge in this limpid inlet, continue to struggle downwards in apprehension, as if they felt that it did not afford the usual refuge.

Ascending this inlet several hundred yards, it is found to terminate in a well head or basin, of some thirty feet diameter, with high banks, in the centre of which there is a permanent turmoil of the waters, as if a fountain below threw up its contents with much force. Rowing the boat upon this agitated spot, it was with difficulty kept there in its position, against the efforts of the ebullition to throw it off. A strong odor of sulphur fills the air around, and the taste of the waters is equally sulphureous.

Above Lake Monroe, wide-spread savannas become prevalent. They form the main body of the section of country through which the St. John's flows, and are so slightly inclined, that its course is extremely tortuous, the bends having more the shape of a horse shoe, than of a segment of a circle. The immediate banks in these savannas are somewhat elevated above the level of the waters, as the growth of a wild cane indicates, but the greater portion of them bear a tall, rank grass, which shows that it is often inundated, and that the soil is constantly saturated with moisture. Lakes George, Monroe, Jesup, Harvey and Poinsett, are fine sheets of clear water, of no great depths, but generally free from aquatic vegetation. They all abound in fish and wild fowl.

Fort Taylor, (a mere stockade like all the other forts in Florida of recent origin,) which was built a few miles above Lake Poinsett, three hundred and fifty miles or more from the mouth of the St. John's, is the highest point to which the army boats ascended. Above that post, the river narrowed and shoaled, so as to become useless for all purposes of transportation. The army there took its course southwardly, reaching the head waters of the St. John's, some seventy or eighty miles S. S. E. The source of this river has been in question up to this time, having been supposed to be connected either with the everglades or the sea. Both of these suppositions are now at an end. The strip of land between the coast and the St. John's, as far south as Cape Florida, has been sufficiently explored, to determine the fact, that it has no channel connexion with the sea in that quarter; and it has been equally ascertained, by various army movements, that it is also without a like connexion with the everglades or the lakes, to the west and south-west. In rainy seasons, when the water overspreads nearly the whole country, the St. John's may be connected in a diffused way with both sides. Fall and spring rains, when they come, elevate the river sometimes many feet, as would appear by marks on the banks. The last two or three seasons, the difference has been from two to three feet. The low stages are, at midsummer and midwinter and when the periodical rains happen to fall, or are only moderate, the subsidence must be very great. It has been remarked by the Indians, that all the waters occasionally drain out. This may be an exaggeration; but such a result, nearly to the extent expressed by it, might easily be supposed to follow a year of drought, the St. John's being evidently dependent for its supply on the tides below and the rains above.

The interior of Florida, south of Lake Monroe, was scarcely known, until the present war. It was assigned by conjecture and common report, to the "everglades," an indefinite and comprehensive term, which means neither land nor water, but a mixture of both. These supposed everglades, have been much circumscribed by late examinations. They have lost, at least, one or two degrees of latitude. Okachobee Lake, a body of water of some forty miles in diameter, and of a decided lake character, and the lands east and west of it, can no longer be thus classed. The lake south of this, reported to be still larger than Okachobee, called by the Indians, Pai-hai-okee, or grassy lake, may prove, on examination, the true everglades. But it is now about as probable, that even this, their last hold, will be found to partake of the general character of that part of the peninsula, and that land and water will then have its usual divisions, so far as a sandy country of unusual flatness permits. The name which the Indians have given the lake, shows that it must be generally so shallow as to allow grass to predominate; rendering it probable, that it has a less decided lake character than the lakes above.

It was until lately taken for granted, that the interior of Florida was without any eminent parts, but the army movements have opened to obser-

* This is a mistake. The seeds of the mistletoe are not *winged*, or capable of being conveyed to other trees by the winds. But their diffusion and propagation are as well secured by another curious and admirable provision of nature. The seeds are enclosed in berries, filled principally with a glutinous pulp, and which form food for certain birds. In eating the mistletoe berries, the glutinous matter and the seeds contained, which adhere to the outside of the bird's beak, are wiped off, on any branch on which it afterwards perches. By this operation, the seeds are stuck to any other, and often to distant trees, where they sprout and take root; and the manner of the deposite is the cause why the mistletoe more often than otherwise is rooted in the lower side of the limb, as a bird most conveniently wipes its beak on the lower side of the branch on which it stands.—Ed. Far. Reg.

vation, some sandy ridges or hills of considerable elevation. These are not far from that central region where the waters diverge to different sides of the peninsula. The course of the various streams which take their rise within these central parts, marks out the character of the slope, running north-west, south-west, south-easterly and northwardly. The Onithlacoochee, Pease Creek, Kissimmer, St. John's, and the waters emptying into the Indian River lagoons, all illustrate this central elevation, and general inclination towards the coast.

One of the striking features of the coast of Florida, is the lagoons, as they are termed, or long and narrow bodies of water, separated from the sea by a strip of sand, generally not more than a mile or two wide. They are connected with the sea here and there by inlets, which are made and kept open by the out-rushing or in-rushing tides, as they happen to prevail. The outward current is that which chiefly prevails, from the most natural causes. Accumulations from rains, must give a great preponderance to the inner waters, which, however, may, in the course of a dry season, drain out to a level with the outer waters, when the drift of a storm blocks up, at least for a time, the usual passage, and so it remains until the balance of force is turned by new rains.

This alternate operation of counter causes, explains the fact well known by those who frequent this coast, that these inlets are at one time very accessible, and at others, nearly or quite closed up. These lagoons extend from above St. Augustine to Jupiter inlet, a stretch of three or more hundred miles, with but a few miles interruption by land. Their common depth is several feet, though they all are traversed by shoals or bars, which reduce their navigable facility to about three feet. These shoals, however, could easily be made passable for useful purposes. It has been proposed to connect the river St. John's by a canal with the Matanzas river, separated by about ten or fifteen miles; the Matanzas with the Halifax, twice that distance, perhaps, apart. Between the waters of which the Musquito inlet is the embouchure, and those of the Indian River, there is only a narrow neck of about half a mile. Such a project would open an interior navigation from Charleston to Jupiter inlet; and below Cape Florida it is well known that a practicable and sheltered channel runs around the peninsula, within the "keys."

The mangrove tree is a conspicuous embellishment of the Indian River lagoon. Being of an aquatic character, these trees, by a happy provision of nature, are radicated to suit their thrifty habits, not unlike the long-legged species of birds which are fitted for the water; they stand with their trunks lifted several feet in the air, sending out roots from that elevated point, like so many bow-legs, to seize the earth or water below, with a base often as wide-spread as the branching head above. Then, again, as if these roots could not drink moisture enough to satisfy their cravings, each branch sends down many a slender tube perpendicularly to the water, like so many syphons to draw it up. The foliage is of the brightest green. Altogether, a mangrove thicket is a most attractive object to the eye. These thickets sometimes shoot out a spur into the lagoon, resembling just above the water a fisherman's weir-net, but surmounted by a most redundant foliage, and almost closing up the channel.

The bars at the mouths of the lagoons are an obstruction to the commercial facilities of Florida. The entrance to St. Augustine harbor is perhaps the best on the coast, and, with proper attention to the tides and winds, is safely practicable for vessels of light draft. The drift of the ocean, which in this quarter is strongly charged with alluvion, heaps up the sands along the coast, constantly changing their position, with, probably, a gradual augmentation. The inlets would share the common fate, and be closed up, if it were not for the outsetting currents, arising either from the tides, or the accumulation of waters within. These causes, with partial exceptions, keep open a channel, but cannot preserve it in one place. The bar off St. Augustine has widely shifted, being now nearly one-half the points of the compass to the north of its position, within the memory of living pilots. Those of the more southern inlets are less practicable, excepting that of the Musquito. The channels are known only to those who are habitually upon them. A fearful looking surf is always coursing over them, when a wind is blowing with freshness, which renders them formidable to strangers, while those who are accustomed to them, pass through it with little real hazard. The evil, however, is a great one, and apparently irremediable.

The rivers of Florida, though of no great length, are, generally, of a most convenient depth. The banks are bold and firm. Those which empty into the lower part of the St. John's, are fitted for any craft that comes into the main river, or have no impediments in the way, excepting what arise from fallen trees. There is no current to change their character, which belongs to a level country.

The botany of Florida was early examined by the Bartrams, and Audubon was some time among its birds, which are rich in number and variety. Many anecdotes are told of the latter, showing the patience with which he kept his station in swamps and marshes, in order to ascertain the habits of the feathered creatures there, in spite of musquitoes, reptiles, and other intolerable annoyances. Doct. Leitner, who was killed in a skirmish with the Indians, this campaign, (1838,) is said to have been a skilful botanist, and an ardent votary of science. Accompanying a portion of the active force, he would have had uncommon opportunities for observing the plants of the southern interior, which, probably, came little within the scope of the Bartrams, whose investigations were mostly, if not altogether, on the river St. John's and the coast. He had already made considerable advances towards the object he had in view, with a most flattering prospect before him, when he fell in the honorable performance of his duty.

The orange tree has been extensively cultivated in Florida, since its first occupation. The Seville or sour, and bitter-sweet orange, are apparently indigenous to the country, as many groves of both are now found flourishing, where no labor of man would seem to have placed them. The China, or sweet orange, is probably an exotic. These were found, not only around nearly every house in the country, but occupying a part of nearly every garden in the towns. They were an important article of commerce. The oranges of Florida excelled all others in the northern markets. More than two millions, were annually shipped from St. Augustine alone. One tree there is said to have produced six thousand in one year. But this staple of the country was cut down in one night, in 1835. A severe frost occurred in the time of Bartram, (1765,) which killed the lemon, citron, and other tender trees, but only partially injured the orange. There were trees standing in 1835, more than a century old.

This calamitous event, besides destroying one of the principal sources of revenue of St. Augustine, divested the place of its chief ornament. Each lot became, as it were, denuded of its drapery, which had been thrown over every building, high and low, giving them all a borrowed beauty. A person who was absent at the time of the frost, in revisiting the place, could scarcely recognize the most familiar scenes, their aspect was so entirely changed. It takes about seven years to renew the orange tree to a bearing state.

Cotton and sugar grow well in Florida, but silk will probably be the staple of the country after a few years. The mulberry tree, multicaulis, &c., grow there with a vigor and luxuriance that have no parallel in the United States. More than eight months in the year afford a fulness of food for the worms.

The soil of Florida wears a forbidding aspect. Sandy barrens form the principal part of the surface. Hammock land, that which bears the oak, maple, and other "hard woods," and which are the richer and more productive parts, constitutes but a small proportion. But the sands of Florida are but in part siliceous. They are probably for the most part comminuted shells or lime-stone. Hence they have a degree of fertility which often surprises those who undertake their cultivation. The surface, however, is so level, that it is liable to the extremes of drought and inundation. In riding from the St. John's to St. Augustine, a distance of eighteen miles, the road will be found, after a moderate rain, one-half or two-thirds under water, which is carried off more by evaporation than by subsidence; and this is a sample of the country in general.

The yellow pine, pinus palustris, is a conspicuous tree in Florida, both on account of its lofty symmetry, and its adaptation to many useful purposes. It affords tar and turpentine in inexhaustible abundance, and is an equally inexhaustible material for lumber. Whether it be the only growth the soil can yield, or merely a pre-occupant, as in many other parts of the country, giving place, when removed, to a species of hard wood, is, perhaps, not yet ascertained. It is propable, however, that when this tree shall be cut down, and fires, scorching the whole face of the country, shall cease, the growth of the forest lands will assume a better aspect, and that the soil will improve in a corresponding degree. It is the fallen tree of this pine, which furnishes the Indian with his "light-wood;" a source of comfort and convenience that strongly attaches him to the soil which produces it. The fuel formed from these prostrate trunks, is at hand on every spot, and is easily ignited, making, in all weathers, a bright and durable fire. The nights of Florida are almost invariably cool, and the facility with which the Florida Indian can temper their chilliness, by means of this ready and combustible wood, is a conspicuous item in the privileges of his life, the great design of which is to attain desirable objects with the least effort. Our troops, in the late campaigns, have been equally indebted to it for many a comfortable encampment, as, even in the midst of heavy rains, a brilliant fire might be kindled, which, with due care, no rains could extinguish.

The hammocks at present are generally secure from encroachment from the barrens, being mostly covered with a dense growth of trees, which preserves them from change. But, whenever the time arrives in which they shall be cleared up, and become exposed to external influences, it is not unlikely that the surrounding barrens, clothed in a soil of such levity as to be acted upon by winds and rains, will gradually overspread these comparatively small spots on the surface of the country, and reduce nearly the whole to one general character.

The waters of Florida abound in fish. Even the upper parts of the St. John's afford a large supply of very tolerable quality. But the lagoons of the coast have not only an abundance of the finest fish, but also of the finest oysters. The oysters of Indian river are surpassed by none, in size or quality, on the Atlantic coast. Want could never approach the inhabitants of that region.

The present war, during which the Indians have been too much harassed to attend to seed-time or harvest, has turned attention to the class of indigenous esculent vegetables, which, by their spontaneous abundance, have, through the extremities of this period, afforded them ample means of subsistence. The most conspicuous among these are the red and white coonta roots. The first is the China-brier, or *Smilax china*, a vine of great thriftiness, spreading sometimes over the space of more than a hundred feet, with roots like a large, long and irregular potato. The white coonta is the *Zamia integrifolia*, which has a full tap-root, rounded with the symmetry of a boy's top. The leaves are large and fern-like, forming, when the seed-bud is in its fulness, a handsome plant.

Both of these roots are grated or bruised by the Indians, and the starch separated, by frequent changes of water, from the fibrous or woody parts, as also, in the white coonta, from a poisonous quality which is combined with it in its natural state. The flour of the latter has the look and feel of arrow-root, and is equally nutritious and well suited to weak stomachs. The flour of the China-brier is of a reddish hue, and more easily obtained than the white coonta.

These two important articles of food are found in abundance, the one or the other, in most parts of southern Florida; the China-brier in nearly all the hammocks, and the Zamia in most of the barrens along the coast lagoons. Thousands could subsist upon them, with only the labor necessary to gather the roots and prepare the flour. Previous to the war, one or two persons were established near Cape Florida, who manufactured the white coonta in large quantities for shipment. Medical men often prefer it, for hospital purposes, to the arrow-root.

The palmetto is often called the cabbage-tree, from its containing an edible substance within its top, which somewhat resembles a cabbage—more in look, however, than in taste, which is not unlike that of a raw chestnut. Where the fan-shaped leaves of this beautiful tree put out at the top, is found unfolded a pith, forming about one-third of the diameter of the trunk, and about 12 or 15 inches long, which is of an eatable quality, particularly when boiled, or preserved as a pickle. It is true, a tree some half-century old might be sacrificed to the attainment of a single meal; but these trees are abundant, and no doubt have often afforded one to a roving Indian, who sat down hungry and unprovided beneath their shade.

But the necessities of the war now going on, have opened a new resource to the Indians, or which, at least, does not appear to have been used by them in more abundant times. This is found in the root of the *saw-palmetto*, a singular species of most common vegetation in Florida, which overspreads nearly every pine-barren, covering it like a vast reticulated carpet. In passing over these barrens, the palmetto leaf is seen shooting up from the ground in great luxuriance, forming, as is found on close inspection, the termination of a recumbent cabbage-tree, several feet long, and probably half buried beneath the surface, or deciduous vegetation. Lying constantly on the ground, it never acquires the bony hardness of the exterior coat of the upright cabbage-tree, but is covered with a fibrous hairiness, which gives it almost the softness of silken plush, prevailing through every fold, to the very heart, excepting within a few inches of the end, where is found a nutritious pith, smaller than, but not unlike, that of the cabbage-tree. This is bruised into meal, and made subservient to the purposes of food. These roots spread, as we have before remarked, over nearly every barren; and, since a portion of them is convertible into food, there can be no limit to the spontaneous subsistence of those who frequent them. The leaves or foldings of this root are thin and pliable, several inches long, and three or four wide, and are worked into many articles of ornament and use.

There is also found in Florida a wild potato, of tolerable quality, and much wild fruit. Game of all kinds is abundant, and wild fowls are numerous on every stream and lake. The Indians, in Spanish times, were accustomed to herd cattle largely, and at the commencement of the present war, they are said to have had thousands.

From this enumeration of the articles of food which present themselves spontaneously to the wants of the Indian, it will be seen that they are little dependent on care, foresight, or labor, for subsistence.

The mineralogy of Florida is scanty. The rocks found in situ are all calcareous, though siliceous boulders, of a small size, are occasionally seen, and nodules of hornstone are here and there mingled with the limestone, which elicit sparks, and are sometimes used by the Indians for flints.

The geology of Florida presents many interesting features; but it has as yet been examined with little attention, warranting few definite conclusions. The coast, as far as Cape Florida, is alluvial, a seeming mass of comminuted shells, resting on a rocky formation, composed also of shells, more or less broken and abraded. From Cape Florida, the formation is mostly coralline, the Keys being of that character. The shells around the Keys are found in nearly a perfect state. Take up a handful at random, and it will exhibit little else than fragments of coral and univalves, generally of a small size, and diminishing almost to a point. As high as Indian River Inlet, the beach is still formed of shells, though less distinct and perfect in their form, mingled with some sand; while about Cape Carnaverel the sand predominates, until shelly fragments almost disappear to the naked eye. Still, it seems probable that the whole beach is of a calcareous character.

The coquina rock (as the Spaniards called it) is a formation found in the spits of sandy land which separate the lagoons near the coast from the sea. It has been quarried in Anastasia island, for more than a century, affording a material for structures of all kinds in St. Augustine, worked with uncommon facility, and of a durable character. A large fort, of Spanish construction, at that place, is of coquina. In latitudes where there is little or no frost, it is, perhaps, the best material that can be used in fortifications; being firm enough to sustain the form of any work, and receiving a shot like a plastic mass, exhibiting no fracture, and throwing off no splinters.

The quarries near St. Augustine are generally about ten feet deep. The profile of the strata, as presented to the eye there, exhibits, first, a superficial covering of vegetable mould; next, a stratum of shelly fragments, quite small, and without any distinctness of character, with no cohesion. This stratum varies much in thickness, according to the undulations of the surface, being generally from two to three feet. The next in the descending series is a stratum of several inches thickness, composed of similar shelly fragments, but united in a mass by some cement. Then intervenes a stratum of sand, an inch or two in thickness. Immediately below this sand is a stratum of shelly rock, between two and three feet in thickness. This stratum is formed of shells in various states, the upper several inches being much like the stratum above, that is, of small and indistinct fragments, when, for several inches more, it assumes a new character, many of the shells being perfect in their outlines, and only much abraded, and most of them of a size to give some clue to their species. The interstices in this portion of the mass are large in proportion to the size of the shells, and the cement which holds them together is hardly visible. Bivalves, cockles, of the cardium species, predominate, while here and there is found a conch of large size, as also oyster fragments. Some of these conchs are several inches in length, though much worn. This coarse and comparatively unbroken deposite has a substratum, with which it is equally closely joined, like that superimposed. A thin stratum of sand next succeeds; and then a third stratum of shelly rock, about two feet and a half thick, the component parts of which are in a state rather more comminuted than any lying above. This stratum is likewise of a more solid and uniform character than its associates, and gives the largest blocks for building purposes. A sandy stratum is found below this, and, so far as an examination has penetrated, a coquina formation descends no lower.

All these strata are firm concretions, their component parts being obviously conglutinated by a calcareous substance, which holds them well together. This foreign substance, or cement, is quite visible in the finer formations, though little seen in the coarser. Taking up a piece of the latter, the cause of cohesion is apparently so slight, that one is surprised that the mass does not crumble at a touch.

It is a common conjecture that the coquina is of recent formation, and that causes are still operating to produce it. This conjecture has some apparent and plausible grounds. It wants, however, the support of deeper investigation into the character and force of these causes. Fragments have been constantly heaping up on the coast, portions of which have been long lying in a quiescent state, without exhibiting any evidences of a change, or a tendency to one, particularly of a change from a loose to a concrete state. The upper stratum of the quarries we have been describing, would be likely to assume the character of the strata below, if such a change were in progress. But the century, during which it has been subject to observation, has witnessed no alteration. The fragments all lie in a separated state, without showing any signs of cohesion.

It has been surmised, that the animal matter of the shells might have furnished the element of cohesion. But this surmise would seem to be at once disproved by the condition in which the shells were found, when the concretion took place. It is evident that they must have been subjected to a long and severe process of attrition and contusion, previous to that event; such a process as must have widely separated all animal matter, from its former covering. Besides, there is no reason for supposing, that this animal matter, even if it had existed in connexion with the shells at the time the rocky formation occurred, could have produced the effect assigned to it.

A more probable conjecture is, that the shells themselves, by some chemical exertions or agency, which operated in connexion with their partial dissolution, furnished the bond of union among the fragments, though not in a way that leaves the same agency still in operation. These different strata are evidently so many distinct deposites, probably at different and distant periods; broken shells thrown up or spread over a certain space, and no doubt converted at equally different and distant periods into solid masses, either by sudden or gradually operating causes, ceasing with their effect. Such a hypothesis is in harmony with our notions of other formations of rock.

There are appearances of shelly formations on the St. John's, particularly the upper parts of it, but the shells are of a different character. Scarcely a bivalve is seen on or near that river, either loose, or in rocky connexion. The prevailing shell there, is the helix, while univalves are as rare in the formations on the coast. The soil at Volusia and Fort Mellon consists of half shells, which are generally perfect in their shape, the defects evidently arising rather from decay than abrasion or contusion.

The limestone does not show itself on the coast, nor on the St. John's until you reach Lake Monroe, where it is intermixed sparingly with shells. On Black Creek, west of the St. John's, a porous, rotten limestone appears, and this is said to be the character of the rock formations throughout the western part of the peninsula. Hence the many "surth-holes," deep and (some of them) unfathomable orifices in the earth, which appear in these regions, and the disappearance of streams for many miles beneath the surface of the earth, while others come forth in all their fulness at once.

The climate of Florida, during the six or seven months from October is truly delicious. The frosts are generally few and slight, leaving vegetation its verdure, and flowers their bloom, throughout the year. Such frosts as kill the tender trees or shrubs are of rare occurrence. Rains occasionally prevail during the winter months, but more commonly during the latter part of summer. Our troops have now been operating during three winters. Two of them have been decidedly dry. The first was rainy.

By a loose diary, kept in Florida, since the last October (1837) and continued through two hundred and fourteen days, more than one hundred and fifty of them, were decidedly clear and pleasant days; about forty somewhat cloudy or foggy; and about twenty rainy, but of these nearly one-half were single rainy or showery days, leaving only about ten which were of a rainstorm character. Musquitoes have bitten, and frogs have peeped throughout the whole time, though not always in the same numbers or with the same spirit.

It is perhaps a common impression, that there are some formidable animals and many venomous reptiles in Florida. The alligator is a clumsy, timid animal, never, it is believed, the assailant, unless it mistake a swimming boy, for its common prey. Scorpions, snakes, lizards, &c., are common upon the barrens, and our soldiers, in sleeping on the ground, often came in contact with all of them, and were often stung by the former, generally with unpleasant, but never with fatal consequences.

Invalids have long looked to Florida as a refuge from the northern winter, and during the disturbances of the last few years, St. Augustine has necessarily been the only place of resort. But when peace shall be established, and the St. John's re-occupied, that river will present many places of great attraction to the infirm and pulmonic.

From Loudon's Gardeners' Magazine.

OF THE ANALOGY BETWEEN PLANTS AND ANIMALS. BY J. A. W.

Many persons buy a plant and plant it in their garden, as they would purchase a piece of furniture and place it in a room, and fancy that the one requires no more after-care than the other; but, when they understand something of the nature of a plant, and of the manner in which it obtains nourishment; and when they perceive how cultivation operates on it; they will take a degree of interest in its growth and developement, that a person totally ignorant of these subjects can scarcely form an idea of.

Plants are organized beings, that, like animals, depend for their existence on nourishment, warmth, air, and light. Their nourishment they derive from the soil, their warmth and air jointly from the soil and the atmosphere, and their light from the sun. As all men may be presumed to know something of the nature of animals, perhaps the easiest way of giving some knowledge of plants to those who have hitherto paid little attention to the vegetable kingdom, will be, by first pointing out the principal points of analogy between plants and animals, and next noticing the structure and functions peculiar to plants.

Plants resemble animals in having an organic structure endowed with life, and in requiring nourishment to enable them to continue to exist. They absorb this nourishment through the small tubular fibres of their roots, in the same way as animals do theirs through the small tubes called lacteals, which convey it from their stomachs. Plants differ from animals in being fixed to one spot; in having the principles of vitality and reproduction diffused over every part, and in thus being propagated by division, as well as by ova, or seeds; in being without a brain or nervous system, and, consequently, incapable of feeling; and in light being as necessary to their existence as air is to that of animals.

The soil in which a plant grows is as essential to it as the stomach is to an animal. Food, before it can be absorbed into the system, must be reduced into a pulpy mass, consisting partly of chyle; or nutritious matter, and partly of refuse. This process, in regard to animals, is performed in the stomach, and is called digestion; and, when it is finished, the lacteals suck the chyle from the mass, and convey it to the lungs, where it is assimilated to the blood, and thence is distributed through the frame.

The food of plants is rotted, (a process similar to digestion) in the soil; and is there brought, by the addition of water and gases, to a sufficient state of fluidity to enable the spongioles of the roots to absorb from it the part necessary for the nourishment of the plant. It is then carried up to the leaves, where it undergoes a process similar to that to which the chyle was subjected in the lungs, and becomes true sap, which contributes to the growth of plants, as blood does to that of animals.

When a plant or an animal is in a state of disease, no application to the leaves and branches of the one, or to the external members of the other, will be of much use, if the soil or the stomach be neglected. The stem and branches of a plant, and the external members of an animal, may be injured, mutilated, and even diseased; but, if the soil and the stomach be invigorated, and placed in a healthy state, the whole plant or animal will soon recover from the injuries it has received, so as to perform all the functions necessary to its existence. The first step, therefore, in cultivating or in improving plants, is, to improve the soil in which they grow.

In all vertebrate animals, there is a part at the back of the neck, between the spinal marrow and the brain, where a serious injury will occasion immediate death. There is a corresponding point in plants, between the root and the stem, which is called the neck, or collar; and at this point plants may be more readily injured than any where else. Most plants, also, may be killed, by covering this point too deeply with soil. In all seedling plants, this neck, or vital point, is immediately beneath the seed leaves; and, if the plant be cut over there when in a young state, the part which is left in the ground will infallibly die. In old plants, however, and particularly in herbaceous plants, which have creeping stems, and in various kinds of trees and shrubs, the roots, after a plant has attained a certain age, become furnished with buds; and, when the plant or tree is cut over by the collar, these dormant buds are called into action, and throw up shoots, which are called suckers. No sucker, however, is ever thrown up by the roots of a plant cut through at the collar while in its seed leaves. The branches of a tree may be all cut off close to the trunk, and the roots also partially removed; but, if the collar remain uninjured, the plant, in a suitable soil, and under favorable circumstances, will throw out new roots and shoots, and, in time, will completely recover itself.

There are some plants of the herbaceous kind, (such as the horse-radish, for example,) that do not suffer, even if their collar should be buried two feet or even three feet; but by far the greater number of plants, (such as the hepatica, the common daisy, the common grasses, &c.,) are killed by having the collar covered two or three inches; and nothing is more injurious to woody plants, whether large or small. It is easy to destroy a large tree by heaping up earth around the base of its trunk; and easy to prevent a small one from growing, by lifting it, and planting it six inches or one foot deeper than it was before. Hence the great importance of not planting any plant deeper in the soil than it was before taking it up. The cause why plants are so much injured by burying the collar has not, as far as we know, been physiologically explained; but it probably proceeds from the want of the action of air on the collar, or on that part of the stem which is immediately above it; or from the pressure of the soil upon that vital part.

The next point of analogy between plants and animals, which it may be useful to notice, is that between the lungs and the leaves. An animal can no more live without its lungs than without its stomach. The stomach, as we have seen, is necessary for the turning of food into chyle, and the lungs for turning that chyle into blood. Now, a plant can no more live and grow without leaves, than an animal can without lungs. The use of the lungs is to expose the chyle to the action of the air, which they decompose, so that its oxygen may unite with the chyle, and thus change it into blood. The leaves of plants, which act to them as lungs; not only decompose air, but light, in the process of elaborating the sap; and, hence, plants can no more live without light, than without air or food, as light is necessary to turn their food into sap, or, in other words, to bring it into the proper state for affording them nourishment. Hence, in the culture of plants, the great importance of light. An important difference, however, between the circulation of the sap in vegetables and the blood in animals, is, that the former have no heart.

Plants and animals agree in requiring a certain degree of temperature to keep them alive; and the warmth of this temperature differs greatly in the different kinds both of plants and animals. Hence, the constitutional temperature of any plant to be cultivated being known, that temperature must be maintained by art; either by a suitable situation in the open air, or by its culture under a structure which admits the light, and is capable of having its atmosphere heated to any required degree. The temperature which any plant requires is ascertained by its geographical position in a wild state; making allowance for the difference produced in the habits of the plant by cultivation.

Plants agree with animals in requiring periodical times of rest. In animals, these periods are, for the most part, at short intervals of not more than a day; but, in plants, they are commonly at long intervals, probably of a year. In warm climates, the dormant period of plants commences with the dry season, and continues till the recurrence of the periodical rains which are peculiar to the tropical regions. In temperate countries, the dormant season in plants commences with the cold of winter, and continues till the recurrence of spring. When plants are in a dormant state, they commonly lose their leaves, and, consequently, at that season, they are unable to make use of the nourishment applied to their roots; and hence the injury done to them when they are stimulated with nourishment and warmth, so as to occasion their growth during the period at which they ought to be at rest. Hence, also, arises the injury which plants receive, and especially bulbs, if the soil about them be kept moist by water when they are in a dormant state. Plants having no feeling, in the common sense in which the word is used, can neither experience pleasure nor pain; but they resent injuries, either negative or positive, by slow growth, or by becoming diseased. By their being fixed to the spot where they grow, they necessarily depend for their food, heat, air, and light, on the circumstances peculiar to that spot; and, hence, to increase their growth beyond what it would be if left to nature; additional food must be brought to them, and the warmth, airiness, and lightness of the situation increased. Hence, what is called vegetable culture; which consists in stirring the soil, adding manure to it, regulating the supply of water by draining or irrigation, sheltering from the colder winds, and exposing to the direct influence of the sun's rays. If we imagine any one of these points attended to, and not the others, the plant will not thrive. Stirring the soil, and mixing it with manure, will be of little use if that soil be liable to be continually saturated with moisture, either from its retentive nature, from springs from below, or from continued rains from above; or if it be continually without, or with very little moisture, from its porous nature, the want of moisture in the subsoil, and the want of rain and dews from the atmosphere. Improving the soil without improving the climate, (that is, without communicating a proportionate degree of warmth and light,) will increase the bulk of the plant, but without proportionately bringing its different parts to maturity. For example, we will suppose two plantations of trees planted at the same time, on similar soil, and in the same climate; that in the case of the one plantation the soil was trenched and manured, and in the other not; and that the trees were planted in equal numbers in both plantations, and at the same distances. The trees in the prepared soil would grow rapidly, and in the unprepared soil slowly. After a certain number of years (say twenty), we shall suppose both plantations cut down; when the timber produced by that which had grown slowly would be found hard, and of good quality; while that produced by the plantation which had grown rapidly would be found soft, spongy, and, when employed in construction, comparatively of short duration. The reason is, that in this last case the rate of nourishment to the roots exceeded the natural proportion which nature requires in plants, between the supply of food to the roots, and of light and air to the leaves. Had the trees in the prepared soil been thinned out as they advanced, so as never to allow their branches to do more than barely touch each other, they would have produced a great deal more timber than the trees on the unprepared soil, and that timber would have been of equal firmness and duration with timber of slower growth. It ought, therefore, to be strongly impressed on the minds of amateur cultivators, that though nourishment of the root will produce bulk of the top, or, at least, length of top, yet that it is only by abundance of light and air that quality can be secured.

One very remarkable point of difference between animals and plants is, that which has been before alluded to, the much greater provision which nature has made for the propagation of the latter than of the former. Plants not only produce immense quantities of seeds, which are distributed by the winds and waters, by animals, and by various causes: but they extend themselves by shoots, which run on or under the surface of the ground, as in the case of the strawberry, the raspberry, &c.; and they produce buds, each of which, by human art, can be rendered equivalent to a seed, either by planting it (with a small portion of the plant from which it is taken) at once in the ground, or by inserting it in another plant of the same family. Hence, the great facility with which plants are multiplied both by nature and art; with the exception of a few, in which the process of propagation by artificial means is comparatively difficult.

Another remarkable difference, also before alluded to, between plants and animals is, the absolute necessity of light to plants during the whole period of their existence. There are many animals of the lower description, such as worms, to which light, so far from being necessary, is injurious; and there are instances of even the more perfect animals having lived for several years without the presence of light, either natural or artificial. Light is not necessary for either the functions of the stomach, brain, or lungs, in animals: but in plants, though it is equally unnecessary for the functions of the root and the collar, it is essentially so for those of the leaves; and the leaves are necessary to the elaboration of the sap, and, consequently, to the nourishment of the plant. A plant, therefore, from which the leaves are continually stripped as soon as they are produced, soon ceases to live. Small and weak plants, from which the leaves are taken off as they are produced, will die in a single season; and this practice, continued for two seasons, will kill, or nearly so, the largest tree. If, instead of stripping a plant of its leaves, the leaves are produced in the absence of light, and light never admitted to them, the effect will be precisely the same. Seeds germinated, or plants struck from cuttings, in the dark, will not exist a single season; nor will trees, or tubers, such as the potato, placed in an apartment from which all light is excluded, live more than two seasons. Hence, the importance of light to plants can scarcely be overrated; for, while it has been proved that plants, even of the most perfect kind, will live for many months, or even years, in glass cases in which very little change of air has taken place, there is no instance of plants, even of the lowest kind, such as ferns and mosses, living for any length of time without light. Without light, there can be no green in leaves, no color in flowers, and neither color nor flavor in fruits.

Plants agree with animals in having a sexual system; but they differ from animals in having for the most part both sexes in the same individual. In the improvement of plants, as in the improvement of animals, the sexual system is a powerful agent; and what is called cross-breeding is employed with as great advantage in the vegetable as in the animal kingdom. It is remarkable, that the general laws and results by which the process of cross-breeding in both kingdoms is regulated are the same: the two parents must be two varieties of the same species, and their qualities may be different, but must not be opposite: the preponderating influence, in point of character, is also with the male, and in point of bulk and hardiness with the female, as it is in animals. Many of the finest varieties of fruits, culinary vegetables, cereal grains, and grasses, have been produced by cross-breeding. When cross-breeding is effected between what are considered different species, the offspring is a mule, or hybrid; is incapable of maturing seeds; and generally, in the course of a few years, degenerates, or reverts to its original parentage. The purple laburnum, which was raised from a seed of the common laburnum, fertilized by Cytisus purpureus, is an example of a true hybrid. The flowers partake of the color of that of both parents; and the plant, for two or three years, produced only flowers of this kind, which were never succeeded by seeds: but in the sixth year, in some plants, and seventh and eighth in others, branches of Cytisus purpureus were produced on some parts of the tree, and branches of the common yellow laburnum on others, the latter bearing seed. (See *Gard. Mag.*, vol. xii. p. 225; and *Arb. Brit.*. p. 590.) It thus appears that a true mule, or hybrid, can with difficulty be propagated, even by portions of the plant, or by what is called extension; since it never can be certain whether the portion taken off for propagation will produce the mule or one of the parents. As it is uncertain what are, and what are not, very distinct species, many of these plants originated by cross-breeding, and considered mules, may not be so; and may, consequently, prove permanent and improved varieties. Some mules, also, such as that between the sweet-william and the common pink, are much less liable to degenerate than others. As some of the most beautiful and useful plants in cultivation are cross-bred varieties, or mules, the subject well deserves the attention of the amateur, who will find it a source of useful amusement and recreation.

Plants agree with animals in the offspring, when it is raised from seed, bearing a general resemblance to the parent; but as, in every family, the children of the same parent differ individually in feature, temper, disposition, &c., so, among seedling plants from the same seed-pod, no two plants will be found exactly alike; and some will occasionally differ considerably from all the rest. Nevertheless, it is an undoubted fact, that all seedling plants not only possess the character of the species from which they have sprung, but even, in by far the greater number of cases, some of the peculiarities of the individual. The seeds of any kind of cultivated apple, for example, will produce plants, the fruit of all of which will more or less resemble that of the parent; though perhaps some one or two among a hundred may be considerably different. Hence, by selecting from beds of seedling plants those which are in any way remarkably different from the rest, new varieties are procured: and, till within the last half century (when artificial cross-breeding began to be practised by gardeners), this was the only way in which an improved variety of any species of plant was procured.

Plants, like animals, are subject to various diseases, as well as to be preyed on by insects, most of which live on plants till they have completed their larva state. Plants are also injured by being crowded by other plants, either of the same or of different species. When these spring up naturally around the cultivated plants, they are called weeds, and the cultivated plant is cleaned from them by weeding; as it is in the case of being crowded by its own species, or by other cultivated plants, by thinning. Plants are also injured by epiphytes, which grow on their outer bark, such as mosses and lichens; and by parasites, which root into their living stems and branches, such as the dodder, mistletoe, &c.

The life of plants, like that of animals, is limited, but varies in regard to duration. Some plants vegetate, flower, ripen seed, and die, in the course of a few months, and these are called annuals; while others, such as the oak and some other trees, are known to live upwards of a thousand years. In both plants and animals, decay commences the moment the life is extinct; and in both they are ultimately resolved, first, into a pulpy or other homogeneous mass, for manures, and ultimately into certain gases, salts, and earths. After death, the decay both of animals and plants may be retarded by the same means; viz. drying, exclusion from the air, or saturating with saline or antiseptic substances.

Hampstead, July, 1838.

THE MILK-SICKNESS OR PUKING-COMPLAINT.

[The subject of the following article requires the aid of the botanist, as well as of the physician, for its investigation and remedy. Even if the particular plant which causes this fatal and wide-spread disease has been really discovered, the knowledge of it will not be extended so far in ten years, by means of such description as is given below, as it would in a month, by being recognized by a botanist, if old, or named and described by one, if it is a new, and, as yet, undescribed species or variety.

There has lately been passing through many (if not most) of the newspapers of the United States, as if a statement of recent facts, an account of the ravages of the "milk-sickness" in a particular neighborhood on the Wabash. It should have been given (if at all,) as an old account. Precisely the same article was republished more than five years ago, in the Farmers' Register. See page 319, Vol. I.]

From the Genesee Farmer.

Mr. Tucker.—I promised, some weeks ago, to give you a brief sketch of the "milk-sickness or puking-complaint," as it is called, that prevails in the west in many places. There never was a disease in any country, where there were so many conflicting opinions respecting the cause. This disease is fixed in the stomach; a fiery burning sensation is felt in the lower region of the stomach, accompanied with a constant desire to puke—the glands are affected; and as the bowels become torpid from the poisonous matter making a lodgment on the stomach and destroying not only the coats of the stomach but affecting all the digestive powers, it is almost next to an impossibility, in an advanced state of the disease, to procure a passage from the bowels. The cattle that have been opened present what is called the "manifold," with its contents as dry as a chip: a part of the substance taken as a nourishment digested, other parts again remaining as when first deposited; the whole region of the stomach having ceased to act! This, in animals, produces what is called the "trembles." The animals may live for weeks in this state, if not entirely overcome; but the attacks, in many instances, are not discernible until there is sufficient action or exercise to produce a circulation of the blood, when the poison diffuses itself throughout the whole system, and soon destroys the animal, and those of the canine or vulture race that prey upon the carcass are destroyed also.

Narrative.—The first persons in the west, that fell victims to this dreadful disease, were Mr. William Tompkins, an emigrant from my father's neighborhood, (Harwood County, Va.,) and a Mr. Bernard Fowler, brother of Maj. John Fowler, who for many years was the only member of congress from Kentucky, when that state was entitled to one representative only. The two persons were neighbors, and lived on Bank Lick Creek, a branch of Licking River, which empties into the Ohio, directly opposite to Cincinnati; they died about the year 1794 or '5. The disease frequently prevailed about the Forks of Licking, as the country was settled—on Raven Creek, another branch—on Eagle creek, a branch of Elkhorn. The next we heard of it was in divers places in the Green River country, so called, the southern part of Kentucky: frequently in divers other places.

As Ohio began to be settled in 1798, '99 and 1800, up to the years 1836, '7 and '8, this disease made its appearance on the Miamis—on the waters of the Scioto, particularly on some of the branches of Paint Creek. Becoming a residenter of Ohio in 1806, I discovered that the Rattlesnake Fork of Paint Creek, and the upper part of Big Darby Creek, were places most affected with it. Some places on Deer Creek, particularly within four or five miles west of London—also places on Mad River, vicinity of Springfield and Urbana. It again was found in different settlements towards the Muskingum; not confining itself to the *flat* regions of the Miamis, Scioto and other places, it had fixed itself in the hilly regions of Kentucky, on Licking and its tributary streams, and in like manner in the flatter region of the Green River country. So it was in Ohio, some portions of the rolling region of country on Hockhocking and of the Muskingum rivers, were afflicted with it also: and it has been subsequently felt in different parts of Indiana and Illinois.

The Cause.—Like others, for many years, my mind was bewildered as to the cause of this dreadful disease. My business leading me to visit every region nearly of the country in Ohio, I felt great sympathy for the afflicted, and an ardent desire to detect the cause. In 1807, I think it was, Col. Robert Rennick then living on the present site of Springfield, Ohio, an emigrant from the South branch of the Potomac, in Virginia, and a great cattle raiser, began to try experiments. His cattle took it, and he effected a cure, as he said, by administering to each steer a bottle of whisky, about a quart. Indeed, *Captain Whisky*, in those days, was almost a *King-cure-all*. But his remedy, in some instances, failed. He then turned out his cattle, let them range over the prairie and timber lands, and as the frost had nipped the green herbage, he followed his cattle to the timber lands, where he found them greedily stripping the foliage and browsing on a stubby and running vine: after eating this, and on returning home, the cattle took the "trembles." We have frequently springs running from high banks into larger streams, collecting from the savannas back, or from beds of vegetable or mineral substances, or the earth, poisonous matter; but this, I was fully satisfied, was not the cause of what is called the puking-complaint, or milk-sickness; for where it prevailed most, there never was purer or more wholesome water issuing from our mother earth. To Col. Robert Rennick's vine, I then began to direct my attention, and full 25 years were spent in making researches and trying experiments, and to go into detail would be too tedious and unnecessary. I found it necessary to lay all theory aside, and to go on *facts*.

Facts.—1. About 1816, a man living in Indiana on the Ohio river, bruised the vine, extracted the juice, gave it to a cat, and it killed it.

2. The vine grows in every region, where the milk-sickness or puking-complaint prevails. Where the vine is not to be found, there is no disease of this nature. This is a stubborn fact!

3. Calling to see a friend living on Darby Creek, in [illegible] whom I had not seen for twenty years, (M[illegible]loud,) in 1832, or '3, he pointed to his wife and remarked:—"She is my third wife, I am her third husband, and in yon graveyard lie 15 of our families taken off by the dreadful disease, the puking-complaint!" "And do you know the cause," said I? "Yes, we have found it out; it is partly a shrub, which, coming in contact with trees, ascends as a vine. I followed my cattle, found them eating of it, and soon taken with the complaint, and some unable to reach home." This awful astounding fact, having before fixed on the vine, led me to make a full disclosure in the papers, which set many doctors, both mineral and steam, by the ears.

4. While the doctors were discussing the subject, and some of them calling my facts in question, a warm friend of mine, John McNeil, Esq., of Frankfort, Ross County, Ohio, a very extensive farmer and grazier, determined on satisfying his own mind, sent out his son to purchase the healthiest steer he could find in the neighborhood, and, to get a good one, paid thirty dollars for it; he

gave the steer the vine, as he informed me; he ate it, and the next morning the steer was found *dead*.

5. Two purchasers of cattle, Messrs. Harrold and Harrod, living in the corners of Clark and Fayette Counties, on the head waters of the Little Miami, I think, had purchased about 120 head: The drove was divided, 60 were placed in a meadow that had been kept clear of shrubbery and vines, and 60 put into an adjoining enclosure, taking in some woodland. The cattle were fed on the same hay and watered from the same well—most of the 60 enclosed in the woodland died. It was winter; snow was on the ground; it was discovered that these cattle had eaten the vine down to the very roots! So this was a *stubborn fact*.

6. A man not far from the same vicinity, by the name of Allen, had a horse that broke out of his enclosure, and ran off into the barrens; he trailed him up, found him browsing on the vine, and had eaten a considerable quantity of it: being vexed at the animal, he caught him and mounted him and rode him home at full speed; this heated the blood of the horse, he took the "trembles," and died!

I could still proceed with statements of facts of like nature; but will in place thereof give—

Vouchers.—The following papers a few minutes ago I laid my hands on, by overhauling some old papers. They have been before published in Ohio, but now taken are from the originals:

I hereby certify, that my father settled upon the waters of Mad River, about the year 1801—that in harvest the cattle took the "trembles,"—that the country was settled some time before the cattle took the "trembles"—[range first eaten on,]—before this "the puking-complaint" was not known among the people—that in cases of cattle having the "trembles" and dying, the manifold of the paunch was dried up—that believing the complaint to be caused by a poison vine, we looked for it, took some of it, and gave it to a calf, and the next morning, (after eating of it,) it took the "trembles." Each of us chewing some, (myself and father,) and it caused the water to run from our stomachs, and we were seriously affected by it; we did not swallow the juice. No one in the country believed it to be the water that caused milk-sickness. The vine described by Mr. Th. S. Hinde is the vine referred to by me.

W. Taylor.

Champaign County, Ohio, Aug. 19th, 1833.

We state, that Thomas Parker, a neighbor of ours, from the information given by him, had a cow that, after eating the vine, died. Our father's cattle also died after eating of it. Mr. Schoonmaker and a part of his family died of the puking-complaint. Mr. S. gave a dog a crock of cream, he ate it and it died. The crows, ravens and buzzards that ate the carcass of the cattle of Mr. Schoonmaker died. Our brother, T. Taylor, lives at the place—the water is pure and wholesome.

Wm. Taylor.
August 19th, 1833. S. Taylor.

I do hereby certify, that I lived in Clark county, Ohio, for sixteen years—that I had been uniformly of opinion that the water drank by the cattle was the cause of the milk-sickness or puking-complaint. Having been told to the contrary, and that it was the eating of the poisonous vine produced it, I did not believe it. I then ate a handful; the next day I was attacked with puking, and sick a month; Dr. Neadham of Springfield, attended on me, and I recovered. I now live on Lewis's Reserve, Logan County. James M'Manna.

August 11, 1833.

Description of the vine.—1. It grows as a shrub, somewhat resembling a hickory or buckeye bush; when not attached to a tree, grows bunchy or bushy at the top. It is also found clinging to fallen timber, old rotten logs, in wet places, near the edge of ponds, creeks and hollows of hills, frequently around stumps along the road, and sometimes in pastures or meadows. It has a singular leaf with one or two notches or saw teeth on each side.

2. As a vine when it attaches itself to a tree, it runs up as a creeper attaching itself to the body of the tree to a considerable height, and bears a berry, with a buff or brown coat, in bunches, and is minutely described as a vine affecting the vineyards of the Asiatics, and styled by the Arabs "*The wolf grape;*" and by Isaiah the "wild grape." I enclose one or two of its leaves for your inspection. Th. S. Hinde.

Mount Carmel, Ill., Sept. 29, 1838.

☞ The poison vine referred to uniformly has three leaves on a stem—the poison ivy *five*, and notched all round. The wild creeper or trumpet flower, a long stem and many leaves.

ADDRESS OF W. S. MORTON, PRESIDENT OF THE AGRICULTURAL SOCIETY OF CUMBERLAND, DELIVERED AT ITS ANNUAL MEETING, ON THE 12TH OCTOBER, 1838.

Communicated for publication in the Farmers' Register, by order of the Society.

Gentlemen—At our last regular meeting, it was determined, that we should, at each annual meeting, invite some gentleman at a distance, to come among us, and address us, on some subject connected with the great cause which has associated us. This resolution, could it be successfully executed, might be productive of much good. Besides the pleasure afforded from hearing such address, much valuable information might be obtained, and a refined and enlarged benevolence, so dignifying to agriculture, might be diffused. I particularly regret, that in this, our first annual meeting, we have failed to enjoy the aid of the highly qualified gentleman selected for this occasion. And I crave your indulgence, while I offer you, in connexion with this disappointment, only my own efforts at the fulfilment of an official duty.

It has been much the fashion of late, to eulogize the present age, for the amazing developements of the talent for discovery, which it has displayed. And, it has been almost equally common, to remark, that, while the other sciences and arts have been wonderfully improved, and new arts and sciences have suddenly sprung into existence, and risen, at once, almost to the summit of perfection, agriculture, as if depressed by its connexion with the earth, has grovelled in the beaten track of ancient usage, without improvement. While I cannot subscribe to the truth of the observation, at least to the full extent, I believe there are reasons, arising out of the nature of man and the constitution of society, which will account for, and excuse any delinquency in this noble pursuit.

In order to secure the utmost exertion of his faculties, man has ever needed the powerful aid of concentrated action, and to be stimulated by the hope of success. While governments have carefully encouraged and rewarded enterprise, in other pursuits—with a few honorable exceptions—they have either embarrassed agriculture, by awkward attempts to afford aid, or positively depressed her, by unjust exactions, or unskilful interferences with her concerns.

From the nature of most other pursuits, their votaries can easily assemble, either for the purpose of regulating prices, appealing to government for aid, consulting for their common good—or they can, with comparative facility, change the place of residence, and adapt their labors or commodities to the state of the market. While the scattered condition of agriculturists, the expensive preparations of internal improvement and other adaptations for their common benefit, the conflicting interests arising from locality, and the sacrifices connected with removal, render most of these objects almost unattainable. The nature of the employment too, requiring such multitudes to be engaged in it, in order to secure food for the race, while it also demands, for great success, such high attainments in science, from its votaries, constitutes another serious obstacle to its improvement.

For the highest success in agriculture, diligent study of its theory, and application to its practice are indispensable. It is true, that many very thriving farmers hold the former in great contempt. But the simplest operation in husbandry has its reason, or, in other words, its *theory*—and whether this is learned from books, derived from the instruction of others, or from personal observation, it is still *theory*, and leads to the practice. The reason why theory in agriculture has fallen into disrepute, is plain: those who make the greatest noise about it, are apt to be speculative, visionary men, who dream of deriving splendid profits, from the wildest schemes, while they have not the industry and perseverance to execute the simplest. The case is the same in all professions. Whenever they get filled with incompetent men, whose high pretensions are betrayed and their ignorance exposed, by their blundering performances, the undiscerning lose confidence in the science they profess, and prefer the boldest empiricism, provided it be not directed by *book-learned theory*. And, perchance, they may fare as well with the one, as with the other. But, sound learning, guiding a conscientious and diligent practice, in agriculture and all the other avocations of man, will always, eventually, secure the approbation and encouragement of strong-minded and judicious men. It is the doom of man to attain high enjoyment and profit, only by ardent and persevering exertion. From this, the agriculturist may not expect exemption. His profession, to attain the dignified station it may claim among the arts of men, should draw for its principles, from the whole round of physical sciences, from the purest morality, and the sublime truths of religion; requiring—for a thorough knowledge of it—perhaps a more arduous course of study and preparation than any other.

For the removal of evils and difficulties of a general nature, the formation of agricultural societies has been resorted to. These, if properly constituted and diligently attended, may effect much good, in the sphere of their action. But, from the nature of the case, they must, for the accomplishment of the grand purposes required by the general interests of agriculture, be entirely impotent. They, moreover, generally die in infancy, for want of nursing. It would be a waste of time, to remark upon the incompetency of our political legislatures, for this purpose. Nothing but the formation of bodies, for the special business, possessing both power and means—something like the Agricultural Board in England, or the Highland Society in Scotland—can be efficient. Such a body of men might be employed, among other things, in ascertaining and recommending suitable routes for roads and other channels of conveyance for the products of agriculture and manures for the improvement of the soil. The time is speedily coming, when the great benefit of lime, gypsum, bone-dust, poudrette, animalized carbon and many other new manures, will be generally admitted and desired. In the present miserable state of internal improvement in Virginia, it is no matter for surprise, that our husbandry should be so defective. From the splendid schemes of extended navigation and rail-ways, now in agitation, we, in this region, are likely to derive but little benefit. We need improvements more limited in their objects and extent. For instance, if a good rail-road, or even a turnpike, so nicely graduated and well constructed, that a good team might draw on it ten thousand pounds, were made from Lynchburg, or some more convenient point on the river below—along one of those fine ridges on the south or the north side of the Appomattox to Farmville, it would afford to some of the valley counties and several counties on this side of the Blue Ridge, a more extensive market for many of their commodities, such as butter, cheese, tallow, wool, honey, domestic linen, &c., while we might be enabled to procure lime for manuring on remunerative terms. Until lime can be procured, at a much lower price than it has heretofore commanded, and our roads and other means of transportation are vastly improved, and until a much greater proportion of our population are engaged in other than agricultural pursuits, there can be no hope of elevating our husbandry to the highest grade. For while these advantages are denied to us, we are almost compelled, as a body, to grow tobacco, for a market crop. This consumes more manure, and more time and attention, than any other. And the benefit of a meliorating rotation of crops, and of almost every other improving method of culture, is placed beyond our reach.

But, the consideration of these general matters, over which we have no control, may be waived, while we attend to those coming more particularly within our province.

Most of us cultivate, on the belt of gray hickory land, extending, in length—with a variable width—from about the mouth of Deep Creek, in Powhatan, to the head of Bush River, in Prince Edward. It is the region, for which the late John Randolph, of Roanoke, said, that God had done more to bless, and man more to destroy, than for any country he had ever seen. Its peculiar characteristics show more strikingly on the Guinea Creeks, than elsewhere, and hence it has usually been called the Guinea vein of land. It is quick, free land, and, after exhaustion, has a wonderful power of resuscitation. This is evinced, even to the eye of the passing stranger, by the quantity of hickory, dog-wood, red-bud and walnut, interspersed among the old-field pines. It is well adapted to the production of corn, tobacco, oats, nearly all the minor crops, and yields wheat much better than would be supposed from the sandy nature of the soil. The spots of red land interspersed through this region, yield wheat finely, as do most of the fields with a red clay substratum, if not too much exhausted.

Feldspar is the most abundant rock, in the bowels of the earth, in this belt of land. The potash, usually found in this rock, may afford to the soil its peculiar fertility when fresh, and its capability to be improved when impoverished, as also its adaptation to the growth of tobacco; for this plant contains much potash in combination with nitric acid. This may also account for the free and improvable nature of much of the other lands between tide-water and the mountains, denied the use of lime. There is, however, generally a little lime in feldspar; but hardly enough to account for the fact stated. Potash, as is well known, enters largely into the formation of vegetable matter, and, being an alkali, may neutralize the acid, in the soil. This theory is apparently contradicted by the fact, that on much of our land most abundantly supplied with feldspar, we find the rankest growth of sorrel, and every indication that the land is greatly poisoned with acidity. It may readily be observed, however, that in such places, the feldspar is harder than usual, and of course, gives off its potash more slowly by decomposition, and, lying very near the surface, whenever the interstices between its strata become surcharged with water, this must ooze into the soil, and produce acidity by its putrefaction. In most cases, deep and well-formed hill-side ditches, and other means of preventing the stagnation of water—which I believe to be the most usual cause of acidity in land—would correct this evil. In many places, there are marshes at heads of bottoms and on hill-sides, produced by strong bars of feldspar, running across the declivity and stopping the current of water. These may be removed, by cutting deep channels through the beds of rock, and forming blind drains for the passage of the water. About these ledges of feldspar, I think, there will generally be found a yellowish-brown clay, resembling that on which the lie of ashes has been spilled, which effervesces freely with acids. We frequently see clay of this appearance, in our roads, near beds of feldspar, but I have never exposed any of it to the action of acids.

I have thought the agency of feldspar in fertilizing our lands, not unworthy your attention, and regret that I have not given it a more satisfactory investigation. As a geological fact it is certainly of some importance; and in agriculture, it will be pleasing, if we can ascertain, that we have, incorporated in our soils, a substitute for lime, though greatly inferior to it; which, though it may not bear transportation to much distance, tends constantly, under proper management, to correct acidity, and of course, according to Mr. Ruffin's ingenious theory, prepares the land to receive benefit from plaster. In all those soils, coming under my observation, where plaster has failed, there is a perfect destitution of feldspar, and I do not now recollect a case of failure, where it exists. But I know my observation, in this matter, has been too limited, to justify my undertaking to lay down rules.

We have also, almost every where in our region, the detritus of hornblende, in the form of bottle-green or black-sand, and, in many places, that of green-stone, in the form of a light pea-green sand. A striking sample of this may be observed in the Guinea road, on the hill-side north-east of Felixville. Both of these are intrinsic evidences of good constitution in the soil, or, at least, warrant the hope of improving by clover and plaster.

Having consumed, perhaps, too much time, with the foregoing remarks, connected with the politics and philosophy of agriculture, I shall have the less space left for remarking on the practice. I have but little cause to regret this, as most of my hearers are much better acquainted with this department of our subject than myself.

The practice of agriculture may be divided into those processes which are intended to preserve and improve the soil, and those intended to protect, to cultivate and to preserve the crops. As we have no time for minute details, and as success in the cultivation of crops depends so much on the improvement of the land, we will attend chiefly to this matter.

In the improvement of land, manuring is the leading process. Indeed, it is the source from which all permanent success in agriculture must flow. Without it, the lands must constantly deteriorate and the crops diminish; while both will improve, if manuring is judiciously and diligently conducted. No man, without a trial, could form an adequate estimate of the quantity of manure which might be made in one year, by a moderate force, applied simply, to what may be termed the *main force of gathering*, from the leaves of the woods, the offal of the crops, ashes, marsh mud, and all other substances convertible into manure. But when to this is added a judicious system of enclosing and rotation of crops, and a skilful apportionment of the quantity of land yielding cattle food, and of the number of cattle, to the wants and means of the farm, the quantity of manure and the increase of fertility—compared with ordinary attainments, in these matters—become amazing.

A manure, pen or stercorary, in a suitable place, into which the children of the family are employed in accumulating weeds and other litter, to be rotted and enriched, by being sprinkled with the dirty slop-waters from the kitchen, the refuse soap-suds, and all other filthy fluids, usually thrown away, would produce a large and rich addition to the manure of the farm. This, however, might generate disease, unless great care be taken to scatter ashes, frequently and liberally over it. These would combine with and neutralize the unwholesome effluvia, and greatly improve the quality of the manure.

Much of the manure, in this country, is lost, by being permitted to lie in heaps during hot weather, burning with fermentation, and steaming off its richest gases. If it be not demanded for some hoe-crop, it would be much better to use it as top-dressing on grass. Thus employed, in dry weather, instead of fermenting as it would in a bulk, it simply loses its moisture, and, in wet weather, its soluble matters soak into the earth, and greatly benefit both the grass and the soil.

If, however, manures are kept in heaps, in hot weather, for the purpose of decomposing their coarser materials, they should be largely mixed, with common earth, sand, clay, or, which I think much better, with the broken coal and burnt earth, from the sites of old coal-kilns. Such admixture causes a more gradual and steady decomposition, and prevents what the Scottish farmers call "*fire-fanging*," viz.: the moulding of the manure, which renders it so light, chaffy and worthless. If I have not been greatly deceived, in a small experiment with the charcoal, it does vastly more than this. It arrests and retains the volatile effluvia of the manure, effectually removing its scent, and forming a chemical compound, in which both ingredients are fitted for the food of vegetables. If any mode of rendering charcoal soluble, could be discovered, it certainly would constitute a fine food for plants, as they all contain so much carbon. It appears to me, that no substance, so easily attainable among us, promises so fairly to become a substitute for lime as charcoal. They have both the same greedy appetence for putridity, taking the smell out of every thing. And while they both long retain the matters with which they are combined, they may equally be disposed to yield them, to the roots of plants, as food. They both, certainly, enter largely into the composition of vegetable matter. As I before observed, my experiment with charcoal impregnated with putrefying animal and vegetable matters was small. I intend to repeat it, with more care, and I would thank any gentleman who will give it a fair trial.

While on the subject of manuring, it may be well to remark, that although we cannot afford to use lime largely, yet it might be profitable to employ it on a small scale. A valued friend, who is a member of this society, informed me, that after washing his seed in brine strong enough to float an egg, that the spelt, cockle, &c., might be skimmed off, he rolled it in lime, and sowed it; sowing a stripe through the middle of the lot, without lime. At harvest, in his own judgment, and that of others, in whom he confided, the wheat whose seed was limed, bore one-third more crop than the other. In this experiment there was one bushel of lime used, to ten of wheat. The experiment is richly worth repeating, if we only aim to get rid of such nuisances as cockle, cheat and spelt—but the whole process is the best that has been discovered, for preventing smut.

Volumes might be written on the improvement of agriculture, gentlemen, and I intended to touch on many other branches of this subject, but having already imposed a tax on your patience, and being unable to furnish you with any matter, with which you are not already familiar, I must conclude.

There is, however, one subject, which I must not neglect. One leading object of our association is, "to increase the ties of good feeling, which already so happily bind us together." If we attain this we shall not have united together in vain. This seems to be, emphatically, the age of discord, and the furies seem to be let loose in the hearts of men. The demon of party has enlisted even the most peaceable, and has made veterans of those who were once child-like. To what extent the fiery fanatical passions of men may rage, is left in awful doubt. But there is much reason to fear that new storms are rising, and will rage, until all that is lovely and desirable among men is destroyed. Be this as it may, the time is coming, when he who can feel that he has honestly endeavored to promote "peace and good-will among men" will possess a jewel of complacency in his heart, worth more than all the diadems of all the conquerors that have lived upon earth. May every member of this society enjoy this blessedness! And may we remember, that while the first and great commandment is, to love God, "the second is like unto it, namely, thou shalt love thy neighbor as thyself."

AN ADDRESS DELIVERED BEFORE THE ROCKBRIDGE AGRICULTURAL SOCIETY, AT ITS ANNUAL FAIR, OCT. 11TH, 1838.

By Geo. D. Armstrong, A. M., Professor of Natural Philosophy and Chemistry, in Washington College, Lexington, Va.

Communicated for publication in the Farmers' Register, by order of the President and Directors of the Society.

Gentlemen of the Agricultural Society,—The subject which I have selected as affording a theme suitable for the present occasion, is—the value of natural science to the farmer. The practical rules of agriculture, and the best methods of cultivating the great staples of our country, would have afforded a more appropriate subject, had I felt myself competent to the task. But with my imperfect acquaintance with those matters, any attempt to communicate information to the members of this society, must have proved worse than useless. The importance of agriculture to the prosperity of our country, and the honor which is due to the independent American farmer, would have afforded a theme in the highest degree grateful to my feelings; but its discussion could not have been of any real value. In such a country and in such a state of society as ours, where the farming part of the community are acknowledged to be "the bone and sinew of our strength," that class upon whom more than upon all others, our national prosperity depends, the poor tribute of my praise, could neither make them more honored in fact, nor to feel themselves so. Precluded as I am from the discussion of either of these subjects which would have been most appropriate to the occasion, I will be pardoned for selecting a theme, which in other circumstances I should have left untouched.

The system of agriculture pursued in this section of country has, within a few years, undergone a change for the better. Whilst a country is new, presenting a deep rich soil, which has never been vexed for the support of man, it makes comparatively little difference in what manner it is tilled. All that is necessary is, to bury the seed in the earth, and in due time to gather home the golden harvest. But if a careless system of agriculture be pursued for a time, the soil becomes gradually exhausted. Instead of gathering an abundant crop almost without labor, the farmer is compelled "to eat his bread in the sweat of his brow." From year to year, whilst the amount of his necessary labor is increased, the return for those labors becomes more and more scanty; until at length a point is reached at which the only alternative left him, is to change his system of cultivation, to emigrate, or to starve. There are portions of our southern country which have nearly reached this point—and the tide of emigration is fast sweeping off their old population to the new countries of the west and south-west, those lands of promise. Accustomed for many years to a certain routine of farming operations, they either would not, or they knew not how to change it for a better. The valley of Virginia, possessing as it does a soil which it is difficult if not impossible entirely to exhaust, has never become impoverished to such an extent;—yet, even from the valley of Virginia, not a few have sought a home in the distant forests of the west. Far be it from me to call in question, either the policy of such a movement, or the patriotism of those who have made it;—doubtless they have found a richer soil; and having carried our free institutions with them, wherever they have gone, they still possess all that which most endears his native state to the bosom of a Virginian. But those who remain behind have a work to perform. By long cultivation the soil has become so much exhausted, that it is necessary for our systems of cultivation to be improved, if we wish still to see "smiling plenty reign in the home of our childhood." Instead of making it, the one absorbing question, how can I get the largest return from my lands this year? our farmers must inquire, how can I get the largest return in a series of years? how can I permanently improve my lands? This I suppose every one is ready to admit; but then the question arises, how is this change for the better to be effected? in what way are our lands to be improved? in what respects ought our systems of cultivation to be changed? It is not difficult to mention some way in which lands may be improved, and some particulars in which our systems of cultivation might be changed for the better;—but to give a correct and full answer to these questions, to state in what manner lands may be permanently improved to the best advantage, and how our systems of cultivation may be changed, so that a given portion of land shall yield the largest return, with most certainty, least labor, least detriment to the soil, is a task which it is impossible to perform at the present day; and we can hope to do it only after long-continued and careful study of the subject.

It is at this point that natural science may be advantageously introduced to assist us in our labors. I know that in time past, while men have acknowledged the importance of applying science to the arts, and in fact to almost every-thing else, they have doubted the value of its application to agriculture. Is this a reasonable doubt? What do we mean by natural science? As I understand it, we mean nothing more nor less, than our knowledge of nature arranged and generalized. Our knowledge on all subjects is, in the first instance, a knowledge of individual facts. After a stock of facts has accumulated, we perceive that many of them are of the same character; these we class together, and include them under a general statement. Again, we observe that some of these facts bear to others the relation of cause to effect, and we arrange them in accordance with this observation. This once accomplished, our knowledge has become science. By this process, the form, and not the nature of our knowledge is changed. Scientific principles are nothing more than human knowledge packed up in a portable form. Founded as they are upon our observation of nature, their application to the affairs of life, is one of the very best methods of testing their truth.

To the arts, and to almost every other business of life, natural science has been applied with the happiest result; and is there any thing which forbids the hope of its being applied to agriculture with equal success? There are departments of physical science, which apply as naturally and as directly to the business of the farmer, as mechanical or chemical philosophy do to the business of the artizan. Such are mineralogy, geology and vegetable physiology. One great object of mineralogy and geology is to enable us to determine the character of soils, to ascertain the elements which enter into their composition, and the proportions in which they severally enter. No one has ever doubted that the difference between a fertile and barren soil, lies in a difference in their composition. There are some combinations of the elements of soil, which seem particularly adapted to the growth of plants, whilst there are others which will scarcely support a scanty vegetation. A piece of land may be rendered barren, either by the absence of some one or more of the elements of good soil, or by the presence of some noxious principle. If the former is the case, it is to the interest of the possessor to supply the deficiency; if the latter, to remove the noxious principle. But how shall he set about this work, unless he know whether it is the absence or the presence of an element which renders his land barren, and also what that element is? Lime and vegetable matter are our two most common manures. To make it a general question, as has sometimes been done, whether lime or vegetable matter is the best manure for land, is very much like making it a general question, whether fire or water is the best agent for doing work. Unless the nature of the work to be done is specified, it is impossible to answer the question. For smelting iron fire is the best, and water is good for nothing; for removing a stain from linen water is the best, and fire is good for nothing. So it is with respect to manuring; it is necessary that we should know the nature of the soil, before we can determine the proper method of improving it. It is (as I have already mentioned) one great object of mineralogy and geology to enable us to ascertain the nature of soils; the former, teaching us to distinguish them by their external characters, the latter by their position.

Let this suffice for mineralogy and geology, I wish to direct your attention mainly to vegetable physiology; a department of natural science, which has hitherto been little valued and little understood; and yet one which applies more directly to agriculture than any other. Under the title of vegetable physiology, is comprehended whatever is known respecting the structure of plants, and the history of vegetable life; embracing our knowledge of the nature of the organs of plants, the offices these organs perform, the manner in which they perform these offices, and the changes which they naturally undergo, or which they may be made to undergo by the art of man. Its object is to lay open the machinery of vegetable life, and to explain the manner in which that machinery operates. In order the more distinctly to illustrate the application of such knowledge to practical agriculture, I will select that which concerns one subject; viz: the circulation of the sap. We all know that plants are nourished by their sap, just as animals are by the blood which circulates through their veins.

If we inquire for the point at which the sap enters a plant, we find it to be the root, but not all parts of the root alike. There is a peculiar class of organs whose office it is to absorb nourishment from the soil; and these are situated along the fibres or smaller subdivisions of the root, of course it is at these points and no others that the sap enters. Let us see if we can make any practical application of this knowledge. If we wish by manuring to assist the growth of a tree, we should place the manure at some distance from the point at which the trunk enters the ground, so that it may lie as nearly as possible over the fibres of the root. If we wish to plant a vine so as to twine around a tree and be supported by it, we should plant it very near to the point at which that tree enters the ground, rather than at the distance of several feet from it; because in this way the two will interfere least with each others growth. If we wish to transplant a tree we should be more careful about the extremities, than about the main divisions of the root. If the root have several branches, it is better to cut off all those branches excepting one and retain that with all its subdivisions perfect, than to cut off the ends of all the branches, as is the common practice.

Again; if we trace the course of the sap during the different seasons of the year, we find that in such trees as the oak, the hickory and the chestnut, it circulates principally in the sapwood during the spring and summer, but during the autumn and winter it retires to the heart-wood and not to the root, as is generally supposed. In order to satisfy ourselves of this, nothing more is necessary than to take a part of the body of a small tree cut in the spring, and of another cut in the winter, and lay them on the fire. The sap will be seen to exude in the first from near the surface; in the second from the heart. Let us see if we can make any practical application of this knowledge. It is generally acknowledged that, that most destructive disease in timber called the dry-rot arises from the presence of the sap. It is generally the heart-wood which we use for timber, whilst the sap-wood is considered of little value. If then the situation of the sap at different seasons is such as I have just mentioned, in order to get our timber free from the sap, we should cut it in the summer and not in the winter. The course thus indicated is, I know, in direct opposition to the common practice of men. As this is a matter of some practical importance, permit me to cite one fact in confirmation of the rule which I have laid down. The fact is mentioned in connexion with many others of a similar character, in a communication from a very intelligent ship-carpenter to one of our scientific periodicals. "In accordance with the common practice of ship-carpenters I was in the habit of cutting my timber in the winter. During the summer of 1820, when engaged in framing a vessel, I found I had no piece which was suitable for a certain place in the frame. It was necessary that the work should go on, and as the only alternative left me, I sent immediately to the woods and had a suitable stick cut; this I framed in with the others. After several years the vessel was sent back to me to be repaired. On examining her side timbers, I found them all more or less affected with the rot, excepting this one, whilst it was perfectly sound."

Again; if we inquire into the nature of the sap, we find that as it enters the vegetable system, it consists mainly of water holding carbonic acid gas in solution. Water has the power of absorbing large quantities of certain gases, whenever it is brought in contact with them. Strange as it may seem to those who have never thought much on the subject, water is porous, and absorbs these gases just as a sponge absorbs water. The great object of manuring, in most instances, is to supply carbonic acid gas to the growing plant. A large portion of this gas is liberated from vegetable matter during its decay; and hence the value of such matter as manure. The gas furnished by the manure, must be absorbed by the water, as it sinks down into the ground. Of course, the water should meet the manure before reaching the roots, and not after it has passed beyond them. This would suggest that the manure could be placed to the best advantage upon the surface, because then the water must pass through it before meeting with any of the roots. But, then, there is a difficulty arising from another source. The valuable material furnished by the manure, is furnished in the form of a gas. If the manure is placed upon the surface, it soon dries, and whilst in that state, as the gas is liberated, no water being present to absorb it, it is soon dissipated in the atmosphere. The two facts taken in connexion, suggest that the manure should be placed as near the surface as is consistent with its being kept in a moist state, and in every instance, above the roots of the plant which it is intended to benefit. Where manure is spread upon the ground in the fall to benefit a winter crop, it should be placed very near to, if not upon the surface; where it is spread in the spring or early part of the summer it should be always covered with earth.

Our knowledge of the nature of sap, enables us to explain the manner in which clover improves land. Had we no experience on the subject, it would seem, to say the least, improbable that any crop could improve land. We would naturally suppose that plants were nourished by the ground itself—that they fed upon the soil. If such be the case, when a crop is ploughed under and decays, it can give nothing but what it has first taken; and how then can it improve land? Yet we find that growing clover upon land, and then ploughing it under and suffering it to decay, is one of the very best methods of improving land. Bearing in mind the nature of the food of plants, this admits of a simple explanation. We will suppose that clover is sown upon a perfectly barren spot. The atmosphere which is above this spot, contains a portion of carbonic acid gas, for all atmospheric air contains a greater or less portion of it. A rain comes; as the rain falls, it absorbs a portion of this gas, and in this condition enters the ground. No sooner does it come in contact, with the seed in the first instance and with the root afterwards, than it is absorbed and its materials used for increasing the size of the vegetable structure. When the portion of air above the spot, has in this way been exhausted of carbonic acid, a supply is obtained from the neighboring portions, in consequence of that strong tendency which gases manifest, to intermix and diffuse themselves throughout each other. This process is repeated again and again, and thus the clover increases in size. Perhaps some one may ask, from whence is this gas obtained in the first place? From many sources, but principally from decaying vegetables, such as are found in the woods and along the fence sides. The quantity of the several elements which enter into the composition of our globe, is fixed; it is impossible for man either to increase or diminish this quantity, and it is equally impossible for him to convert one of these elements into another. All he can do is to make an economical use of that which already exists, to gather up those portions which subserve no valuable ends, and apply them to use. This is what the farmer does in sowing his land with clover. He impresses the very wind into his service, for every wind that sweeps over a field of clover, laden as that wind is with the materials of vegetable structures, is made to contribute to its growth. After a large portion of vegetable matter has, in this way, been collected upon the once barren spot, it is ploughed under and secured for future use.

Again; in absorbing nourishment from the earth, the roots of a plant do not seem to exercise any choice; but drink up every thing, presented to them in a sufficiently fluid state. This we learn from actual experiment. Almost any substance which is soluble in water, may be made to enter vegetable systems. After a heterogeneous mass is thus taken up by a plant, such portions as are suited to its nourishment are retained, whilst such as are not suited, are returned to the roots, and by them again deposited in the soil. From observation, we learn that the matter thus rejected, is thrown back in such a state as to be not only unsuitable to the nourishment of the plant (rejecting it) but positively deleterious. It has also been ascertained, that the substances rejected by different plants differ from each other; and this to such an extent that the matter rejected by one plant, is well adapted to the nourishment of another. With a knowledge of these facts, we can assign the reason, why it is not a good plan to sow the same crop upon the same pieces of land for several years in succession. It will not do to say (as is often done) that a second crop of wheat will not grow as well upon the same spot, as the first, because that spot has been so much exhausted by the first. This is, it is true, one reason; but if it be the only reason, or even the principal reason, why is it that a crop of corn succeeds so well? The failure in the second crop of wheat, arises not so much from the exhaustion of the soil, as from that soil's containing a portion of matter positively deleterious to the growth of wheat, and which was deposited by the first crop. At the same time this matter is not injurious to the growth of corn, and hence the crop of corn is almost as good as it would have been, had wheat never been sown upon the land. If we could ascertain the precise character of the matter which is retained, and of that which is rejected, by each of the several crops commonly cultivated, it would be an easy matter to determine the best order in which crops can succeed each other. Perhaps too, if this subject was better understood, we should find that the way in which some manures benefit crops, is not by supplying nutritious matter to them, but by removing this deleterious matter from their roots. If this matter possess the character of an acid, as it is more than probable it does in some cases, lime would act in this way. Being a salefiable base, it would unite with the acid and neutralize its properties.

I might go on and multiply instances such as these, did the occasion call for it: but as my object is, not to give a lecture on vegetable physiology; but by illustrating its application to agriculture, to show its importance to the farmer, these will suffice. Perhaps some one may ask, if scientific principles are nothing more than facts, araged and generalized, why is it, that knowledge in this form, is more valuable, than in the form of unconnected observations; the form in which this knowledge is at first obtained?

There are several reasons. Knowledge in the form of science is more easily retained, and is more perfectly at the command of the possessor, than it can possibly be, in the form of unconnected observations. I doubt not that the experience of every one here will confirm the statement, that it is easier to remember fifty effects, when we can trace them to one common cause, than it is to remember five, when we can trace them to no cause. A knowledge of the cause of any number of effects, serves as a band, by which they are bound in one common bundle, and thus secured from being scattered and lost. It is one of the characteristics of science, that the relation between cause and effect is distinctly traced out.

Another reason why it is desirable to have our knowledge in the form of science is, that in this form it will serve to direct us in our course of experiment and observation. Such is the constitution of nature, so intimately are the various parts of creation interwoven, that a cause generally gives rise to several effects. When we have traced an observed effect back to its cause, we can generally infer other effects, which will spring from the same cause; and these often of a character entirely different from the one first observed. To illustrate my meaning by an instance. In attempting to sink a pump to an uncommon depth, it was found that the water could not be raised by it, to a height greater than 32 feet. The cause of the rise of the water was ascertained to be the weight of the atmosphere. The reason why the water would not rise to a height greater than 32 feet, was that the weight of a column of our atmosphere was only equal to that of a column of water of the same diameter, and 32 feet high. It was at once inferred, that as the weight of the atmosphere was fixed, it must sustain columns of different liquids at heights, inversely proportioned to their specific gravities. And again; that as we rose from the level of the sea, leaving as we must, a part of this atmosphere behind us, the height at which a column of any liquid would be sustained, must diminish in proportion to our rise. Thus by tracing the refusal of a pump to act in certain circumstances, to its cause; we ascertain, in the first place, a method of determining the specific gravity of liquids; and in the second place, a method of determining the height of mountains. The effects by which we determine these things, spring from the same cause as the refusal of a pump to act, and yet they are of such a character that we never should have dreamed that there was any connexion between them, had we not traced them to their common cause; and more than this, we should probably have remained long in ignorance of the two last mentioned effects, had we not traced the first to its cause. Thus it is, that throwing knowledge into the form of science, is like putting it out at compound interest.

Another reason why it is important to have our knowledge in the form of science, is that in this form it will greatly assist us in observing facts, and collecting information. When the attention has been directed to any particular subject, facts connected with that subject are observed and remembered, which, in other circumstances, although they might have passed before the eye, would have made no impression on the mind. Let a farmer and an architect travel together, through the same country, you will find that although they must have seen the same things, yet they have brought home with them entirely different kinds of information. The farmer can give you an account of the soil, the condition of the crops, the methods of cultivation, &c.; whilst he can tell you little or nothing of the structure of the buildings which he has passed. The architect, on the other hand, can give you a minute description of every principal building on the way; whilst he can tell you little or nothing respecting the crops. This difference arises entirely from the fact, that these two men have had their attention previously directed to different subjects. By throwing our knowledge into the form of scientific principles, we get a number of subjects worthy of attention, distinctly out before the mind, and each of them will be a nucleus around which knowledge will naturally collect.

Such are some of the arguments, which urge a study of natural science upon the farmer. The want of success, which has in many instances attended the efforts to apply science to agriculture, may be brought forward as an objection, by some. To such I would answer, this want of success is to be attributed, in part to the present imperfection of those sciences which most naturally apply to agriculture; and in part also, to the visionary character of many of those who have hitherto made the attempt. If you will consult the history of the application of science to those of the arts to which it has been most successfully applied, you will find that this has been a misfortune which has happened to them all, in their infancy. Visionary men being the lightest part of society, seem always to rise to the top; and rising science, like the rising sun, is forced to shed its first rays upon those barren spots, where it is impossible that any thing should grow. Let it rise higher, and pour its flood of light upon the rich valleys below, and if it cause not these to spring with life and verdure, then may you fairly call its claim in question. If the attempt has failed hitherto, in consequence of having been made by visionary men, the greater is the necessity that sober, substantial, practical men should now take the matter in hand.

Much has already been done in Virginia for the advancement of the interests of agriculture. A geological survey of the state is now in progress. An able periodical, devoted exclusively to diffusing information respecting the best methods of cultivating and improving land, has been established, and thus far well sustained. And last, though not least, societies such as that whose anniversary we to-day celebrate, have been established in many parts of the state. Thus far it is well. There is yet another, and, as it appears to me, an important step to be taken. The nature of that step and my reasons for believing it important, I have presented before you. "I have spoken as unto wise men, judge ye what I say."

Every inducement is held out to the farmer of the valley to improve his land and his system of cultivation. Who that looks upon the inexhaustible water-power of our state, and at her vast mineral resources; the iron and the coal, which the hand of a bounteous Creator has so lavishly bestowed upon her, can doubt, that she is yet to become one of the principal manufacturing states of the union. Thus will she possess within herself a market for all that her farmers can produce by the most skillful cultivation. The James River improvement will soon open a grand highway, from the valley to the very centre of this market. Our climate is well adapted to the growth of every species of grain; our soil is already good, and susceptible of the highest degree of improvement. What then is there to forbid the hope, that the valley of Virginia may yet rival in fertility the fairest portions of the west? Let our farmers but improve the advantages which they have; let them engage in earnest in this work, and this hope must soon become a reality.

The traveller as he rests for a moment on the top of yonder mountains, will cast his eye over a broad land of golden harvest. As he descends and mingles amongst us he will receive the hospitality of an intelligent, a blest, a happy people. The inhabitant of the valley has already much to rejoice in. He trembles not before the chill wind of the north, neither is he striken down under the oppressive heat of the south; surrounded by a scenery so grand and beautiful, that no part of the country can boast a superior; possessed of a mount-girt home, such as has always been the strong hold of the freeman, let him but add to these, that fertility which he can bestow upon the soil, and with an honest pride may he exclaim, my own, my native valley, is the fairest spot on which the sun shines.

From the Genesee Farmer.

SPANISH CHEESE PUMPKIN.

Mr. Tucker—If you think the following notice of an agricultural production worthy of a place in your paper, you are at liberty to insert it.

I have the present season, from the planting of one pumpkin seed, raised twenty pumpkins, weighing in the aggregate, 671 pounds.

The six largest weighed as follows: 71, 71, 70, $62\frac{1}{2}$, 60, $57\frac{1}{2}$, making 392 lbs.; 14 others weighed 279 lbs., making 671 lbs. Whole length of the the vines, 989 feet.

They are of the kind called the Spanish cheese pumpkin, yet, notwithstanding the name, they are evidently a winter squash, not as rich in quality as some of the smaller kinds, but much richer than the common field pumpkin, and may, with proper care, be kept through the winter.

ISAAC CURTIS.

Brighton, Oct. 10, 1838.

PREMIUMS AWARDED BY THE AGRICULTURAL SOCIETY OF ALBEMARLE, 2D AND 3D NOVEMBER, 1838.

Horses.

To Col. William Woods, for his stallion Clarence, the first premium of - $15
To George W. Craven, do. do. Gen. Warren, the 2d do. - - - - 10
To John Rodes, do. brood mare Rosina, the 1st do. - - - - - 10
To Stephen Price, do. do. 2d do. - - 8
To William Garth, for his 3 year old gray colt, by Graybeard, the first premium, - 6
Do. do. 3 year old sorrel colt, by O'Kelly, the 2d do. - - - - - - 5
To Col. William Woods, for his 3 year old black filly, by Murat, 1st do. - - 5
To Captain Thomas Davis, do. do. sorrel do. by Goliah, 2d do. - - - - 4
To William Tompkins, for his 2 year old gray filly, by Oscar, the 1st do. - 5
To Reuben Lewis, for his 2 year old filly by Murat, 2d do. - - - - - 4
To William Gilmer, for his yearling filly by Terror, 1st do. - - - - - 5
To Col. William Woods, for his bay filly by Murat, 2d do. - - - - - 4

Cattle.

No bull over 4 years old exhibited worthy a premium.

To Jesse Garth, for his full blooded Durham bull, Major Downing, under 4 years old, the first premium of - - - $5
To Gen. J. H. Cocke, for his full-blooded Durham bull, Young Patrician, under 4 years old, 2d do. - - - - 4
To Gen. J. H. Cocke, for his full-blooded Durham cow, Cindarella, 1st do. - 6
To Jesse Garth, for his full-blooded Durham cow, Roanoke, 2d do - - - - 4
To Gen. J. H. Cocke, for his full-blooded Durham heifer, Dowager, 1st do. - 5
To Nelson Barksdale, for his spotted heifer, by his full-blooded Devonshire bull, 2d do. - - - - - - 4

Sheep.

To Reuben Maury, for the best ram, - $5
To William Garth, 2d do. - - - 4
To R. Maury, for best pen of ewes - 5
To William Garth, for 2d do. - - 4

Domestic Manufactures.

Woollen, and Cotton and Woollen Goods.

To Mrs. John Rodes, for the best piece of flannel, all wool, - - - $5
To Mrs. John H. Craven, for the best piece of flannel, wool and cotton, - - 3
To Mrs. William Woods, for the 2d do. do. 2
To Mrs. Jesse Garth, for the best piece of carpeting, - - - - - - 8
To Mrs. Peter McGee, for the best hearth-rug, - - - - - - 4
To do. do. 2d do. - 3
To Mrs. John H. Craven, for the best piece negro winter clothing - - - 6
To Mrs. Sarah Woods, for the 2d do. - 5
To Mrs. George M. Woods, for the 3d do. - 4
To Mrs. Jesse Garth, for the best wool and cotton counterpane, - - - 4
To Mrs. Jesse Garth, for 2d do. do. - 3
To Mrs. Robert Gentry, for 3d do. do. - 2
To Mrs. William Woods, for the best pair woollen socks, - - - - - 2
To do. do. 2d do. do. 1
To Col. William Woods, for the best suit home-made clothes, - - - 10
To Dr. Jno. R. Woods, 2d do. do. - 8
To Richard D. Sims, 3d do. do. - - 6

Cotton and Linen Goods.

To Mrs. R. D. Sims, for the best piece of negro shirting, - - - $5
To Mrs. Dr. Brown, do. 2d do. - - 4
To Mrs. R. D. Sims, for the best piece shirting or sheeting, - - - 5
To Mrs. Col. Woods, do. 2d do - - 4
To Mrs. Peter McGee, for the best cotton counterpane, - - - - 3
To Mrs. M. Johnson, do. 2d do. - - 2
To Mrs. Dr. Brown, for the best piece flax and cotton diaper, - - - 5
To Mrs. Col. Woods, do. 2d do. - - 4

Butter and Wines.

To Mrs. Frank Nelson, for the best specimen of butter, - - - - - $4
To Mrs. R. D. Sims, 2d do. - - 3
To Mrs. G. W. Kinsolving, 3d do. - 2

Only one specimen of domestic wine exhibited, which, although good of its kind, (currant,) was not deemed worthy of a premium.

GLANDERS COMMUNICATED FROM A HORSE TO A MAN.

On Saturday week, an adjourned inquest was held at the Champion, Princes-street, Lisson Grove, on the body of John M'Lellan, whose death occurred under the following circumstances. The jury first proceeded to view the body of the unfortunate man, which presented a spectacle too horrible to describe, the face being entirely eaten away, and the whole body being one mass of sores from top to toe. From the depositions, it appeared that the deceased was the driver of a cab and horse, the property of Mr. W. Johnson, a cab owner, at the west end of the town. On the evening of Friday week, deceased came home, and complained of having a cold. He took some gruel, and went to bed. On the following day, large lumps or swellings began to make their appearance under the jaw and on the nose, which, as well as the eyes, emitted a great deal of running. The eyes gradually became worse, and full of holes, and the nose and jaw broke out into dreadful sores. Medical aid was called in, but the gentleman who attended was unable to tell the nature of the disease. On Wednesday week deceased was conveyed in a cab to Sir Astley Cooper, who examined him, and pronounced it to be the glanders, caught from a horse. The deceased's medical attendant subsequently fell in with his opinion; but all remedies were found of no avail. The unfortunate man gradually became worse, and entirely insensible. In the space of two days his nose fell from his face, and his eyes became like a colander, both emitting a thick mucous running. He, however, about a quarter of an hour before his death, which took place on Thursday evening, recovered his senses, and stated that he had got his death by wiping the horse which was glandered with his pocket handkerchief, and then incautiously using the same to wipe his own nose. He expired in the most excrutiating agony. The jury returned a verdict "That the deceased died from glanders accidentally caught from a horse, of which he was the driver."—*London Paper.*

SINKING OF DRAINED SWAMP LAND.

[The following is an interesting account of the *sinking*, as it is called, but which is more properly the *rotting away* of vegetable soil, after its being dried and cultivated. The intelligent writer did not seem to be fully aware of the cause and manner of the disappearance of his soil. Before draining, for cultivation, any marsh or swamp, the undertaker should examine carefully the quality and chemical composition of the soil, so as to know whether it is of vegetable, putrescent, and therefore perishable matter, or sufficiently earthy to be permanent. Especially should this important point be settled before undertaking such great and expensive, and yet we hope most valuable and profitable public works, as the drainage of the immense body of swamp lands belonging to the Commonwealth of North Carolina, as ordered by the legislature.—ED. FARM. REG.

From the American Farmer.

Poplar Grove, St. Paul's,
South Carolina, May 20, 1823.

To the Editor—A correspondent in one of your late numbers, ask for information through the medium of your paper, relative to the reclamation of marsh land, which is covered with a heavy growth of trees—such as ash, maple and gum. He says, that an impression exists in his neighborhood, where large bodies of that land are to be met with, that woodland marsh, when reclaimed, will sink more than that which is free from wood. If any conclusive experiment has been made of this kind of marsh, I should be pleased to know the result; when convenient, if you will make the inquiries, to obtain information on the subject, I shall be obliged to you. As I have derived much instruction, and received a great deal of pleasure from the pesusal of your interesting paper, I will lay before you the result of an experiment, which I think will be conclusive to the mind of your correspondent, that I have made upon two hundred acres of marsh land, which was once as heavily wooded with cypress trees, as perhaps any swamp in Carolina; and of which I gave you some little account in Vol. 2, No. 44.

My plantation is so situated, that at the lower extremity, where I formerly embanked about two hundred acres, the tide-water is generally brackish, and oftentimes salt. It is so embodied with the old rice fields, that in order to supply it with the quantity of water necessary for the cultivation of rice, I dug a canal of twenty feet wide, and four miles long, entering the creek where the tide ceases to flow, and where from the drainings of a swamp many miles in extent, it is generally fresh; from whence at the flood tide my rice fields are supplied, and assisted in a drought by a long reservoir of water. The beautiful level appearance all alluvial soils exhibit to the eye, connected with its natural richness, induced me, about the years 1793 and 1794, to commence the undertaking, and which I have never had reason to repent. After many laborious and ineffectual attempts to get rid of the rushes, and turn up the land with ploughs and hoes, I became almost disheartened, being at a loss in what manner to proceed to effect pulverization, without which, the scheme must prove abortive. It occurred to me, that notwithstanding my ditches were dug three feet deep, there yet remained too much sobbiness in the land, to allow the successful operation of the plough. Satisfied of that fact, I dug up my river trunks, and replaced them at six inches above low water mark, sunk the ditches to the depth of five feet, and struck quarter acre drains about three feet deep. The effect was visible in the course of a few months; the rushes being deprived of that nourishment, they had been accustomed to receive from the sobby state of the land, died away. A fire was then applied on a windy day, which consumed them. The plough and hoes were again resumed, and I had the satisfaction of seeing the work progress. The land having now assumed a light husky appearance, very much resembling the peat morasses in Scotland, was thrown into large potato, or corn beds. In a short time a fire was again applied, which burnt them smooth to the ground, leaving ashes of a red color. It was repeated during the course of the winter, and in the spring, partial crops of corn, oats, barley and rye were planted upon a small scale, all of which failed. Perseverance, however, in tillage, and attention to the depth of my ditches, at length overcame all these discouraging results; the land, in due time, produced rice, cotton, corn, barley, rye and oats, all of which I have had since growing as a part of my crop, particularly barley, which was harvested about the 15th of May, and the land immediately planted in rice, making it produce two crops in one season.

The land, by constant cultivation, has sunk so much, that it is almost incredible to suppose the probability of a plough, drawn by oxen, could have gone over many parts of it. Large cypress stumps and roots have since risen up, and now show themselves 18 or 20 inches above the surface of the land, with the visible marks of the axe. The main bodies of the trees have been removed, many of them six feet in diameter; here and there a large limb is found, which has been squared by my carpenters, and carried home, for the purposes of building—and here, Mr. Editor, arises a question for those who are fond of diving into these matters, who were the persons that applied the axe, and to what market were the trees carried? From the above statement, I think your correspondent will view it in the light of a conclusive experiment, that heavy wooded marsh land sinks more than any other kind of land without wood.

Before I conclude, I will adduce one more instance, still more conclusive, of the excessive sinking of this kind of land. In digging the canal, above mentioned, a piece of the land in question, consisting of about 20 acres, was enclosed by the embankment, wooded with the identical kind mentioned by your correspondent—ash, maple, gum—besides a few very large loblolly pine trees, a quantity of palmetto and cedar bushes, and the greatest part covered with rushes. This land, through which a creek runs, was so completely raised, that nothing but a very high spring tide, aided by an easterly wind, could at all affect, (the tide with me rises six feet)—knowing it to be of the very first quality, I ordered it to be cleaned. Since which, it has produced abundantly of every kind of grain, planted on our low country. It now ranks among my first rate fields, and often produces fifty and sixty bushels of rough rice to the acre. I remain, very respectfully,

CHAS. E. ROWAND.

From the Edinburgh Farmers' Magazine.

REVIEW OF THE COMPARATIVE STATEMENT OF THE EXPENSE OF OXEN AND HORSES FOR FARM-LABOR, GIVEN IN THE NORTHUMBERLAND SURVEY.

As the authors of the Northumberland Survey, reviewed in your fourth number, appear to have very much undervalued the expense of keep, both of oxen and horses, I have sent you an attempt at a new estimate of both, on what seem to me truer data.

Expense of an Ox for one year.

Summering on grass, being the customary payment for a cow .		£ 3 10 0
¼ of an acre of tares during summer, at £5 . . .		1 5 0
Wintering on straw .	£ 1 10 0	
½ an acre of good turnips, at £5 . . .	2 10 0	
	4 0 0	
If on hay, 200 days at 8d.	6 13 4	
Half of this, as the average expense . .	10 13 4 is	5 6 8
Interest, harness, shoeing, as per Survey . . .		1 5 0
	Total	11 6 8
Deduct supposed increased value of the ox . . .		1 6 8
Gives the annual expense of one work ox . .		£ 10 0 0
Hence, the 1st year, with 8 oxen, will cost .	£80 0 0	
The 2d and 3d years, 6	120 0 0	
Expense of three years	£ 200 0 0	
Average for one year . .		£ 66 13 4
To which must be added, the expense of a driver, which I cannot estimate, including wages and victuals, below		14 6 8
Gives the total annual charge of each ox plough . . .		£ 81 0 0

Expense of a horse for one year.

Summering on grass, 165 days, at 6d.	£ 4 2 6
Vetches or tares, as for the ox .	1 5 0
Straw for half the winter, at the same rate with the ox . .	0 15 0
Hay half the winter, or 100 days, at 8d.	3 6 8
Oats, 70 bushels, at 2s. 3d. .	7 17 6
Harness, shoeing, and annuity, as per Survey	3 5 0
Annual expense of one horse	£ 20 1 8

Hence, the annual expense of a two-horse plough will be £41 3s. 4d., leaving a balance in favor of horses for farm labor, and against the use of oxen, of £39 16s. 8d. for each plough. The ploughman is not charged in either, being the same in both.

In the strongest soil, the improved *swing-plough* can never require more than three horses, and that only for once ploughing, in particular seasons and situations. Suppose three required for half the year, and with a driver, this would add £17 7s. 2d. to the expense of each horse plough in such stiff soils, still leaving a balance of £22 7s. 6d. against each ox team.

Extending this comparison, with the authors of the Survey, who suppose 5000 ploughs in Northumberland, and, allowing Great Britain and Ireland to contain forty times the extent of tillage land in Northumberland, the two-horse ploughs give a difference of nearly six millions sterling annually. Supposing half the ploughs to have three horses, the difference would be nearly five millions. In such years of scarcity, the difference would be more than double.

It must, however, be observed, that the above comparison is made with the improved swing-plough, and will by no means hold good with the extravagant horse-teams so prevalent in the South, which are more expensive even than ox-teams.

It would go a great way towards lessening the danger of future scarcities, to devise a means of introducing the swing plough universally into practice. Perhaps a tax, increasing annually, upon all ploughs drawn by more than two, or at most three horses, would answer the purpose. A similar tax on boats constructed of hewn timber, very speedily introduced the saw into Russia.

The *second* calculation respecting the value of produce, by using ox-labor, comes much nearer mine, than the direct estimate of expense. Had the authors allowed nearer the average price, the difference would not have been very material.

They calculate directly the loss on each ox-team	£ 8 3 0
Estimate of lots of produce by each is	17 13 0
My calculation with two-horse ploughs	39 16 8
Ditto with three horses . .	22 7 6

The average of the whole is .	£24	10 $7\frac{1}{2}$
And, leaving out the first, as greatly too low, the average will be almost	30	0 0

Upon the whole, the loss to the farmer, in the first instance, cannot be under £25 annually for each ox-plough team.* And it may be worthy of remark, that the whole of this loss must ultimately fall upon the landlord and the community.

R. R. R. R.

From the American Farmer.

FISH AS MANURE. STATEMENT FOUNDED ON EXPERIMENT.

Sir—I promised you, when I had the pleasure of seeing you here last year, that I would give you the result of an experiment made by using herrings as a manure; and since I have fully tested the experiment, I now give you the result, with all its minutiæ. In May, 1822, I purchased 32,000 herrings, and placed them in drills four feet apart, on 4023 square yards of ground, which is 817 yards less than an acre—they were placed quite thick in the drills—and then covered with a plough, by throwing two furrows together. On the 24th May, I finished planting the ground in corn, by dropping the same on each side of the drill at about three feet apart; but found when the corn grew about three feet high, it was much too thick, and was compelled to plough out every other row. The corn was once ploughed with a small corn plough, and twice with the cultivator, which was all the cultivation I gave it—the corn yielded, when gathered, a fraction more than 30 bushels; and although last year the corn in this neighborhood suffered much from the long drought, it had upon this corn no apparent injurious effect. While the leaves of other corn in its immediate neighborhood were dead and dried up above the ear, this was perfectly fresh; and the dry weather appeared not at all to affect its verdure.

On the 10th of October, I again ploughed the ground, and on the same day, sowed the same with two bushels of wheat. In the spring, the wheat grew so luxuriantly, I found it necessary to cut an acre with a scythe. It again very soon covered the ground. The weather preceding harvest was very favorable to this wheat, being uncommonly dry: had it been wet, I believe not one bushel would have been gathered. Dry as the weather was, it was cut with much difficulty, it had fallen to the ground so much. It yielded, when carefully taken from the straw, twenty-nine bushels. You saw the ground yourself, and know how very poor it was—and I am persuaded, had the fish been placed with some regularity on the surface of the ground, in the place of drills at so great a distance apart, by which the ground would have been regularly manured, it would have produced several more bushels of wheat than it did. As it is, it yielded at the rate of $34\frac{3}{4}$ bushels to the acre. I now give you the cost and profit:

32,000 herrings, at 31 cents -	$9 92	
Hauling five loads of herrings at $1 25 - - -	6 25	
Ploughing in ditto - -	1 00	
Expense of planting and cultivating corn - - -	3 00	
		$20 17
Cr.		
By thirty bushels corn at 75 cents, which was the price last fall - -		22 50
Clear profit on the first crop - -		2 33
I say nothing of the fodder, leaving that to pay the expense of getting in corn.		
29 bushels of wheat at $1 25 - -		36 25
		$38 58
Expenses.		
Two bushels of wheat at $1 25 -	$2 50	
Cultivation - - -	2 50	
		$5 00
Clear profit, leaving the land rich - -		$33 58

I would here remark, that although I used 32,000 herrings, 20,000 to the acre is quite sufficient, and will make a more certain crop than a greater quantity. I have used this spring, cat-fish and perch for my potatoes, and find them as good again as the best stable manure; and you will find at Messrs. Bradford & Cooch's, in a few days, a barrel of potatoes made from the fish—also a few at the top of the barrel in paper, the seed of which you gave me last fall—they were, I think, sent you from the north—they grew well with me, and are the finest potatoes for the table I ever saw.

Yours, respectfully,

BENJAMIN F. MACKALL.

Wilna Mills, Cecil Co., Oct. 12, 1823.

From the American Farmer.

SHEEP HUSBANDRY OF R. R. MEADE, DEC'D.

Read at the last meeting of the Agricultural Society of the Valley, (1824) and by order of said Society communicated for publication in the American Farmer.

Gentlemen—If an apology were necessary in making a communication to farmers on the subject of their profession and prosperity, I might find it in the queries propounded by our secretary, and his invitation to a free exchange of information on agricultural topics; also in a sincere desire I profess for the improvement of our husbandry through agricultural associations. Under similar impressions I had been in the habit of sending to the American Farmer the result of my efforts to improve the breed of sheep, with a hope of exciting a more special attention to that part of our occupation, but the suggestion of a member that any remarks made on the subject might reach those useful pages through the medium of our society, determined me in the propriety of respectfully placing at your discretion the report of my last shearing, with a few observations thereon—perhaps in the infancy of our institution, and in the absence of learned or scientific communications, a plain practical relation of facts may be interesting, and enable you to turn them to some advantage. The subject in my humble opinion has not receiv-

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* We humbly recommend the above observations, together with the comparative statements between horses and oxen, for the purpose of the draught, presented in the Northumberland Survey, to the consideration of those members of the Legislature, who supported the bill for taxing farm horses, solely because it would operate as a premium in favor of oxen.

ed its share of discussion in the agricultural journals of our country, especially as it bears a double relation to our wants and our comforts. It is from the same animal that we obtain the choicest and most wholesome supply of food for our tables, and the material for a great variety of clothing suited to a vast extent of climate. The improvement and increase of our wool and mutton must then be an object of great concern to both rich and poor; and if by a change in management we can obtain more wool and meat from one-half, or two-thirds of the animals kept, our soil must consequently improve under an additional covering of grass, and we be immediately benefited in the increased quantity of tallow, flesh, and wool. There is a beguiling propensity with most of us to crowd our lands with stock, preferring, as it would seem, numbers to quality, and forgetting the difficulties attending a dry climate and long winter. When in the habit of keeping double the number of my present stock of sheep on the same ground, I was compelled at particular seasons to go to extraordinary expense in their feeding to keep them in a thriving condition. Notwithstanding, the average weight of their fleeces fell from eight to between four and five pounds. Experience then teaches me to keep no more sheep than I can feed well with economy, and have those separated in warm weather, never increasing their expense, risk, or trouble, by having lambs sooner than the first or middle of March, when they may have green food. A rye lot proportioned to the number of breeding ewes need be the only additional expense in keeping, to common pasture and good wheat straw when the snow is on the ground. A slight portion of Indian meal (too little to be called food) should be given them once or twice a week throughout the year, mixed in their salt. With the aid of improvements through crosses and selection, I will venture to say our flocks will double their produce in a short time. With regard to the expense of an individual flock, I may almost say that mine cost me nothing last winter. The weather, to be sure, was uncommonly favorable. A rye lot of nine acres divided, was their chief food, which was grazed until the 10th of April, and left pretty bare. I have hired the thrashing of the rye, in order to ascertain the quantity in time for your information. Two hundred and twenty-three bushels have been measured up, and I have no doubt there was two or three bushels left on the ground per acre, not having horse-raked it, as was the rest of my stubble (nearly twenty-five bushels per acre.) I had like to have forgotten a considerable part of the production of this ground. Turnip seed was sowed the last of August, with the rye, at the rate of two pints per acre, and harrowed in. Very late in the fall the largest were carried off, and the sheep had ample provision in the balance, preferring turnips to rye. I had hoped at this time to have been enabled to make a comparison between the productiveness of the long wool, and the merino; and to have ascertained how much good wool they sheared to the pound of flesh, but the circumstance of my long woolled sheep being in their prime, and the merinoes on their decline (not having bred from them for four or five years but by the long wool cross) would make an unequal comparison, and I should be sorry to venture an opinion lessening the value of the one, or increasing the value of the other, without a confident experience of both. Take them as they are, a few of the best selected from each, prove in favor of the long wool, nearly two to one, with regard to the fleece; but we must give the merino the credit of imparting a large share of this value to the long wool, for it appears, as far as my observation has extended, that the first long wool cross on the merino has the heaviest as well as the finest fleece. If this be the fact, my determination to select the finest, closest woolled males to breed from, will have the desired effect of uniting as nearly as possible the quality and quantity; the same practice will, of course, apply to other breeders of a similar stock.

Several of the first shear long wool, produced at the rate of one pound to every ten and eleven pounds weight on the hoof. The merino, Arlington long wool, and Tunis sheep are the most noted and valuable breeds immediately amongst us, and according to the situation and views of the breeder, deserve the greatest attention, either to perfect them as a distinct stock, or by judicious intermixtures to produce such valuable varieties as their nature, controlled by our skill, is possibly susceptible of.

June 3d. Sheared 49 sheep—5 wethers, one only a two year old—2 rams, one and two years old—12 ewes first shear—30 ewes from two to five and six years—26 of which produced 36 lambs, and raised 30 of them.

Weight of wool from Mr. W. Barton's notes.

9 fleeces full blood merino or 7-8	$58\frac{3}{4}$ *lbs.*
8 do. Arlington long wool cross	$73\frac{3}{4}$
8 do.	$55\frac{3}{4}$
8 do.	$66\frac{3}{4}$
8 do.	$56\frac{3}{4}$
8 do.	$62\frac{3}{4}$
49	$374\frac{1}{2}$

A total average, of above 7 5-8—the average of the 40 long woolled fleeces 7 7-8 lbs.—9 merino fleeces $6\frac{1}{2}$ lbs.

There were a few fleeces weighed in presence of some of the officers and members of the society.

	wt.	fleece
A Ram 2 years old, wt.	188 lbs.	10 lbs.
Ewe 1 year old, wt.	128	13
Ewe same age,	118	$11\frac{3}{4}$
Ewe do.	130	$11\frac{1}{2}$
Ewe do.	122	11
Wether, first shear,	128	11
Wether do.	120	11
Wether 2 years old,	185	8

It is to be understood that the whole of the wool was unwashed, and freed only from the gross tags. Samples of the above fleeces are sent you, which will be found to measure when the fibre is extended from six to nine inches—but take the very heaviest fleece we exhibit, and compare it with the Vermont fleece of $18\frac{3}{4}$* washed wool.

* This fleece proved to be of four years growth, as appears by a correspondence in relation to it between the editor of the American Farmer and the postmaster at Bennington, see American Farmer, volume 5th, page 213. The sheep is there stated to be a full blooded merino of the Livingston stock. It would be worth while, if practicable, to ascertain the increase of *each year*, where fleeces are thus left more than one year.—Ed. Am. Farm.

Does it not prove the necessity of our endeavoring to do so likewise? There is a practice prevailing with us, which, however congenial with the best social feelings, is nevertheless utterly at war with the prospect of reformation—I mean that of selecting the very finest of our lambs for our tables—a moderate forbearance, in the use of the second best for a time, or until our flocks are more uniform, would enable us to have them very fine, and still leave the best—the practice also of permitting the butchers to pick the fine fat ewes out of our flocks is extremely injurious, as in getting the best mutton they will also get many of the best breeders.* Therefore be particular in marking your breeders. To all such as will not find it convenient to introduce crosses into their flock, let me recommend the value and importance of using their best judgment in selecting not only from their own flocks, but as the celebrated Bakewell did in the commencement of his improvement, pick them up from the highway—perseverance will do for them what it has already done for him.

To the society I would now most respectfully and particularly appeal, as to a body of liberal and intelligent farmers, associating themselves not merely for individual benefit, whether in the expectation of rewards, honorary or otherwise, immediate; or relying on future advantages accruing from a mass of practical information which should naturally arise out of such an institution, but as having from principle and conviction taken on themselves (so far as the case will admit) the responsibility of a reform in the cultivation of the soil, and the improvement of our domestic animals, as essential to the more comfortable existence of a very large class of our farmers, whose situation, moderate settlements, and most industrious lives, preclude from advantages, to be derived only through the intervention of superior wealth and intelligence. I would take the liberty of suggesting, whether the most useful and economical way of diffusing information on the subject of husbandry (together with that respectability which would be added to our institution) would not be in acquiring a small, but well selected library, for the use of the society, and afford the presses of Winchester an opportunity of a weekly supply of agricultural matter for the benefit of their subscribers; is it not reasonable to suppose that a work of such apparent usefulness would have the effect of rewarding them through an increase of patronage for any trouble they might meet with in assisting the cause? The materials for the speedy amelioration of our live stock, are certainly to be found in the middle and eastern states, and are to be had on terms entirely within the capacity of this society, and such perhaps must be the course of our improvement, if at all—as their wealth has enabled them to import and improve both by breeding in and in, and by crosses on our home stock, some of the best stock in Europe.

Out of the numerous kinds of sheep in Great Britain, which they appear to have nicely discriminated and allotted to their various soils and situations, we have selected the Leicester or Dishley (alias celebrated Bakewell sheep) and South Down, which are to be had in admirable quality in Jersey and Delaware, and are by far the most valuable sheep for all those who do not intend raising wool on a large scale for the manufacturer —the latter of these breeds may be formed in our own country by a cross of any short close woolled ram on well modelled ewes. I know not whether they have the full blooded Teeswater to the Eastward, the heaviest breed of sheep in England; it would be well for us to possess so large a race—but I am of opinion we are mainly deficient only in the form of the animal, which enables them to carry much more flesh and fat with a greater economy of keep. I beg leave to refer you to the engravings of the Bakewell or Dishley, and South Down, as not a descriptive, or highly wrought, but a faithful picture of such sheep, if they maintain the same form now, as when viewed by me some years past in the state of New Jersey. The form of these sheep must strike the eye of every beholder, and will, I hope, make an impression of the great necessity of reform. 'Tis easy to raise sheep of great apparent size, a considerable body, on long legs* covered by loose long wool, may cut a conspicuous figure—but in real value take a flock throughout the short legged, long bodied, straight backed, &c. &c. carrying a close fleece of a fineness to suit the purposes of the breeder, the longer the better, for in that is to be shown the great skill of the shepherd, extending the fibre without injury to its other qualities. They are two to one in value.

March 4th, 1824. It had been my intention to have made this communication last summer, had not circumstances prevented—with some addition and amendment, which I am not able to do now—since that time we have learned, through the Farmer, that the Teeswater sheep are to be had to the eastward. Permit me to call your attention to the subject of cattle, as contained in the accompanying letter from the ex-secretary of the Philadelphia Society.

RICHARD K. MEADE.

From the Edinburgh Farmers' Magazine.

DIRECTIONS FOR MAKING COMPOST DUNGHILLS OF PEAT-MOSS, BY LORD MEADOWBANK.

[The following directions and observations, though relating to peat, a soil found rarely in Virginia, (if any where but in the Dismal Swamp,) would probably be valuable if applied to the more decomposed and already fertile vegetable soils, which our tide-marshes and alluvial swamps present.—ED. FAR. REG.]

Presuming that the directions for making compost dunghills of peat-turf, in a judicious manner, as ascertained in a pamphlet lately written by

* Mr. Barney, of Delaware, always selects his breeders *first*, and never permits the butcher or the purchaser of breeding stock, even to look at his *best* sheep with a view to the purchase of them. This, after all, is the way for the farmer to get the highest prices, because it gives him the best *stock* sheep.—ED. AM. FARM.

* Such was the character, in a considerable degree, of the wether weighing 185 lbs. and shearing 8 lbs. wool, mentioned at the close of the list. This sheep had height and length enough to have weighed with a proper form and close fleece 250, and have shorn at least fifty per cent. more.

Lord Meadowbank, will be of utility to many of your readers, I have sent you a transcript of a part of that pamphlet. I have only to add, that I have seen a compost dunghill, made according to his lordship's directions, which completely answered the purpose, by fermenting the peat-turf, and thereby reducing it into a situation proper to be applied as manure; which appears to me to be a far preferable method to that of reducing the peat-turf (or moss, as it is called in Scotland) to ashes.

I am, &c. A. S.

Let the peat-moss, of which compost is to be formed, be thrown out of the pit for some weeks or months, in order to lose its redundant moisture. By this means, it is rendered the lighter to carry, and less compact and weighty, when made up with fresh dung for fermentation; and, accordingly, less dung is required for the purpose, than if the preparation is made with peat taken recently from the pit. The peat taken from near the surface, or at a considerable depth, answers equally well.

Take the peat-moss to a dry spot, convenient for constructing a dunghill to serve the field to be manured. Lay the cart-loads of it in two rows, and of the dung, in a row betwixt them. The dung thus lies nearly on an area of the future compost dunghill, and the rows of peat should be near enough each other, that workmen, in making up the compost, may be able to throw them together by the spade. In making up, let the workmen begin at one end; and at the extremity of the row of dung, (which should not extend quite so far at that end as the rows of peats on each side of it do,) let them lay a bottom of peat, six inches deep and fifteen feet wide, if the grounds admit of it; then throw forward, and lay on, about ten inches of dung above the bottom of peat; then add from the side-rows about six inches of peat; then four or five of dung, and then six more of peat; then another thin layer of dung; and then cover it over with peat at the end where it was begun, at the two sides, and above. The compost should not be raised above four feet, or four feet and a half high; otherwise, it is apt to press too heavily on the under parts, and check the fermentation. When a beginning is thus made, the workmen will proceed working backwards, and adding to the column of compost, as they are furnished with the three rows of materials directed to be laid down for them. They must take care not to tread on the compost, or render it too compact; and, of consequence, in proportion as the peat is wet, it should be made up in lumps, and not much broken.

In mild weather, seven cart-loads of common farm-dung, tolerably fresh made, is sufficient for twenty-one cart-loads of peat-moss; but in cold weather, a larger proportion of dung is desirable. To every twenty-eight carts of the compost, when made up, it is of use to throw on, above it, a cart-load of ashes, either made from coal, peat, or wood; or, if these cannot be had, half the quantity of slacked lime may be used; the more finely powdered the better. But these additions are nowise essential to the general success of the compost.

The dung to be used should either have been recently made, or kept fresh by compression; as, by the treading of cattle or swine, or by carts passing over it. And if there is little or no litter in it, a smaller quantity will serve, provided any spongy vegetable matter is added at making up the compost, as fresh weeds, the rubbish of a stack-yard, potato-shaws, sawings of timber, &c. And as some sorts of dung, even when fresh, are much more advanced in decomposition than others, it is material to attend to this; for a much less proportion of such dung as is less advanced, will serve for the compost, provided care is taken to keep the mass sufficiently open, either by a mixture of the above-mentioned substances, or, if these are wanting, by adding the peat piece-meal; that is, first making it up in the usual proportion of three to one of dung; and then, after a time, adding an equal quantity, more or less, of moss. The dung of this character, of greatest quantity, is shamble dung, with which, under the above precautions, six times the quantity of peat, or more, may be prepared. The same holds as to pigeon dung, and other fowl dung; and, to a certain extent also, as to that which is collected from towns, and made by animals that feed on grains, refuse of distilleries, &c.

The compost, after it is made up, gets into a general heat, sooner or later, according to the weather, and the condition of the dung: in summer, in ten days or sooner; in winter, not perhaps for many weeks, if the cold is severe. It always, however, has been found to come on at last;* and, in summer, it sometimes rises so high as to be mischievous, by consuming the materials, (fire-fanging.) In that season, a stick should be kept in it in different parts, to pull out and feel now and then; for, if it approaches to blood-heat, it should either be watered, or turned over; and, on such an occasion, advantage may be taken to mix it with a little fresh moss. † The heat subsides, after a time, and with great variety, according to the weather, the dung, and the perfection of the making up of the compost; which then should be allowed to remain untouched, till within three weeks of using, when it should be turned over, upside down, and outside in, and all lumps broken: Then it comes into a second heat; but soon cools, and should be taken out for use In this state, the whole, except bits of the old decayed wood, appears a black free mass, and spreads like garden mould. Use it, weight for weight, as farm-yard dung; and it will be found, in a course of cropping, fully to stand the comparison.

Let it be observed, that the object in making up the compost, is to form as large a hot-bed as the quantity of dung employed admits of, and then to surround it on all sides, so as to have the whole benefit of the heat and effluvia. Peat, nearly as dry as garden-mould in seed time, may be mixed with the dung, so as to double the volume and more of it. Workmen must begin with using layers; but, when accustomed to the just propor-

* In order to bring on the heat more expeditiously in a compost made up in frost, a narrow addition of dung and peat has, sometimes, after the frost had gone off, been laid along the sides of the compost, scraping down a little the coating of peat upon it.

† In June 1796, a compost was formed, only 2¼ peat of 1 dung: it heated in July beyond the measure of a thermometer graduated to 110°. Part was allowed to stand, part turned with a half more moss. Three weeks after, (18th August,) the heat of the former had descended to 84°, while that of the latter had got up again to above 110°.

tions, if they are furnished with peat moderately dry, and dung not lost in litter, they throw it up together as a mixed mass; and they improve in the art, so as to make a less proportion of dung serve for the preparation.

The addition recommended, of ashes or lime to the compost, is thought to favor the general perfection of the preparation, and to hasten the second heat. The lime laid on above the dunghill, as directed, is rendered mild by the vapors that escape during the first heat.

Compost, made up before January, has hitherto been in good order for the spring crops; but this may not happen in a long frost. In summer, it is ready in eight or ten weeks; and if there is an anxiety to have it soon prepared, the addition of ashes, or of a little lime rubbish of old buildings, or of lime slacked with foul water, applied to the dung used in making up, will quicken the process considerably.

Lime has been mixed previously with the peat; but the compost prepared with that mixture, or with the simple peat, seemed to produce equally good crops. All the land, however, that it has been tried on, has been limed more or less within these twenty-five years.

The rich coarse earth, which is frequently found on the surface of peat, is too heavy to be admitted into this compost; but it makes an excellent top-dressing, if previously mixed and turned over with lime.

Peat, prepared with lime alone, has not been found to answer as a good manure. In one instance, viz. on a bit of fallow, sown with wheat, it was manifestly pernicious.

ON THE CONSTRUCTION OF ICE-HOUSES, AND STOWING AWAY OF ICE.

To the Editor of the American Farmer.

Sir—Having observed in a late number of the American Farmer, some remarks upon the convenience and utility of securing a plentiful supply of ice, for use through the summer season, I take the liberty to add a few observations upon the subject, which, if you think useful, you are at liberty to insert in your valuable journal.

As it would neither be convenient to myself, nor beneficial to the object we have in view, to enter upon an extended discussion of this subject, I shall at once proceed to remark, that the common manner pursued, by almost every one in putting up ice, is to throw it promiscuously into the house, and then employ laborers to break it into small pieces. In this manner of securing it, numberless interstices are formed by the angles of the pieces after they are broken, which being filled with air, operate of course through the season, to promote the decay of the ice, and greatly accelerate its dissolution.

The manner which I have pursued, and which I strongly recommend to the observance of your readers, is, to cut the ice as nearly into squares as can conveniently be done, and when conveyed to the house, lay these down carefully, in regular layers, taking care to break them as little as possible. As soon as the first layer or stratum is completed, fill up with fine ice all the crevices, which the angles in the pieces may have occasioned, then sweep the surface clean, from all small fragments of ice, so as to leave a smooth clear floor or surface, to commence your succeeding stratum or layer upon; and thus proceed, until the house shall have been completely filled. In this manner, I have found that one-third more ice can be stowed in a given space, than could be put into it by the ordinary mode of pounding; and as there will not be the smallest crevice throughout the whole mass, if the plan here recommended is properly executed, it is confidently asserted that the ice will last *double as long* as under the common mode of securing it.

Every ice-house should be provided with a drain to carry off the drippings throughout the warm season, unless the bottom be an open porous sandy soil; as nothing is so fatal to ice as moisture. This drain should be so constructed as not to admit air; else a constant current of warm atmosphere will be drawn to the bottom of the ice, which will rapidly destroy it. The house, which the writer of these remarks has erected, is of the most simple construction, and a similar one may be built by any farmer, for an expense not exceeding $30. It has been filled in the manner here recommended, and has not been without ice since it was first stocked, and at this time contains a considerable quantity, notwithstanding the most profuse use was made of it, by two families, during the whole of last summer.

The following plan is recommended, in the construction of ice-houses: Dig a pit on the north or north-west side of a bank or hill, 18 feet square, and about 14 feet deep on the upper side, to which depth, the pit may be raised all round, by the dirt being thrown to the lower side; build in this pit a house of white oak logs, so as to leave a clear space between the outsides of the house and the wall of the pit, of about two feet. If the bank is of hard clay, it will need no stay: if it be not of clay, or hard firm soil, it must be stayed by pieces of plank propped against it, from the outsides of the logs, so as to prevent its covering the space between the logs; and this bank should be filled all round with straw, and the insides of the logs boarded up, so as to present a smooth even surface; this will leave the inside of the house about 12 or 13 feet square, which will be sufficient for any family.

The drain from the bottom of the house, should be placed on the lowest side, to which a sufficient fall ought to be secured from all parts of the foundation. The drain should be formed by stone, so laid as to afford an opening for the water readily to pass off, and then covered up with earth, taking care to allow to it a sufficient fall; and then its termination be covered slightly with earth, so that no air can pass up, whilst the moisture may gradually soak through. Lay at the bottom of the house, sleepers, so as to raise the planks to be placed upon them, about one foot from the ground, and upon these planks lay your first strata of ice, as is here before directed.

After raising your house with logs, (as here recommended, to the height of about 14 feet,) build another house over it, with logs, to be placed upon the surface of the ground, at the outer edge of the pit; raise this house about three feet high, upon which place your roof, and from the inner logs which inclose the ice, to the outer ones, which support the roof, nail planks, and stow the whole space under them with straw—you will thus have an ice-house surrounded on all sides with a thickness of about two feet of straw. When the ice is put away, cover the whole with a suitable thickness of straw, which should be removed once or twice in the course of the summer, as it becomes wet, and replace it with a fresh dry covering. By pursuing these means, you need never be without a plentiful supply of ice at all seasons.

P. E. T.

From the Edinburgh Farmers' Magazine.

AN ESSAY ON THE PROPER SIZE OF FARMS.

This will best appear from observing the *effects* of the different classes of farms as at present existing, and which may be arranged under the following heads:

I. Of farms altogether under *tillage*.

II. Of farms altogether in *pastures*.

III. Of farms *partly in tillage, and partly pasture*.

Head I.

Of farms altogether under *tillage*, yet including as much pasture as may serve the milch-cows for the family use alone.

These again may be subdivided under the following classes:

1*st*, Of small farms in the occupation of *mechanics*.

2*d*, Of small farms in the occupation of *husbandmen*, having no other profession.

3*d*, Of *two* or *more* farms contiguous, cultivated by one farmer.

4*th*, Of *several* farms *separated* from one another, but in one man's occupation. First, then,

Of small farms in the occupation of mechanics.

These are generally to be met with in the vicinity of towns or large villages; there are some examples of them also in the smaller villages scattered over the country, in which the wright, the smith, the webster, or the sutor, have their bit of land.

The husbandry of all these, without a single exception, is bad; the more inexcusable, when it happens to be in the immediate vicinity of a populous town, where, from market and manure, they ought to be in the best state: but there is an inherent vice in this system, which no situation can counterbalance. For agriculture, in such hands, can never be more than a secondary object, or rather a by-job altogether: But, unhappily, this is not all the mischief; for even their primary profession suffers in their unavoidable distraction of attention between the different occupations: And thus, from commencing their agricultural career, as bad husbandmen, they commonly dwindle down, in the end, to be sorry mechanics likewise.

It would, however, be wrong to prohibit this species of husbandry. Why should a man be hindered from giving vent to his folly in this line, as well as in any other. His time, to be sure, is very ill bestowed on such a speculation; but it would be worse *spent* in the *tavern*, on the *turf*, or in the *cock-pit;* and if there be any truth in the notion, that the *health* of such people is promoted by rural operations, it may compensate in some degree, to the state, what it thus loses by their wretched cultivation.

There are, indeed, some examples of farms on a larger scale, that are occupied by *townsmen*, in which the cultivation is by no means bad. Some people, however, are ill-natured enough to remark, that the original profession declines in proportion as the farming advances: but the consideration of this is foreign to the present question.

2. Of *small* farms in the hands of *husbandmen having no other profession.*

By a farm of this description, I mean one of a *single ploughgate* of land, containing from 30 to 50 acres.

In this situation, the farmer cannot afford to *lie idle*, as it is termed; he must be a laborer himself, and is commonly the hardest wrought laborer on his farm. He is indeed the only able-bodied man about his *town;* his servants consisting of a raw lad to assist him in the field-operations, and a boy to take care of the cows. In winter, he may have an old man, supernumerary, to assist him four or five months to thrash out his crop; but, at all seasons, he receives much assistance from the female part of the family. The women are ever kept in full employment. They *redd* the barn to the old man; they fork the dung, and spread it along with the lad; they muck the byre, and fother the nolt with the boy; they carry the seed-corn to the *gudeman;* and, in company with the *gudewife*, they weed the lint, and dress it; and besides spinning, and the daily operations of the *dairy*, and making of the *porridge* and *kale*, they have the occasional drudgery of the washings to perform too. Nothing, indeed, can exceed the industry of this part of the family, but the cheerfulness of their disposition, and their unaffected simplicity of manners.

With regard to the agriculture of this plodding class of farmers it depends very much on the practice they have been educated in. No improvement almost was ever known to originate with them. They have even a reluctancy to adopt any that may be suggested to them. This does not arise, however, from any perversity of disposition or failure of intellect; but it is the natural consequence of their confined situation, and scarcity of transactions. They cannot afford to mix with the world from curiosity: even their indispensable absence from home, on account of business, is peculiarly inconvenient and expensive, as it lays the full half of their home-operations at a stand, while the little business they have to transact abroad is not full employment for the time.

There are, however, many examples of good cultivation in this class, (in well established modes of good cultivation they are indeed excelled by none); but it will always be found, that the most intelligent of them or those who have had, from some specialty in their circumstances, an unusual intercourse at an early period with society; or who, living in the vicinity of a great town, have hence acquired, at little expense, a knowledge of mankind, and of the principles of improvement, which in a remote situation, in their limited sphere, they never could have attained.

Whenever our country is so completely cultivated, that there will not remain a single improvement that can be made, either by inclosing, draining, watering, &c., or in cattle, implements, or rotation, then may it be laid out into such small farms, and consigned into the hands of these little tenants, who will be able, perhaps, without any great loss, to retain the soil in fertility. Such arrangement may be even necessary, from a regard to the morals of the people; as, from the dissipation which will naturally accompany such a state of prosperity, there would be no class of men so apt, from their circumstances, to retain the simplicity of manners and laborious industry of ancient times. Even at the present day, they may be placed in the vicinity of great towns, where the land is already, for the most part, in an improved state, as their habits of industry and temperance would, for some time, prove a barrier against the spread of the enervated licentiousness of city-depravity; though it might still be necessary, from time to time, to renew the race from more remote parts, in proportion as the present possessors become contaminated with the vices of a more luxurious life. This change of tenantry would be of advantage, were it mutual between the parties: for, if those who have been living for a series of years in the neighborhood of a great town, were removed to a more remote situation, their more intelligent ideas in their profession would operate to the more rapid melioration of the less improved lands on which they might choose to settle, while they would lose the habit of dissipation, from being less in the way of temptation to indulgence.

At present, the produce brought to market from small farms is always less in proportion, than from farms of a larger size: because a greater proportion of it is consumed at home, by the more proportionably numerous stock of unproductive cattle; an inherent evil in little farms, which no genius in the occupier can obviate: and, in general, there is even less produced on the ground, from the circumstances before stated, with regard to the abilities of the husbandman himself. With regard to the effect of small farms on population, that will best appear from the next subdivision.

3. Of two or more farms lying *contiguous*, occupied by one farmer; being the general means by which *great* farms have originally been formed.

Though this system of letting lands has ever been a grievous subject of lamentation with half-witted politicians, it has nevertheless, in practice, been found to be the most beneficial to the country, and still continues to add to the general prosperity.

When two or more farms are conjoined, the following effects arise: 1. The *expense of labor is reduced*, in so far as the peculiarities in the soil in one, are contrasted by those in another farm; so that when the land is not in a condition of being labored in one, it may with propriety be labored in another; as in the example of one of the farms being of a dry soil, and the other of a wet; and which is commonly a conducing reason for the conjunction. Even where the soil is all of the same nature, there arises an advantage in the laboring of a great farm, from the concentring of the strength of men and horses at any particular operation, by which it is got finished in proper case, with less risk of being spoiled, from the uncertainty of weather, &c. 2. The *expense of house-keeping* is reduced, in proportion as there are fewer families of farmers to maintain. 3. The farmer, having more business, is more abroad in the world; is conversant in a higher line of life; and thus, having more opportunities of information, he, in fact, becomes better informed; and as he has, 4. The *profits* of a *greater quantity* of ground in his hands, he is thence more able to introduce an improvement in practice or in stock, from another quarter, or better enabled to propose it himself, from his own observation and experience.

The real produce of the lands becomes thus augmented; and as there is less of it consumed at home, (there being fewer men and horses to maintain), a still greater proportion goes to market.

The *population* on the land is also augmented; for although it be true, that the common operations of the farm are conducted by fewer hands, yet there is always some extra work going forward in the various operations of improvement; such as, in hedging, ditching, levelling, draining, building, &c. which the little farmer never would have thought of, or never have performed. The great farmer also excels the little tenant in a circumstance, which, more than any thing else conduces to the population of the country; which is, that the *greater part of his servants are married, and have families of their own:* and this he chooses, not from any affectation of patriotism, but from a principle of more effective influence—a regard to his own interest; as he finds, that a numerous household of unmarried servants are very unmanageable, and that he is better served with sober married hinds, who board in their own houses, at less expense, and more to their satisfaction, as well as his own.

The following state, in regard to this point, of a farm in the vicinity of Edinburgh, consisting of about 280 Scottish acres, and which, prior to 1736, was in three farms of two ploughgates each, and which has since been united into one, shows this in a more explicit manner.

1735.		1793.	
Families of farmers	3	Family of the farmer	1
Ditto of cottagers	6	Families of cottagers	14
Total families	9	Total families	15
Horses	33	Horses	16
At this period, the increase from the married servants, was not sufficient to keep up the number of unmarried servants, who, of course, were obtained partly from the neighboring villages; being sons of weavers, tailors, &c.		At the present period, the increase from the married servants does much more than supply the population necessary. Their sons and daughters are therefore sent to supply the neighboring towns, or to *the smaller farms in the neighborhood which cannot supply themselves!* There are also at this time, four young men from this farm at sea.	
Rent about 230l.		Rent 636l.	

As to the question, *How large ought a farm to be?* I can perceive no bounds, in point of propriety, except those which nature has set to the genius of the farmer, and providence to his fortune; for the larger that the farm be, if the tenant has capital, and abilities answerable, the better it will be, in every respect, to the community; as not only more produce is brought to market, but actually more is produced, from the superior advantages the great farmer enjoys, of being more able to make improvements, because more wealthy; but also better inclined to do so, from being more intelligent. We even see, that the population of a country thus occupied, is augmented, from the circumstance of his interest being concerned, in giving the preference to married servants, instead of lads and boys, and superannuated men, with which the small farms are peopled. That he does not employ the whole progeny of these hinds, is a favorable circumstance to the public, as they serve as an excellent nursery for the supply of the mechanical branches, which not only cannot be recruited from a country laid out in small farms, but are themselves drained of their youth, to keep up the population of that unproductive system.*

Instead, therefore, of inquiring what ought to be the size of a farm, an assize ought to be held on the judgment of the farmer, and the capital he is able to command; for although it may be remarked, that the powers of the mind, even in the same person, expand and contract, according to the situation in which he may for some time be placed, yet there can be no doubt, also, that there are people whose genius far surpasses the general run, in whatever circumstances they may be placed. Thus, while it would require a man of considerable abilities to manage, in the best manner, a farm of 300 acres in tillage, I should suppose, that were the vast abilities of a *Fox*, or of a *Pitt*, to be concentred on agriculture, with an inclination to the profession, they could, with equal ease, manage a farm of ten times the extent: at least, those who undertake such a charge, and do justice to the subject, might be considered, in agriculture, as those two great characters are in politics, among the most enlightened of their compatriots.

A farm in the vicinity of a great town, requires more abilities to manage, in proportion to its extent, than a farm in a more remote situation; because the branches of operation are more minutely divided, and the sources, from which the revenue is obtained, flow in more various channels; while the general economy of the whole is regulated by more uncertain and variable principles.

4. Of *several* farms in the possession of *one* farmer, lying at *a distance* from one another.

In this system, the advantages are not altogether so great as when the farms are contiguous: For, 1*st*, The contrast in the soil gives no advantage in the labor; nor can the strength of the whole be concentred on one object: of course, a greater expense in labor is incurred. 2*d*, As the master cannot oversee the whole personally, he must delegate his authority in part to an overseer, which seldom turns out so effective. But, in other respects, the advantages are nearly equal; and in population it is superior; for more people are required to do the same work. The profit, of course, will be diminished; but as the farmer will be more in the practice of traversing the country, he will naturally become more intelligent, and thence carry on his plans more judiciously.

* It is curious to observe the cant of declamation (for depopulating the country) which has, for these last forty years, been kept up against the uniting of the small farms, which has taken place chiefly in that period, which has not only been an æra of great agricultural improvement, but the population, from actual investigation, has increased, in Scotland, near 300,000 souls, or about one-fifth of the whole.

Head II.

Of farms altogether in PASTURE, *including a small proportion of tillage, for raising corn and potatoes for the residenters.*

These may also be considered under the same subdivisions as in the former head.

1*st*, With respect to mechanics interfering with this system, there is hardly an instance, though it would be much more for their advantage, if they converted their pitiful possessions to the maintenance of a milch cow, or the rearing of a young beast, than, in their present wretched system of tillage, oppressing themselves, and disgracing the country. But, for this purpose, it would be necessary that their patches were inclosed: but that would be by far too great an exertion for their genius; and so I shall leave them to their own mismanagement.

2*d*, Of *small* pasture farms in the occupation of tenants having *no other occupation*.

There cannot well be a very small farm of this description, as the attention required would not be sufficient employment, neither would the profit to be derived be a sufficient recompense for constant attention. They must necessarily, therefore, be of greater extent than the small arable farm, where there is always abundance of employment to the little tenant; and although there may be little recompense to him as a *master*, yet he is generally understood to be sufficiently remunerated for the labor which, as a *servant*, he bestows upon it.

The same circumstance which promotes the prosperity of a corn farmer on an arable farm, and the consequent prosperity of the country, will, I am persuaded, operate in the same manner upon a cattle-farmer in a pasture farm, viz. that the larger that the concern be, if the tenant has abilities answerable, the more enterprising will he become, and the country will the more speedily be improved in the breed of cattle, and melioration of pasture lands.

3*d*, Of *two or more* farms lying *contiguous*, in the occupation of one tenant.

That the tenant in this situation will be more wealthy and more intelligent, and hence, being more enterprising, will be more beneficial to the country, has already, in the foregoing article, been noticed; in addition to which, the following remarks occur.

A man will be able to manage a pasture farm of greater value and greater stock, on a rich soil, than on a poorer one, which must be more extensive to yield the same produce, and will therefore require more exertion to oversee. The quantity of land and quantity of stock that a farmer may have abilities to manage in a pasture farm, may be vastly greater, than in a farm under tillage; as there are fewer servants to oversee, and as the process of breeding and feeding cattle is much less complex than that of raising corn.

The effect on population, of uniting two or more pasture farms into one, will be much the same, as formerly stated, with regard to farms in tillage; for, although the tenant may be enabled to keep fewer herds, yet he will naturally choose that these should be married men, boarding in their own families: even were this to produce no increase of population, it ought to be held as beneficial to the country; for the great farmers' herds have a better chance of getting full employment, than in a small farm tending a small flock,

"The herd diminutive, of many hues;" THOMSON.

where they are little better than half idle: for a population of idle people ought to be exploded; as not only are the faculties of these people themselves locked up for want of exertion, but the money which their maintenance requires, is thus diverted from the channels of enterprise and improvement into which it might otherwise have flowed.

4th, Of *several* pasture farms, at a *distance* from each other, in one tenant's occupation.

The effects in this case are almost the same as if the farms lay contiguous, provided each separate farm has all the varieties of pasture, and proper shelter for the cattle; but if this is not the case, it were better for the farmer (and for the public) that they lay conterminous to one another, as they thereby could afford accommodation, to the mutual advantage of the whole. So far, also, as loss may arise from the master not being able to superintend the whole, so far will there be a disadvantage in having distant farms in pasture, as well as distant farms in tillage; but, on the other hand, as was before observed, the farmer himself will become more intelligent, in proportion as he has to traverse a greater range of country, from which he will the more readily introduce or make improvements in the breed or management of his flock.

Head III.
Of arable and pasture united.

Whatever has been said respecting the *size* of farms, in the two former heads, is equally applicable to this; the larger that the farms are, the more intelligent and enterprising will the farmer himself be; and hence, from his more spirited and judicious exertions, the community at large will derive a greater advantage.

This mode, or system of farming, is the most judicious of the whole, as it promotes the interest of all parties concerned, the proprietor, the tenant, and the public at large, more than either of the two modes separately. It promotes the interest of the proprietor, by affording him a greater rent: it promotes the interest of the tenant; because he will be able to manage a greater extent of land, than in a farm wholly in tillage; and he will have more intercourse with the world, than in a farm wholly in pasture; and hence, performing more business, and being more enlightened, he will become more wealthy. Finally, it promotes the interest of the public; because a greater proportion of the produce will be brought to market, and even a greater crop produced. This arises from two causes: 1*st*, there will be fewer unproductive cattle to eat up the produce at home: 2*d*, The lands being alternately in tillage and in grass, they will be kept in better condition; and the crops of corn, and of hay or pasture, will be more luxuriant, and of a better quality.

With respect to *population,* this system is unfavorable in one case, and favorable in another. It is unfavorable in the case of converting a farm, that had been wholly in tillage, into part tillage, and part pasture; for pasture land always requires fewer people to manage it, than lands in tillage; but for the same reason, it is favorable to, or increasive of population, when pasture lands are converted to the production of grain. In a great proportion of the best lands of England, it would be highly for the advantage of all parties, that this system were adopted, instead of the grazing system, which prevails without variation. In Scotland, however, the case is different; there, the greater part of the arable lands, which formerly were kept wholly under the plough, have been most judiciously improved, from the introduction of this alternate system, and which has, to a certain extent, diminished the number of people employed in agriculture, greatly to the mortification of the gloomy-minded declaimers against the present times, who, in the blindness of their rage, denounce the uniting of small farms as the cause of this mistaken national calamity. But, even were this notion to be well founded, (and it would not be difficult to show that it is not,) yet surely it is not solely the *numbers* of people employed in any profession, that ought to render them respectable in the state: regard must also be had to the *ingenuity* with which they are actuated, and the *industry* with which they carry on their operations. People, not judiciously employed, are little better to the state than if they were not employed at all.

H.

For the Farmers' Register.

ROUGH FIELD NOTES.

No. I.

Chesapeake and Ohio Canal.

This canal is one of the most interesting, and, in point of construction, one of the greatest works in our country. It was commenced ten years ago; and packet boats can now ascend to Williamsport, rather more than 100 miles above Washington. It leaves the head of tide-water at Georgetown, and will terminate somewhere on the Ohio near Pittsburg. The whole length, when completed, will not be less than 340 miles. This route may be divided into three sections: first, the eastern, from Georgetown to near Cumberland, 187 miles; second, the section on which is the summit level, from Cumberland to the north of Casselman's River, 71 miles; and third, from the last named place to the Ohio, 85 miles.

The rise on the first division is 635 feet; the whole lockage on the second, 1961 feet; and the fall on the third, 619 feet; making the lockage of the whole canal 3215 feet. On the second division, there will be a tunnel, of rather more than 4 miles long, under a ridge of the Alleghany, 860 feet in elevation. What a stupendous undertaking! If ever completed, to see it will be worth a trip across the Atlantic.

From Georgetown the canal rises, by a rapid succession of 5 locks, 35 feet. At Harper's Ferry it attains an elevation of 255 feet above tide, by means of 32 locks. The locks are all built of stone, hewn on the face, 100 feet long and 15 feet wide in the clear, and are from 6 to 8 feet lift. The canal itself is 60 feet wide at water-surface and 6 feet deep. For a few miles above Georgetown, the dimensions are even greater. The towpath is 10 feet wide at top. The embankments of the part now in use have become solid and firm. The canal slope of the embankments is covered, for the greater part of the way, with broken stone, measuring not more than an inch or two cube, to prevent abrasion. The stone is found to preserve the banks well, and will be used for this purpose throughout.

After leaving Georgetown, until the principal falls are passed, the banks on either side of the Potomac crowd on the river, and the canal clings along the northern bank with frequently perpendicular bluffs of rock, 50 feet high one side, and stone walling on the other, to protect it from the river. The valley of the river, however, soon widens. The receding hills give more room for the canal, and a better location is obtained on a gentle slope, free at once from the heavy cutting or walling. The hills frequently again approach the river, and again there is very heavy work. Such are the general features of the location from Georgetown to the Point of Rocks, at which place the Potomac breaks through the first range of the Blue Ridge, under the appellation of the Catoctin Mountains. From this point to Harper's Ferry, the canal and Baltimore and Ohio railroad run side by side, frequently along the side of precipitous hills, with rocks hanging a hundred feet above them.

At several places below the Point of Rocks, the canal cuts through the beautiful Potomac breccia, the material of the columns in the hall of congress at Washington: in fact, those columns were taken from this very place. There was a long suit between the canal and railroad companies, with regard to the right of way between the Point of Rocks and Harper's Ferry. The canal company, being the first chartered, and believing that the railroad would seriously injure their interests, strenuously opposed the passage of the railroad. The suit was decided against the railroad company; but the matter was afterwards compromised, and, in consideration of a certain sum of money, the right of way was granted to the railway.

The Monocacy and Catoctin aqueducts, across streams of the same names, are the principal structures below Harper's Ferry. The former consists of 7 arches, each about 55 feet span, the latter of 3 arches. They are built entirely of stone. A part of the Catoctin aqueduct fell down about June last, and they are now engaged in repairing it.

Harper's Ferry is situated in the fork of the Potomac and the Shenandoah. You have heard much of the scenery in its vicinity. My anticipations were very great, but they were not disappointed. I reached it a little after dark, and saw it both by day and moon-light. On approaching it from the Point of Rocks, the scenery combines both beauty and sublimity. The Blue Ridge is soon passed, and the traveller is enclosed by mountains—the river falling and tumbling over rocks—the quiet canal calmly winding its way in graceful curves—the long train of engine and coaches hurrying rapidly past—the high and rugged mountains on either side at times presenting to the eye nothing but naked rocks, at others covered with all the tints of autumnal foliage, and the setting sun with its reflected light streaming along the bosom of the water, all combine to furnish a scene truly enchanting. A little farther, and the course of the river becomes more and more intricate; its egress can no longer be traced, nor can the eye find where it enters the barrier of mountains. On reaching Harper's Ferry, the effect of the scenery is still increased: up the Potomac or down the Potomac, or up the Shenandoah, all is beautiful.

Alexandria Canal and Aqueduct.

The proper termination of the Chesapeake and Ohio canal is undoubtedly at Georgetown; but both Washington and Alexandria have determined to extend it through their respective bounds. To this end, Washington has expended a sum of $225,000 in converting what was once an ugly and filthy creek, into a broad canal, which extends through the lower part of the ground of the corporation, to the east branch of the Potomac. The Alexandria canal is on the south side of the Potomac, and is to be united to the Chesapeake and Ohio canal, by means of an aqueduct, now in the course of construction, at Georgetown. Think of a navigable canal being carried across the tide-water of the mighty Potomac! The aqueduct will consist of nine spans of about ninety feet each. It was commenced four years ago, and has heretofore proceeded slowly. They seem now, however, to be pushing the work with more energy; and it will not be long before the canal boats will be gliding across, at an elevation of 35 feet above the surface of the water. One abutment and 3 piers are now finished; 2 other piers are above high-water, and 3 have yet to be founded. The masonry of the abutments and piers does great credit both to the builders and superintendents, and the coffer-dams and fixtures, (accounts of which have been published in some of the European journals,) show great professional knowledge on the part of their engineers. The piers are founded on solid rock, as much as 35 or 40 feet below the surface of the water. A steam engine is used to pump the water from the coffer-dams.

As much, however, as I admire the execution of the aqueduct, so far as it is finished, and, indeed, as noble and magnificent as is the undertaking, I still more wonder at the consummate folly which throws away hundreds of thousands in constructing a canal by the side of such a river as the Potomac. A striking comment on the wisdom with which this work was conceived, is the fact that a steamboat plies almost hourly between Georgetown and Alexandria, and the fact, that I saw at the wharf of Georgetown, at the very head of this canal, a full-rigged ship of not less than 350 or 400 tons. It is attributable to the same petty jealousy, no doubt, which is so often found throughout our widely extended country, causing immense sums to be sometimes expended in vain, and, at others, preventing the expenditure of a cent, where thousands might be expended with profit.

Baltimore and Ohio Railroad.

This work was commenced in 1828, and is interesting in as much as it was one of the first railroads in this country—and because its company has done more than any other to advance and improve the railway system. Almost every different kind of superstructure has been tried, and experiments made without regard to cost, in order to attain that which was really best.

The railroad leaves the head of Pratt street, in Baltimore, and passes across the country for 9 miles to the Patapsco. In this distance there is much heavy work—excavations and embankments as much as from 40 to 70 feet. In this part of the route is the Carrolton viaduct, well worthy of notice. It is built of hewn granite, consists of two arches, one of 80 feet span across Gwynn's Falls, and a smaller one of 20 feet span for a roadway. The whole length is 312 feet—from surface of water to top of the parapet is 52 feet, and the width between the parapets is 26 feet. The cost of this viaduct was $53,000.

After striking the Patapsco, the railway follows the valley of that river to its head, about 40 miles from Baltimore. For this distance it follows closely the windings of the river, and for nearly the whole way constitutes a shelf along a precipitous hillside. It crosses the Patapsco once, about 15 miles from town, by a stone bridge, 375 feet long, and consisting of 4 arches, two of 54 feet span, and two 21 feet. This bridge is a handsome structure of unhewn granite of the best quality, an abundance of which is found in the vicinity. A small quantity of granite was carried from this place to Washington, for the new Treasury buildings; but much the larger portion of the granite for that immense pile came from James River. These 40 miles are a continued series of curves, and curves too of small radius; some of the curves having a radius of only 395 feet. The evil of bold curvature in a railroad was not so well understood when this road was built. The company is now actively engaged in altering their location in many places, and grading a new way in order to avoid some of their worst curves. In one place they will have to cross and recross the Patapsco, making two expensive bridges.

From the head of the Patapsco to the head of Bush creek, a tributary of the Monocacy, a distance of four miles is occupied in crossing Parr's Ridge. This is the dividing ridge between the waters of the Patapsco and those of the Potomac, and is 813 feet above mid-tide, at Baltimore. It is ascended by two inclined planes, the first 2150 feet long and 80 feet high, the second 3000 feet long and 100 feet high. On the top there is a level 600 feet in length, intended for the location of the machinery for working the planes. On the opposite side, the road in like manner descends from this ridge by two inclined planes, the first being 3200 feet long and 160 feet high, the second 1900 feet long and 81 feet high. These planes are at present worked by horse-power, and are an annual expense of $25,000 to the company. The day I crossed this ridge, each coach, (and there were 3 coaches of the largest class,) was drawn by 6 white horses. These planes might have been avoided by grades of 80 feet to the mile, and I am glad to see that the company is now engaged in making that alteration. The planes are all straight.

From the western foot of Parr's ridge, the road follows down the valley of Bush Creek, to near its junction with the Monocacy. It then crosses this stream, and after running down its valley a mile or two, strikes across the country to the Point of Rocks, on the Potomac. This portion of the road has less bold curvature than any other. though there is no part of it where the curves are not very objectionable. The Monocacy is crossed by a bridge 350 feet long, of 3 spans 110 feet each. The piers and abutments are of stone, but the superstructure of wood. After crossing the Monocacy, there is a branch to Fredericktown, 3 miles long. From the Point of Rocks to Harper's Ferry, as I mentioned before, the railroad runs up the valley of the Potomac, along side of the canal. At Harper's Ferry it connects by a bridge with the Winchester road, penetrating 32 miles up the finest valley of Virginia. This bridge consists of stone piers and wooden superstructure, on the plan of the celebrated Schaffhausen bridge. It consists of 6 spans of 140 feet each. It is now much out of order and considered unsafe for locomotives. The Winchester road leaves Harper's Ferry on trestle work, which is planked over, and forms by moonlight one of the most beautiful promenades I ever saw, running immediately up the middle of the Shenandoah valley, with high mountains towering on either hand.

The valley of the Patapsco furnishes scenery singularly wild and interesting, and the ravine of Bush Creek not much less so, with which the rich and highly cultivated country, through which the road passes from the Monocacy to the Potomac, furnishes a striking and beautiful contrast. So that there are few roads on which you can travel the same distance with such delightful scenery. From Baltimore to Harper's Ferry, the road is 81 miles long, and has cost about $28,000 per mile. The grades on this road, with a few exceptions, are less than 30 feet to the mile.

From Baltimore for 58 miles there are two tracks laid; for the remaining distance, only one has been yet put down. One of the tracks for 30 miles consists of iron plates $2\frac{1}{4}$ by $\frac{5}{8}$ inches on stone rails; all the rest consists of wooden sills, bedded every four feet on broken stone. Into these sills is keyed a rail 6 inches square, and on the rail a plate $2\frac{1}{4}$ by $\frac{5}{8}$ inches. The stone and iron track is used as little as possible; much of the iron has been taken up, and cross ties of wood put on the stone. In a few days they will begin to put new superstructure throughout, on a plan which will be both strong and lasting. They will make their road-bed in the first place of broken stone; on this will be bedded longitudinal string-pieces, on which will be put cross-ties every 3 feet. These ties will support a T rail, weighing 41 to 45 lbs. per yard. It is a source of no small degree of pleasure and admiration, to see a company that has expended such large amounts of money uselessly, and worse than uselessly, still pushing boldly on, gathering experience from its errors, and prosecuting its noble undertaking with an enterprise and energy that must ensure success. The company manufactures its own engines and cars, and has very extensive workshops in Baltimore. The company has my best wishes; it has done much for the cause of internal improvement, and has uniformly exhibited a degree of liberality and enterprise not often met with.

From the Practical Farmer.

CLEANING NEAT CATTLE.

The following we translated, and we would invite the attention of farmers to the subject. Our German correspondent is the right kind of a man.

He gives his notions well confirmed by experience.—*Editor.*

Xenia, Ohio, June 14th, 1838.

MR. EDITOR—Allow me, through the "Farmer," to say a word to my fellow farmers on, what seems to me, an important subject. In this country, you will seldom find a curry-comb and hand brush in the cow-stable; but I consider them indispensable in the cow-stable, as in the horse-stable. Why farmers do not curry and brush their cows, I know not, unless it be that they think cleanliness is not so necessary to the cow as to the horse.

But if we will, for a moment, consider the evils arising from this neglect, the importance of keeping cows clean must strike every reflecting mind. It is well known that no animal, neither horse nor cow, can be healthy, unless *the insensible perspiration goes on regularly*, and this can never be going on if cows are kept in a dirty stable, and no pains taken to rub off carefully the dirt or matter which obstructs the vessels or pores of the skin.

Wherever cows are regularly curried and rubbed they are invariably stronger and in a healthier condition; not liable to *cutaneous* and other diseases; and from experience I know they yield more milk, and that too of a better quality—a cleaner milk, richer cream, and sweeter butter, necessarily follow.

I make it a practice to curry my cows once a day very carefully—I never suffer any dung to stick to their coats—it looks bad, and injures the cows. This useful animal does not deserve such *dirty treatment.* Give them litter sufficient, and remove the dung regularly, and this part is accomplished.

Many of our farmers seem to think that in order to have healthy and good cows, you need only feed them with a sufficiency of food; however, I am fully convinced from experience, that cows may be well supplied with food, still they will not be as profitable as they would be if kept perfectly clean, and free from all kind of dirt and matter obstructing perspiration, as above stated; besides this, if cows are kept perfectly clean, they will thrive upon a less quantity of food.

Cows are often subject to have swollen teats and udders, as well as other excrescences. These may be prevented if the parts be occasionally washed with warm water. The udder and teats should be carefully washed immediately before the cow is milked. It has been well said by Loudon: "Go to the cow stall—take with you cold water and a sponge, and wash each cow's udder clean before milking; dowse the udder with cold water, winter and summer, as it braces, and repels heat."

DAVID HEYMACKER.

KENTUCKY CATTLE.

The following are prices obtained for a part of a stock of fine blooded cattle, belonging to the estate of the late General James Garrard, as we find it in the Paris (Kentucky) Citizen. The list embraces all the thorough-bred cattle offered for sale.

Exception, sold to Brutus J. Clay & Co.	$1830
Eclipse, a calf, George M. Bedford - -	688
Cherry, a cow, to Gen. John Pratt - -	1125
Matilda, to Brutus J. Clay & Co. - -	920
Fanny Kemble, a calf, to Kemus Payne	880
Maria, a cow, to Wm. Gray - - - -	551
Melvira, and calf, to same - - - -	1005
Marchioness, yearling heifer, W. C. Goodloe	407
Moss Rose, to W. G. Clay - - - -	375
Tulip, old, to Thomas Y. Brent - -	130
Beauty, to John and Joseph Collier -	476
	$8187

Below is a list of some of the fine mixed bloods:

Lady Morgan, yearling heifer, sold to W. Scott, for - - - - - - -	$550
Snow drop, a calf, to N. P. Rogers -	325
Lucilla, yearling, to James Batterton -	340
Julia Jackson, to Enoch Kirby - -	195
Rosetta, a calf, to same - - - - -	155
Lily, to John Collier - - - - -	190
Josephina, to Moses Ryan - - -	205
Red Beauty, to same - - - - -	375
White Lily, to John Desha - - -	105
Young Nell, to John Graves - -	140
	$2580

Amounting in all to - $10,967

From the Silk Grower.

SILK-CULTURE.

Having fed a small number of silk-worms the past season, and having, as I suppose, succeeded well, I send you a brief account of my fixtures, feeding, &c. If you think my experience will in the least degree aid the good cause in which we are in common engaged, you are at liberty to publish it. My cocoonery in 36 feet by 18, two stories high, lathed and plastered, with a chimney in each end, and a cellar under the whole. The building is substantial and well finished. It has 28 windows and 5 doors, blinds and venitian shutters. The building was intended to be converted into a dwelling in the event of its not being used as a cocoonery. Two rows of shelves, the whole length of the building, were put up, each shelf one foot above the other, so that I had large aisles between the rows of shelves and around them, affording ample room for feeding the worms and changing the hurdles. My hurdles are three by four feet, made with cotton twine, not knit, but crossed as a bed-cord. I supposed I had accommodations for feeding 2 or 300,000 worms hatched in succession. I accordingly procured two ounces mammoth white eggs, from Mr. Stone, of Burlington, which were understood to come from Germantown Pa., and several ounces of sulphur colored, from Mr. Comstock, of Hartford. These were all put in glass jars, and placed in the ice-house about the 1st of April. The 15th of June, the mammoth white were taken out and exposed for hatching, and in a few days, about 5250 of them hatched, which was all I obtained from the two ounces. I then exposed those I obtained from Hartford, not one of which hatched. Disappointed in my eggs, I called on Mr. A. M. Jerome, of Princeton, who supplied me with a paper of eggs which were in the process of hatching. These I brought home on the 26th of June, and about 25,000 of them hatched. I had then altogether about 30,250 worms. I placed them all on the shelves in the second story; about 12,000 on one side of the room, and the balance on the other side. I fed the whole on the multicaulis, grown from roots and cuttings planted this spring. During the whole time of feeding, the temperature ranged very high, being several days as high as 93 degrees Fahrenheit, and seldom less than 72 degrees.

When I commenced, all the knowledge I had on the whole subject was "book knowledge." I had never seen a cocoonery, and never but once had seen worms feeding. My colored man, who had never seen worms, gathered the leaves and fed the worms until within about two weeks of winding, when I employed an aged man to assist him. Having some leisure, I spent considerable time in the cocoonery, determined to watch the feeding with care. A premium of $100 having been offered by the Monmouth Silk Manufacturing Company, to the person who would raise the greatest number of pounds of cocoons from the sixteenth of an acre, I measured the above quantity of land, and planted it with roots set upright, the rows eighteen inches apart, and the trees eight inches apart in the rows. The 12,000 worms above alluded to, I fed on the premium trees. The drought continuing so severe, and fearing the leaves on the premium trees would fail, on the 19th of July I took off about 5000, for which I borrowed leaves to carry them through. From this time it required 143 pounds of leaves. In about twenty-six days the mammoth white began to rise, and in about 31 days all, or nearly all, had risen. On the 28th day a few of the sulphur began to wind, and by the 35th day, all had wound. As a general rule we fed four times a day, never at night. After the second week we changed the hurdles every two or three days; the room was well ventilated, and always sweet and clean. Although good attention was given to all the worms, yet a little more attention was given by myself to the premium worms. They were fed just as often as they consumed the leaves previously given, and the difference in the size of the cocoons was obvious, the premium cocoons being very perceptibly the largest and most firm. The whole number of pounds of cocoons from the worms fed as above, was 86 lbs. 9 oz.; the whole number of pounds fed on the premium trees was 38, or if an allowance is made for borrowed leaves, allowing 21 pounds of leaves to a pound of cocoons, the number fed on premium trees would be 31 pounds, 14 oz. Of the mammoth white it required 350 cocoons to make a pound; of the premium sulphur cocoons 290 to 300; 192 of the largest, after the floss was taken off, made a pound; of the sulphur colored cocoons, not premium, it required about 325 to make a pound. The worms were vigorous and healthy during the whole time of feeding, I I think remarkably so; indeed I do not know that I lost a single worm by disease. Being a healthy crop, I saved most of my cocoons for eggs, and I have about four pounds of the finest eggs I have ever seen. I stifled, probably, 25 lbs. of cocoons in order to make a specimen of sewing silk. August 4th I obtained a small paper of two crop eggs from Wm. Imlay, Esq., of Allentown; only 300 or 400 of them hatched, which I fed on my premium trees. These were also healthy and vigorous, but they did not wind under thirty days, and the cocoons were small. Owing to the impossibility of procuring eggs to hatch in successive crops, I have only raised 31 lbs. 11 oz. from my 1-16th of an acre, though my trees are smaller than yours in Burlington. This, I believe, is not more than one-half the amount I could have fed if I had been able to procure eggs and hatch them as wanted. The trees do not appear now to have lost any of their foliage. Enough has been done, however, to show that raising silk is profitable even the first year, in the hands of the most inexperienced. I hope you will write an article on this subject, and from what *has* been done, show what *can* be done. From my experience, I am perfectly satisfied there is no mystery or difficulty in feeding the silk-worm. If the eggs are from a healthy crop, and if the worms are kept clean and well fed, success is certain, and from the acknowledged enterprise of our people, I am perfectly satisfied the silk business will succeed, and at no distant period will become a source of vast national and individual wealth. May your valuable publication aid, as I have no doubt it will, in hastening this, by inducing our intelligent farmers and others to engage in the business.

R. V. M'LEAN.

Freehold, N. J., Sept. 20, 1838.

CURIOUS EXTRACTS FROM THE ANCIENT LAWS OF VIRGINIA.

In a former part of this work, there were presented many passages of history, and especially extracts from the older historians, in relation to the general policy and economy, and agriculture, and illustrative of the peculiar habits and condition of the early settlers and inhabitants of the colony of Virginia.* It is proposed here to offer extracts, equally curious and interesting, from the old laws of the colony, and spreading over a greater variety of subjects than was permitted by the purpose of the article referred to above. Though all the extracts which will now be offered are taken from a single work, 'Hening's Statutes at Large,' which is accessible to every one, yet because it is a *law book*, and a voluminous one, its contents are scarcely known to general readers, and it is almost sealed to all others except the members of the legal profession. For this reason, whatever is curious and interesting in these old statutes, will also have, to most readers of the Farmers' Register, all the freshness and interest of novelty.

The following introductory remarks and statements of the compiler of the statutes, will best serve as the beginning of these extracts:

"In June, 1619, the first assembly ever held in Virginia, was convened by sir George Yeardley, then Governor, and met at James Town; which was at that time, and for many years afterwards, called "James Citty." Some account of the acts passed at this session, (taken from the Ancient Records relating to Virginia,) is given in a note prefixed to the acts of 1623–4; being those of the earliest period now extant.

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* See pp. 754 to 760, vol. III., Farmers' Register

"In May 1620, we are told by historians, that another assembly was held in Virginia. *Beverley*, indeed, makes it the *first* legislature under the colonial government. But of the acts of this assembly there is no mention in the proceedings of the London Company; a circumstance which renders it extremely doubtful whether such an assembly was, in fact, ever held."—Vol. I. p. 119.

But this first legislation of the colonists seems never to have been formally considered and ratified by the London Company, the then proprietary government of the colony, and therefore the enactments of this earliest session, whatever they may have been, were of no authority; and it is therefore, probably, that no record of them remains. Hening says—

"The acts passed at the general assembly in 1619, were probably a crude, indigested mass, which never received the sanction of the treasurer and company for Virginia, in England; without whose approbation, *in a great and general court*, they could not have the force of laws."—p. 122.

The first actual legislation, then, occurred in the next session, which was in 1621, and when fifteen years had passed since the first arrival of the English settlers. Of this, the only account is in the following general statement, given in the words of the compiler. This extract presents the curious fact, that a large and prominent portion of the first actual legislation of Virginia, (as well as much of later date,) was devoted to the encouragement of the growth of silk—a culture which, after lying dormant for nearly two centuries, has now suddenly become one of the most engrossing interest throughout this country, and which now promises to be revived, and for the first time to be extensively and successfully prosecuted.

"In November and December 1621, another assembly was held: an event not mentioned by Stith, or any of our early historians. The acts of this session are very briefly noticed in the minutes of the London Company; and relate entirely to the introduction and culture of such staple commodities as the company in England recommended; particularly the article of silk, which seems to have engrossed nearly the whole attention of the legislature. Two acts, the one prescribing regulations for planting mulberry trees, the other directing, that in clearing land, no mulberry trees shall be destroyed, are first mentioned. The remaining acts of this session contain little more than an enumeration of the wants of the colony."—p. 119.

There was lately republished in one of the newspapers, and which has been thence copied into many others, "*an act, for mulberry trees*," passed in 1661, which was presented as the oldest legislation on the subject. And, subsequently, there appeared in another print, a correction of that opinion, in extracts from the earlier acts of 1656 and of 1657. These extracts will be given here, in their order of time. It is enough here to show, that silk-culture was a subject of legislative interest and action, thirty-five years before the earliest of these enactments, and forty years in advance of the other.

The next extracts will be from the "Laws and Orders concluded on by the General Assembly, March 5th, 1623-4." In every extract the spelling and punctuation of the original, (as given in the 'Statutes at Large,') will be preserved.

"For the encouragement of men to plant store of corne, the prise shall not be stinted, but it shall be free for every man to sell it as deere as he can.

"That there shall be in every parish a publick garnary unto which there shall be contributed for every planter exceeding the adge of 18 years alive at the crop after he hath been heere a year a bushel of corne, the which shall be disposed for the publique uses of every parish by the major part of the freemen, the remainder yearly to be taken out by the owners at St. Tho's his day and the new bushell to be putt in the roome.

"That three sufficient men of every parish shall be sworne to see that every man shall plant and tende sufficient of corne for his family. Those men that have neglected so to do are to be by the said three men presented to be censured by the governor and counsell.

"That all trade for corne with the salvages as well publick as private after June next shall be prohibited."

"That every freeman shall fence in a quarter of an acre of ground before Whitsuntide next to make a garden for planting of vines, herbs, roots, &c. subpœna ten pounds of tobacco a man, but that no man for his own family shall be tyed to fence above an acre of land and that whosoever hath fenced a garden and of the land shall be paid for it by the owner of the soyle; they shall also plant Mulberry trees."—p. 125.

"That the proclamation for the rates of commodities be still in force and that there be some men in every plantation to censure the tobacco."—p. 126.

Our ancestors were totally without light on the free-trade doctrine of modern political economy, and had little faith in self-interest serving as the best guide to direct the pursuits of industry. The statute book is full of regulations, like some of the foregoing, which were designed to encourage and compel the raising or keeping of certain products, and restraining or forbidding others.

The following orders of the same session, exhibit the then state of insecurity and peril of every settler. They were enacted in consequence of the recent massacre of many of the colonists by the Indians, in 1622, which was so near being as complete as was its design.

"That every dwelling house shall be pallizaded in for defence against the Indians.

"That no man go or send abroad without a sufficient partie will armed.

"That men go not to worke in the ground without their arms (and a centinell upon them.)

"That the inhabitants go not aboard ships or upon any other occasions in such numbers, as thereby to weaken and endanger the plantations.

"That the commander of every plantation take care that there be sufficient of powder and ammunition within the plantation under his command and their pieces fixt and their arms compleate.

"That there be dew watch kept by night.

"That no commander of any plantation do either himselfe or suffer others to spend powder unnecessarily in drinking or entertainments, &c."

"That such persons of quality as shall be founde delinquent in their duties being not fitt to undergoe corporal punishment may notwithstanding be ymprisoned at the discretione of the commander & for greater offences to be subject to a ffine inflicted by the monthlie court, so that it exceed not the value aforesaid."—p. 127.

Among the acts of October, 1629, first appears the policy, which was so long approved, of limiting the extent of the cultivation of tobacco, for the purpose of enhancing its price, and which was so often attempted to be enforced by legislation, and with so little success.

"It *was put to the question* whether for this yeare there should be an ordinance made and established for the stinting of the planting of tobacco. To this the opinion of the most voices was, that noe persons workeing the ground, which are all to be thithable, should plant above 3000 plants uppon an head.

"An exception is made where the familie consisteth of children and woemen which doe not worke in the ground, and they to plant not above 1000 plants per pol."—pp. 41-2.

The following are some of the proceedings of the governor and council, acting as a criminal court, in 1630:

"Dr. John Pott, late Governor, indicted, arraigned and found guilty of stealing cattle, 13 jurors 3 whereof councillors. This day wholly spent in pleading; next day, in unnecessary disputation: Pott endeavoring to prove Mr. Kingsmell (one of the witnesses against him) an hypocrite, by a story of Gusman of Alfrach the rogue. In regard of his quality and practice, judgment respited till the king's pleasure known; and all the councel became his security."—p. 145.

"Upon the presentment of the church-wardens of Stanley Hundred for suspicion of incontinency betweene Henry Kinge and the wife of John Jackson, they lyinge together in her husband's absence; it is thought fitt that the sayd Kinge shall remove his habitation from her, and not to use or frequent her company until her husband's retorne."—p. 145.

"Hugh Davis to be soundly whipped, before an assembly of Negroes and others, for abusing himself to the dishonor of God and shame of Christians, by defiling his body in lying with a negro;* which fault he is to acknowledge next Sabbath day."—p. 146.

The three following acts, which are copied entire, throw light on the policy and economy of the government. The legislative encouragement or enforcing of corn culture was as much the usage as restraints upon tobacco culture. Tobacco was then, and for a long time afterwards, the legal currency of the country; and the bringing bad tobacco into market and circulation, was therefore something like debasing the coin of the country. This induced the burning of the article, as counterfeit, as well as to punish the owner for the offence. This penalty lasted much longer than its causes. Within the last thirty-five years, tobacco, condemned by the inspectors, was still burnt by law, instead of being permitted to be converted to manure, for which purpose it would have been valuable.

"For the better furtherance and advancement of staple commodities, and more especially that of potashes and saltpeeter, *it is thought fitt*, that every master of a ffamily within the severall plantations of this colony shall use their best endeavours to preserve and keepe in dry and tight houses or casks all those ashes that proceede and bee made by the wood that is burned in clearing their grounds, that they may be ready at all tymes to be delivered to those that shall require the same to make experiment thereof. And that every master of a ffamily shall have a speciall care, after a notice thereof given, to preserve and keepe all their urine which shall be made in their severall plantations, to be disposed and bestowed as by a note in writing they shall receave directions the benefitt whereof shall the first yeare shall redounde to those that shall make the experiment. And the next yeare it shall bee lawfull for every planter to make the best benefitt hee can thereof to his own use. And for other staple commodities, as iron, salt, vines, &c. the whole assembly are willing and readie to yielde their best assistance in setting and raysing them, or any of them when they shall see any incouragement thereunto by such as shall bee men of experience and skill to perfecte such workes."—p. 151.

"To prevent the want of corne which oftentymes doth happen to this colony by reason of the neglect of planting sufficient quantities thereof for their necessarie provisions, *It is ordered*, that two acres of corne or neere thereabouts bee planted for every head that worketh in the grounde, and the same to bee sufficiently tended weeded and preserved from birdes, hoggs, cattell and other inconveniences. And if any planter shall be found delinquent therein hee shall forfeite all his tobaccoe which hee made of his cropp that yeare, the one halfe, to the informer, the other to bee imployed to publique uses for the good of the country."—p. 152.

"For the improving the planting of tobaccoe the neglect thereof in the curing hath caused the same to bee of base price and small esteeme to the discredit and disadvantage of the whole colony in generall, for the preventing and avoyding whereof, *It is thought fitt and accordingly ordered*, That noe person whatsoever shall plant or tende above two thousand plants of tobaccoe for every heade within his family including woemen and children. And to the intent that noe tobaccoe of bad condition may be transported out of this country, *It is further ordered*, That if any man hereafter shall make any bad, or ill conditioned tobaccoe and offer to pay away the same to any person or persons, eyther for debts, marchandize or any other

* Negroes were first introduced in Virginia, from a Dutch ship, in the year 1620. See Beverley, pa. 51. Burk's Hist. vol. i. p. 211.

commodities, it shall be lawfull for the commander of every plantation with two or three discreete men of the said plantation uppon view thereof to burne the same. And the partie that shall bee found delinquent in any particle of this order shall bee hereby barred from planting any tobaccoe until hee bee re-admitted by a General Assembly."—p. 152.

"For the better increase and multiplying of cattell in this colony, it is thought fitt that all the female increase of neate cattell bee with all care and diligence preserved and kepte. And that noe female kinde of cattell bee killed unlesse they bee such as are eyther past breedinge, or are likely to dye by some infirmity. And if any person or persons shall doe contrary to this acte they shall undergo such censure as the Governor and Councell shall thinke fitt to impose upon them." p. 153.

"Mynisters shall not give themselves to excesse in drinkinge, or riott, spendinge theire tyme idellye by day or night, playinge at dice, cards, or any other unlawfull game; but at all tymes convenient they shall heare or reade somewhat of the holy scriptures, or shall occupie themselves with some other honest study or exercise, alwayes doinge the thinges which shall apperteyne to honesty, and endeavour to profitt the church of God, alwayes haveinge in mynd that they ought to excell all others in puritie of life, and should be examples to the people to live well and christianlie." p. 158.

"Uppon a remonstrance preferr'd to the assembly, complayninge that the ffrenchmen who were, about ten yeares since, transported into this country for the plantinge and dressinge of vynes, and to instruct others in the same, have willinglie concealed the skill, and not only neglected to plant any vynes themselves, but have also spoyled and ruinated that vyniard, which was, with great cost, planted by the charge of the late company and theire officers here; and yet notwithstandinge have receaved all favour and encouragement thereunto, which hath disheartened the inhabitants here, *It is therefore ordered* that the sayd ffrenchmen, togeather with theire families, be restrayned and prohibited from plantinge tobacco, uppon penaltie to forfeit theire leases, and imprisonment untill they will depart out of this colony."—p. 161.

"Be *it also further ordered*, That no planter or mayster of a famylie shall plante or cause to be planted above two thousand plants per pol, and that those that shall not plante or be otherwise imployed shall not transferr or make over theire right of plantinge unto any other; and to prevent any greater quantities, every planter or mayster of a famylie plantinge a cropp of tobacco, more or lesse, shall be tyed to procure one of his neighbours or some sufficient man to come and nomber his or theire plants of tobacco, who will uppon his oath declare and testifie unto the commander of that place, before the tenth day of July, that he hath counted and nombred the sayd plants, and shall say in his conscience the just and true nomber of them, which thinge yf the sayd planter or mayster of a famylie shall neglect, or that the nomber of the plants is found to exceede the proportion of 2000 per pol, then the commander is hereby to present it to the next mounthlie cort, and the commissioners thereof shall give present order to have all that whole cropp of tobacco cutt downe under panye of imprisonment and censure of the governor and counsell and grand assembly yf they neglect the execution thereof. Also uppon the neglect of the commander, he shall be censured in like manner."—p. 164.

"It *is likewise enacted*, That no person shall tend, or cause to be tended, above 14 leaves, nor gather or cause to be gathered above 9 leaves uppon a plant of tobacco; and the several commanders shall hereby have power to examine the truth thereof; and yf any offend, to punish the servants by whippinge, and to bind over the mayster unto the next quarter cort at James Citty to be censured by the governor and counsell."—p. 164.

"It *is ordered and ordeyned*, That no person shall tend, or cause to be tended any slipps of old stalkes of tobacco, or any of the second cropps, uppon the forfeiture of the whole cropp, whereof halfe to be to the informer, and halfe to publique uses as aforesayd."—p. 164.

"It *is likewise ordered*, That every man workinge in the ground, shall plant, or cause to be planted, and sufficientlie tended, this yeare, at the least two acres of corne per pol, uppon penaltie of forfeiture of their whole cropp of tobacco, yf uppon vewe thereof they shall be found deficient." p. 166.

The following act, passed in the session of 1631-2, shows the continued state of danger and alarm:

"All men that are fittinge to beare armes, shall bringe their pieces to the church uppon payne of every offence, yf the mayster allow not thereof to pay 2 lb of tobacco, to be disposed by the churchwardens, who shall levy it by distress, and the servants to be punished."—p. 174.

In 1632, an unusually long and particularly penal act was passed for improving the quality of tobacco. It required that no tobacco should be bartered for other commodities at a lower rate than sixpence the pound; that no planter or master of a family should plant more than 2000 plants "per pol;" that no more than 14 leaves on each plant should be tended, nor more than nine leaves gathered from each plant of tobacco; and that no second crop should be made from the suckers, (or "seconds") growing after the cutting off the first crop.

Another act of the same session compelled the planting of vines; but it does not appear that this, or any other of the means of encouragement used, had any important effect in causing wine to be made.

"It *is provided and ordered*, That all workers upon corne and tobacco shall this ensuinge springe before the first day of March next ensuinge, plant, or cause to be planted 20 vyne plants per pol uppon penaltie to forfeite one barrell of corne for every one that shall make default one halfe to be to him which shall make information thereof and the other halfe to publique uses. And the commissioners for the mounthlie corts shall have full power to heare and determine this matter and to see that the sayd vynes bee weeded, tended, and well preserved."—p. 192.

This act was repealed in the ensuing year, by the following, which directs other cultures:

"It *is ordered*, That the 25th act made the 4th day of September 1632 be repealed and voyd. And that every planter as soone as he may, provide seede of flaxe and hempe shall sow the same."—p. 218.

The following short act, is the origin of the present abominable law of inclosures, which operates now as a heavier tax upon agriculture, and a greater absorber of its profits, and obstacle to its improvement, than all the other burdens imposed in taxes, or otherwise:

"Every man shall enclose his ground with sufficient fences or else to plant, uppon theire owne perill."—p. 199.

Another act of the same session, 1632, forbids the killing of wild hogs, on the lands of others, and offers a reward for killing wolves. The settlements, then, were all in the lower tide-water counties, and the falls of the rivers were as yet in "back-woods." It seems that at least one act of protection had been effective—that for increasing the number of cattle; whereupon the assembly determined not only to continue the prohibition to kill female cattle, but also to prohibit their being sent abroad to the other colonies, for sale:

"Whereas it doth appeare that the late preservation of female neate catle within this colony hath much encreased the nomber of them and inritcht this colony, and the continewance thereof yet for a tyme will much encrease the nomber of them further; *It is ordered*, That no cowes, heifers, or female catle be transported to any other parts out of the government of this colony now established, upon the forfeiture of the catle soe transported, or the true value of them, the one halfe of which forfeiture shall be to the informer, and the other halfe to publique uses. And this act to continew in force untill the next Generall Assembly."—pp. 218-19.

The limitations on producing tobacco being still found insufficient to increase the price, the following additional act was passed, in 1639, by which *half of the good tobacco*, as well as all the bad, was ordered to be burnt.

"Tobacco by reason of excessive quantities made being soe low that the planters could not subsist by it or be inabled to raise more staple comodities or pay their debts, *Enacted*, that the tobacco of that year be viewed by sworn viewers and the rotten and unmerchantable and half the good to be burned. So the whole quantitie made would come to 1,500000 without stripping and smoothing: and next 2 years 170 lb. tobacco per poll stript and smoothed was to be made which would make in the whole about 1,300000 lb. and all creditors were to take 40 lb. for a hundred." pp. 224-5.

But tobacco being the current money in which all obligations were made, and debts paid, it followed that the effecting the much desired object of raising the price, would also as much increase the actual amount of every existing debt. The next thing necessary was to cut down every debt to what the assembly deemed a proper amount, which was provided for in the several following acts of the same session:

"Noe man to be obliged to perform above half his covenants about freighting tobacco in 1639." p. 225.

Debtors were "not to pay above two-thirds of their debts during the stint," or prohibition of cultivation of tobacco.—p. 226.

An act to plant orchards, made in 1636, (of which there is no other notice,) was reversed in 1639-40.

The following provision, made the same year, was a departure from the general principle of the fence law, but which unfortunately was not persevered in:

"Hoggs to be confined in pens by night and to have keepers by day or owner to satisfie all damages done by them."—p. 228.

In 1642, the owners of hogs were restored to the rights which they continue to retain to this day:

"Be it also enacted & confirmed, That ev'rie planter shall make a sufficient fence about his cleared ground, And if he be deficient therein, what trespass or damage he shall susteyne by hoggs, goats or cattle whatsoever shall be to his own losse and detriment."—p. 244.

The following enactment was made to guard against a singular kind of waste—the burning of houses, when left vacant, merely to get the nails:

"And it is further enacted by the authoritie aforesaid, That it shall not bee lawfull for any person so deserting his plantation as aforesaid to burne any necessary houseing that are scituated therevpon, but shall receive so many nailes as may be computed by 2 indifferent men were expended about the building thereof for full satisfaction, reservinge to the King all such rent as did accrew by vertue of the former grants or planting of the same from the expiration of the first seaven years."—p. 291.

"To rectifie the great abuse of millers, Be it enacted that no person or persons shall for the grinding any grayne that shall be brought vnto them take above the sixth part thereof for toll." p. 301.

The following singular enactment doubtless was expected to remedy all complaints against the gentlemen of the legal profession, as it aimed to destroy all the attorneys at one blow, by forbidding their receiving any fees for their services. It is to be presumed, from the results, that the prohibition did not work well.

"Whereas many troublesom suits are multiplied by the vnskillfullness and coveteousness of attorneys, who have more intended their own profit and their inordinate lucre than the good and benefit of their clients: Be it therefore enacted, That all mercenary attorneys be wholly expelled from such office, except such suits as they have already vndertaken, and are now depending, and in case any person or persons shall offend contrary to this act to be fined at the discretion of the court." p. 302.

(To be continued.)

UNROTTED LEAVES AS MANURE. LATE SOWN WHEAT.

To the Editor of the Farmer's Register.

On reading your article, in the November number of the Register, on the subject of the use of leaves as a manure, I am induced to offer you the following experiments which I have made with them, as you have solicited communications from the patrons of the Register. Early in the spring of 1837, I covered about 15 acres of highland, with leaves taken from land cleared the previous winter. The land on which I put the leaves was very rolling, and about sixty feet above the level of the flat land on the river. It was very much overrun with blue grass, and required a cleansing crop. The leaves were spread very thickly, and then plastered, at the supposed rate of a bushel and a-half to the acre. The land was then ploughed deeply with a two-horse plough, and was soon after planted in corn, and cultivated altogether with the coulter and hoe. At first it was backward in growing off; but, after it started, it grew rapidly, and withstood the drought of the summer, and continued green longer than my low-ground crop. I did not ascertain the difference between the product of this piece of land and other highland corn that I had on richer and better land; but the result was decidedly in favor of that to which the leaves were applied.

In the fall of 1837, I covered with leaves, quite thickly, a piece of highland of nearly twenty acres, and sowed plaster on two-thirds of the lot, not having enough to sow it all. The leaves were ploughed in, early in January, and before planting corn the land was well harrowed. The cultivation of the crop as before was altogether with the coulter and hoe. It withstood the extreme drought of the past summer better than my low-ground corn; and the fodder continued longer green on it, and the yield, though not ascertained by measurement, was a very good one.

I am quite a novice in farming; but the result of my experience (though differing from yours) is, that leaves ploughed in, the earlier in the fall the better, are a valuable manure for corn. They keep the roots moist, and yield nourishment to the plant, and in a dry season have not the injurious effect, that farm-pen and stable manures have, of making the crop so liable to burn.

In the fall of 1836 I was stopped in sowing wheat by rain on the 13th November, and though I had only a few days' ploughing, the weather continued so unfavorable that I did not finish sowing until the 14th December. The wheat sowed between the 1st and 13th November had come up before I finished sowing; and that sowed last did not come up until about the middle of February. It then came up very well, and was nearly though not quite so thick as the rest of my field, all being on low-grounds. The weather just before harvest was so wet as to cause rust in a considerable part of my crop. I found on examination that the wheat I had sown between the 1st and 13th November was very much rusted, and that sown on the 14th December was entirely free from it; and the latter yielded as well as the rest of my low-ground crop. This, though it is at war with the speculations of some of the correspondents of the Register, is no guessing matter, as I have taken it from a memorandum made at the time. The kind of wheat sowed was purple straw and red bearded, which had accidentally got mixed, and they are both late kinds. That sowed in December had only an equal chance with this humbug of spring wheat, and I am quite sure the yield was fully equal to any spring wheat I have seen. Can you, Mr. Editor, or any of your correspondents, explain why the wheat sown in November should have the rust, whilst that sown one month later did not, when every thing was in favor of the first? It was sown next the river, where the land is light and loamy, and was put in in fine order; whereas that sown in December was on stiff land, inclined to be wet, and, moreover, was ploughed before the land was in good order. The sowing of wheat this fall is unusually late, and the fact above stated may not be uninteresting to your readers. A PLANTER.

James River, November 10th, 1838.

SINGULAR AND FATAL DISEASE OF HORSES.

To the Editor of the Farmers' Register.

Pasquotank County, N. C. Oct. 25th, 1838.

I have lost the greater part of my horses in about 15 days. The 1st of October I discovered two were sick, and they continued to sicken and die until I had lost seven. They were sick from one to ten days. The symptoms were at first, when moving, a rattling in the throat, and unwillingness to move quick; a discharge from the nostrils of a thick ropy phlegm, and, as the disease advanced, it changed to matter, and was offensive, except one; they did not appear to be in violent pain; they had a disposition to eat and drink, but were not able to swallow—had not the least swelling about the throat—eyes not at all affected, although at times a high fever. The second horse that was taken sick, after living three days, and being unable to stand, I had killed for the purpose of opening. I was very particular in examining; the lungs were very much enlarged, and discolored; the same substance that was discharged from the nose was mingled with the lungs. There was nothing in the stomach but water; the rest of the intestines were filled with such food as I should have expected to have found in a horse in health, apparently not affected in the least. No obstruction from the throat to the stomach. The next was opened by a physician. His heart was very much enlarged, the lungs in the same situation as the first. That horse lived but 15 hours after I discovered him to be sick. The day before his death he eat hearty and appeared to be well. The next I opened lived 10 days; his lungs were diseased more than the others, and the discharge from the nostrils very offensive. His heart was not affected. The 4th was in the same situation. As soon as I discovered the disease was a fatal one, I separated my horses, and moved them a quarter of a mile from the house; but it did not have the desired effect. I have two horses that I think will recover. All of my horses were affected but one that had the staggers a few weeks previous, and 3 colts. They were fed with cut oats and fodder, and when they were used they had corn. They were all fed in one stable except the colts, and all ran in the same pasture during the day, but my saddle horse; he remained in the stable, except when in use. He was the last attacked, and had the disease light, I think in consequence of his being bled very freely before and after he was taken. One of my neighbors had a mare and colt, that remained in my pasture all the summer and fall, which were not affected. The food that was given the horses had not been damaged, and was sweet and sound; they were watered in Pasquotank River. The stables were littered with corn-stalks and wheat-straw—were dry, and had no unpleasant smell that I was aware of. The horses had salt once or twice a week. Feeling very anxious to account for the cause of the affection, and knowing no better source for information than your Register, I have applied to you, thinking that you or some of your subscribers may account satisfactorily for it.

THOMAS HARVEY.

A SUGGESTION FOR IMPROVING CHIMNEYS.

To the Editor of the Farmers' Register.

Surry Court-house, Va. Nov. 7th, 1838.

A plan has suggested itself to me for the construction, as I think, of an improved chimney. It is simply this: In a common chimney, from about the middle of the hearth, and just under the spot designed for the fire, let there descend a channel or opening, in an inclined direction towards the back, so as to pass out on the back of the chimney the thickness of six or eight bricks below the level of the hearth. The size and form of this feeder, as I would call it, can be varied according to choice. I should prefer having this, or at least the inner part, long and narrow, say one half the width of the fire-place, and to stretch across, or in the direction of the fuel laid on, so as to keep up a current of fresh air to the whole at once. The outer part of this opening may be of a different form; round, square, or in any shape sufficiently large to admit of the passage of the ashes, &c. outward, and a current of air inward.

The advantages to be derived from this plan, are, I think, several; and one of which is of particular importance. This is derived from the continual current of atmospheric air streaming through this channel, and by this means affording to the combustible matter, from an inexhaustible source, an abundant supply of oxygen gas, the necessary and indispensable agent of all combustions; thus feeding the flame from without, (instead of from within the room, to the great detriment of the air for animal respiration,) which is a matter deserving much more attention than is generally given to it. Close confined rooms, with fires burning in them for a length of time, the burning of candles, lamps, &c., and the breathing of persons in the same room, have a poisonous effect upon the lungs of animals. This, no doubt, is the source of many pulmonary and fatal diseases. We should ever keep in mind, that combustion and animal respiration are supported from the same source; and to be regardless of this, is to be regardless of our health, and consequently our happiness. But this is not the only advantage to be derived from this plan. It would supersede the disagreeable and dangerous job of taking up and moving the ashes from the hearth, which is so frequently necessary. These, as they were formed, would be saved or separated from the coarser unburnt coal by small rods of iron, or a coarse wire grate, let into the hearth over the mouth of the feeder, and conducted away through the opening into whatever may be prepared for their reception. Some precaution would be necessary in keeping the fresh ashes from the wind during dry weather.

D. S.

THE NORFOLK COMMERCIAL CONVENTION.

The second commercial convention of Virginia has been recently held; and the manner of its procedure, and conclusions reached, are, in the general, such as to promise well for the improvement and commercial independence of the state. This convention, more fortunate than its predecessor, kept clear of party questions, and even of the *suspicion* or imputation of the influence of party objects. This was as it should be; and Virginians and Carolinians, of different political parties, and of various interests, met here, with the one common object which all zealously and earnestly urged—that of sustaining the commercial independence and general good of the states which they represented.

The most important and practical results of the deliberations of the body, will be presented in the reports of committees considered and deliberately approved, and in the resolutions founded thereon, and adopted by the convention. These were, the report of the general committee on the causes of, and remedies for, the decline of our direct trade with Europe—the report of the committee on agriculture—the report of the committee on manufactures—and the report of the committee on banking—together with the resolutions on each, as amended and passed by the convention; and also the single general resolution adopted on the policy of the commonwealth in regard to internal improvements, by the construction of canals, railways, &c. This subject, important as it is in itself, was here but subsidiary to the main object of the convention, and should by no means have been permitted to occupy the foremost ground in debate, and the greater part of the whole time of the session. But, unluckily, some thought an opposite course expedient; and which was more like to subserve other interests than the great cause of internal improvement. The result of all the long and earnest debate on this subject was the adoption of the following resolution, (as amended by the convention,) the remainder of the series being indirectly rejected, by a close test vote to lay on the table, to remain there.

"Resolved, in the opinion of this convention, that a liberal system of internal improvement is one of the best foundations for a direct import trade, and the surest means of effecting it."

It would be very incorrect to infer that those who opposed the rejected resolutions were opposed to a proper and liberal system of internal improvement. It is believed, that if there were any members so opposed, they were very few in number. But the objections entertained were to the wide scope and ultra character of the resolutions—the descending to details and propositions of very doubtful character, at least, and which, even if judicious, and proper to be approved, belonged only to a body having legislative power—and in addition to these objections, that of spending the limited time of the convention in debate, which would certainly be fruitless and profitless to the public good, upon an inferior question, which it was impossible to fully consider, or harmoniously to agree upon.

But, notwithstanding the waste of time on these rejected propositions, there was great deliberation and attention given to the several reports and resolutions which have been referred to. Of course, a body which can enact nothing, is not required to enter upon details, nor to scrutinize them very closely. But the main questions on the business of the convention, in their general purport and bearing, were decided upon carefully and deliberately. There never was a similar body more attentive, more laborious, more guarded against surprise, or the insecurity caused by indolence and carelessness, until all that was considered the business of the convention had been decided upon. After the last expected of these subjects had been voted upon, (which was the report and resolution of the committee on manufactures,) and when the necessary hour of final adjournment was close at hand, and nothing more was counted on but the usual resolutions of mere form and routine, many of the members retired from the hall, and most of those who remained either were unable to hear the resolutions offered, or did not attend to them. So it was, that in the conclusion of the last day's session, there were resolutions offered and passed by a very few voting either for or against, through inattention or by surprise, which certainly would not have passed in any previous time of the session. It is as needless to specify the subjects of such action, as it is unpleasant to have to make any such statement.

The direct results of this meeting will be of far less value than the indirect. Much good is done merely by the meeting of fellow-citizens from distant localities, having (as supposed at least) rival and conflicting interests, and who have heretofore permitted themselves, in a greater or less degree, to be influenced by sectional prejudices, and commercial jealousy. Better feelings have been already produced, and they are cherished by all parties; and we are perfectly satisfied, that if these conventions are continued, even if no direct operation whatever should result, incalculable benefit will be effected, in removing narrow-minded jealousy and blind hostility, and producing instead those opposite feelings between every different locality and every different interest, which all true Virginians and southrons must desire. Under these impressions, we heartily approve of the two resolutions of the convention, by one of which they recommend another convention to be held next November, in Raleigh, for North Carolina and Virginia; and by another, recommend to those states to send some members to the commercial convention of the more southern states, which will be held in Charleston next May.

The convention agreed with unexpected unanimity in favor of the general recommendation of increased banking capital and banking facilities, as means necessary to enable our commerce and manufactures to have a chance for advantages equal to those of the northern cities. But the manner of increasing, and all details, (on which there would have been irreconcilable differences of opinion among some who voted together in the affirmative,) the convention wisely left to be settled by the legislative power. There are few reflecting persons who will not admit that Virginia and North Carolina have already lost much by not availing sufficiently of the advantages and benefits of banking upon correct principles, while they have suffered their full share of the evils and losses of the bad system which has prevailed. There were members of the convention who voted affirmatively on the general question of the expediency of increased banking facilities for Virginia, who are utterly opposed to the main features of the existing bank charters—and particularly to the partnership interest, and connexion, between the banks and the state, and to the virtual irresponsibility of the banks for all violations of their charters and other legal as well as moral obligations, which irresponsibility necessarily grows out of that connexion, by giving them a controlling influence over the legislature. We fully concurred in these views; and would wish that the trade and business of banking should be left as free from the prohibitions of law, and the monopoly privileges of the older institutions, as any other branch of trade; but *provided always and surely*, that all corporations and individuals who may pursue the trade of banking, shall be held as strictly responsible for the performance of all their obligations, as are those who are engaged in other trades. We care not to what extent banks may be put in operation in Virginia, (and without charge of bonus, or any other share of their profits on the part of the state, as monopoly-giver,) so long as proper care shall be used, (as is expressed in the report of the convention,) that "*provision be made against the abuse and perversion of their powers.*"

We proceed now to give the several reports above referred to, together with the resolutions of the convention, founded thereupon.

Report and resolutions on the causes of the decline of the direct foreign trade, and the means of remedy.

The committee who were instructed to consider and report upon the object of this convention, respectfully report, that they have carefully considered the important questions submitted by the convention for their examination. In the prosecution of their inquiries into the latent causes of our commercial decline, they have avoided all questions which involve subjects of party preference or political disagreement. Such discussions might not, indeed, be wholly irrelevant, but they believe that there is sufficient common ground upon which every friend of southern commerce may consistently stand, without touching subjects of party dissension, or trenching upon the lines, which divide the public sentiment at the present day. Your committee, therefore, without slurring over any inquiry, which they deemed essential to a correct understanding of the important questions confided to them, have confined their notice to those plain, simple and conceded truths, which only require to be stated to secure the assent of all.

Commerce is but the exchange of property, and however diversified and intricate some of its operations may seem, they are merely designed to facilitate such exchanges. The existence of trade between any two countries, is evidence that neither can sufficiently supply itself from its internal resources, with those things that may gratify the wants of its people. No nation would be guilty of the supererogation of sending abroad to obtain what it was already abundantly possessed of; as no individual would seek his supplies beyond the limits of its own domain, if he could always find there whatever might satisfy his real or his fancied wants.

The same necessity which impels a nation to seek abroad those things, which its own industry cannot supply, would prompt it to obtain what it wanted from the nearest and most convenient point; nor is it probable that its trade would ever be diverted from such a channel so long as its own products could be advantageously exchanged for those of such neighboring community. An individual residing in the town of Hampton, would scarcely submit to the delay and expense of obtaining from the city of Richmond any article that he could purchase upon as good terms in Norfolk Borough; and when he had effected his purchase in Norfolk, he would be still less disposed to bear the unnecessary cost of its transportation to Richmond before receiving it at his own home. In the case supposed, the interests of the purchaser would be as injuriously affected, where the expenses of this circuitous conveyance were paid by the seller, as they would be where he is himself immediately subjected to the increased cost; for, it is obvious that the seller, by undertaking to pay the charges of such an indirect transportation, would be unable to sell his goods at as low a price as he otherwise might be, exactly the amount which he is to pay for their conveyance.

Having shown that "a direct trade is the natural channel of communication between nations," the committee do not deem it necessary to enter into any argument to prove that the trade which supplies the people of Virginia with foreign goods, imported into the northern ports, is *not* a direct trade. To those who are at all acquainted with the geographical relations existing between us and those by whom this trade is conducted, such an argument would be a mere waste of time.

They proceed to consider the more important inquiry, whether any and what part of our consumption of foreign merchandise, is supplied by means of this indirect communication. Upon this point, information has been obtained of as precise a kind as the nature of the case will admit; and it places in a striking light the disadvantages to which this and the other southern states are subjected, from the present condition of their trade. Were there not the most indisputable evidence of the fact, it would scarcely be credited, that when the total imports of the United States amounted to $126,521,332, the imports of Virginia amounted only to the sum of $837,325; while of the total exports, estimated at $104,336,973, those of Virginia amounted to near five and a-half millions of dollars. Of the above amount of imports, those of New York alone exceeded $73,000,000, while the imports into North Carolina were less than one-fourth of a million. Those of Massachusetts amounted to $17,672,129, while South Carolina imported but to the value of $1,787,267. Those of Pennsylvania to $10,479,268, while Georgia received little more than $550,000, and Alabama less than $400,000.

In further illustration of this branch of the subject, the committee present the following extract from the able report submitted to the late convention at Richmond, by their committee, the statements and estimates of which, were based upon the latest official returns, and are believed to be entirely accurate. It will be seen that they are in close accordance with the statements presented above. "On examining the official returns it will be found that the exports from this state, on an average of the three last years, terminating on the 31st December last, amounted to $5,265,461, and the imports to $816,887, the former being to the latter, nearly as thirteen to two. For the same period, the average exports of all the staple states amounted to $72,107,039, and their imports $22,303,656, while the exports of the other states for the same period amounted but to $29,316,019, and their imports to $116,908,721, making the exports of the staple states compared to their imports as 7 to 2, while the exports of the other states are to their imports as 1 to 4."

The report, after adverting to the fact, that the official returns do not give the coasting trade, and that many of the exports from the northern states are products of the south, proceeds as follows. "From these results it appears that of the exports of this state nine-tenth part is direct and one-tenth circuitous through the ports of the other states—and assuming that her imports should be equal to her exports, only one-seventh part is direct and six-sevenths circuitous. Nor is that of the staple states generally in a much better condition. Taken in the aggregate, nine-tenths of their exports are direct, and one-tenth circuitous; while of their imports on the same assumption, only two parts are direct and seven circuitous, subject to all the expense and burthens incident to such intercourse.

Considering this subject upon the received principles of political economy, it would be a natural inference, that a diminution in the imports of any nation would be attended by, or, at least, would indicate a corresponding decrease of its exports; and yet, startling as the fact may seem, the reverse is true of the trade of the different sections of this country. The exports of the southern states have been steadily increasing, during the whole period that their imports have been dwindling to their present insignificance, while the enormous increase in the imports of the northern states, has been attended with so slight an improvement in the sum of their own products, exported to foreign countries, as to be scarcely worthy of mention. In the year 1830, the exports from the United States, of the products of agriculture, amounted to near $47,000,000, of which the articles of cotton, tobacco and rice alone, constituted more than four-fifths; and in the short space of four years, the exports of the products of agriculture had increased to upwards of $67,000,000, of which the exports of cotton alone exceeded in value the whole agricultural exports of 1830. On the other hand, the exports of manufacturers, which were chiefly the product of northern industry, amounted in the same year to only $6,-258,131, and in the year 1834 to but $6,648,393, showing a trifling increase of less than $400,000, while in the same period, the increase in the value of the agricultural exports, which were chiefly the products of the south, amounted to more than twenty millions of dollars.

If we confine our notice to the great staple of cotton, which is peculiarly the product of southern industry, the enormous increase in our exports will be placed in a yet more striking light. This article was not even cultivated in the United States until about the year 1790; but in ten years afterwards, the crop was estimated at 35 millions of pounds; in 1810 at 85 millions, in 1820, at 160 millions, in 1830, at 350 millions, and at the present day it may be fairly computed to exceed 500 millions of pounds. In the year 1830, after supplying the large domestic demand, the exports of cotton to foreign countries amounted to near 30 millions of dollars, and in the year 1834 to the astonishing sum of fifty millions.

Thus is exhibited the singular anomaly, of a country losing the command of its import trade, as it really improves in its capacity to control it. The extent of this decline, the committee now propose to consider. It is a well known fact, that before the establishment of the present government of the United States, the imports of Virginia largely exceeded those of any other State, being at one period nearly five times greater than those of New York, and even more than the aggregate of the whole New England States. The address of the second commercial convention at Augusta, quoting from a writer in the Richmond Whig, states the value of the imports of Virginia in 1769 at £851,-140 sterling—New England States 561,000—New York, 189,000—Pennsylvania, 400,000, and South Carolina, 555,000.

The committee deem it unnecessary to exhibit the successive stages of deterioration in the imports of Virginia, and the other southern states. Let it suffice, to invite attention to the contrast now presented, in the condition of our import trade, at the last named period, when its value was near five times greater than that of New York, and its present state of comparative nothingness, when it is ninety times less.

It is due to candor, and to the character of the southern people for energy and intelligence, to state that the decline of a considerable portion of our foreign import trade, may be accounted for in the fact, that we now derive from the northern states many of those articles that we formerly imported from abroad. At no very remote period, we were dependent upon Great Britain for even such wares and fabrics as are now often manufactured in our own households; and it not unfrequently happened that orders were sent abroad, for bricks and other materials for constructing our very dwellings. While we yet stood in the relation of colonies to Great Britain, the hard policy of the mother country repressed all our endeavors to establish manufactories, of even the simplest articles, and, in some cases, visited with severe penalties those who embarked in certain prohibited employments. It is known that this rigorous system of colonial oppression was a fruitful source of those dissensions, which resulted in the establishment of our national independence. That some idea may be formed of the extent of the importations into Virginia of those articles that are now chiefly produced by the domestic industry of the country, the committee present the following statements, compiled by a well known writer several years before the American revolution. "The people [of Virginia] may amount to about five hundred thousand, which may reasonably be supposed to bring no small advantage to their mother country—as from hence they are all supplied WITH ALL THE NECESSARIES OF LIFE, such as linen, silks, India goods, wine, and other foreign manufactures: and of our home ones, cloths, serges, stuffs, bays, hats, and all sorts of haberdashery ware, hoes, bills, axes, nails, adzes, and other iron tools, clothes ready made, knives, *biscuit flour*, stockings, shoes, caps for servants, *and indeed almost every thing that is made in England, to the amount of near 1,000,000l. sterling*, which is repaid mostly in tobacco, of which it is supposed by the nicest calculators, that near one hundred thousand hogsheads are, in time of peace, imported yearly, *employing between three and four hundred ships*, navigated by upwards of four thousand sailors." *Wyndham Beawes.*—From the details given by the same authority, of the trade of the New England States, it will be seen that they were themselves dependent upon the mother country, at that time, for those wares, which they now supply in considerable quantities to others. He says, "They take from hence *all kinds* of mercery goods, linen, stockings, shoes, sail cloth, cordage, haberdashery ware, and a vast many other things."

The loss of a portion of our foreign imports is thus sufficiently accounted for, in the substitution of a nearer and more convenient source of supply. Such a diversion of our trade is no proper subject of regret. On the contrary, it furnishes, both to the manufacturing and to the staple states, occasion for mutual rejoicing. It is, therefore, in no spirit of complaint, that we refer to it as one of the causes of the diminution of our foreign imports: but merely to show that it has not been overlooked by the committee, and that due allowance has been made for its operation, in producing the decline of our foreign trade. Did we receive from the northern states only such merchandise as is the product of their own industry, we should be constrained to admit that the evils which we complain of are unreal and shadowy; and that the decrease of our foreign imports was but the evidence of the superior advantages of the domestic trade. But when it is recollected that the large importations made into their ports, are designed to supply not merely their own consumption, but that of the southern people also, it can scarcely be contended, that the present condition of our commerce arises only from the cause alluded to.

As to the causes which have had the most powerful operation in producing the injurious results which the committee have noticed, much difference of opinion exists. The funding system, the Bank of the United States, the tariff, have been attacked and defended, in turn, by their respective opponents, and advocates, as the agents of mischief, or the fruitful source of good. Unfortunately, these measures (the last two, at least,) are too nearly connected with the party preferences of the present day, to receive that dispassionate examination which would be necessary to determine how far their agency had operated, for good or for evil, upon the interests of southern commerce. It is the less needful indeed to enter upon such an inquiry, as its successful result, however it might gratify an enlightened curiosity, could lead to few consequences of a practical nature. The bank no longer exists, and the protective policy is believed to have been abandoned. Whatever may have been their effects, they have now ceased to operate; or if they are still felt, they can be neither checked nor promoted, by a solution of the question, whether the decline of our foreign trade was in any wise attributable to them.

There is, however, one cause of this decline, which the committee cannot omit to notice, believing that a knowledge of its operation may be useful, in itself suggesting its appropriate remedy. They allude to the withdrawal of British capital invested in commerce in this and the other southern states, anterior to the revolution. The business of the colonies was conducted, for the most part, by the agents of British capitalists; and even the resident merchants were chiefly foreigners, whose means were supplied from the mother country. The effect of the revolution upon such a state of things, may be easily conceived. Most of the agents were recalled—many of the resident merchants, having no permanent attachment to the soil, and either feeling no sympathy with our grievances, or taking part against us, returned to their transatlantic homes, while the number of those that remained was gradually reduced by death and retirement from business. The withdrawal of so large a portion of our commercial capital, could not but exercise a prejudicial influence upon our foreign trade. It is true that the same result was experienced in the northern states; but, as will be presently seen, in a much less degree. The principal exports of the colonies had been supplied by us, and to us came the far greater portion of the articles that were necessary to purchase them. The merchandise that was thus sent to us being owned by British merchants, and transported in ships belonging to British capitalists, and for the most part manned by British seamen, there could be no motive in policy or reason, for sending them to any other ports than those where their freights could be most conveniently received or discharged.

It was necessary that the vacuum produced by this withdrawal should be supplied. In the competition that ensued for carrying on the trade, thus thrown open, the greater advantage would be secured by those whose condition better fitted them for conducting it. We were in some respects more illy prepared, than the northern States, for engrossing the profits of this trade. Anomalous as it may seem, our very wealth was, to this extent, a source of disadvantage. As has been already shown, the products of our soil were much larger in proportion to our population, than those of the northern states. The rewards of agricultural labor were, of course, richer with us than with them; as it is obvious that where a large production is to be divided among a small number, the average distributive share will be greater, than where the reverse is the case. It would follow that their labor would be diverted before ours from the cultivation of the soil to the pursuits of commerce and manufactures. *They* would be induced to embark in these new employments by the hope of any compensation greater than that which rewarded their agricultural industry; while *we* could not afford to abandon the pursuits of tillage for any recompense short of that which husbandry would yield.

Having thus a larger portion of their capital invested in the pursuits of commerce, they were enabled to compete with us successfully, for that trade which was properly our own. Had they established their residence among us, and imported directly into our own ports the merchandise which was purchased with the products which they carried away, commercial prosperity would have been in no wise impaired. And indeed they would have been themselves impelled by considerations of personal advantage, to conduct this trade upon the principles of the direct intercourse, had not their largest interests continued to be identified with those of another people.

The impulse given to northern enterprise by the causes just mentioned, was doubtless aided by others arising subsequently, and in some cases originating in the legislation of congress; but the committee regard those which they have just commented upon as first in importance, as in time. The exposition of their nature and of the mode of their operation, seems to indicate the means of relief. It is to draw back to us, as far as practicable, that foreign capital, the employment of which once was, and would again be, productive of internal advantage to the capitalist and to ourselves. It is to enlist in our cause those who producing the articles that are designed for our consumption, have a common interest with ourselves in augmenting that consumption, by diminishing its charges. It is, in fine, to imitate the policy of New York herself, in procuring the establishment by foreign capitalists, of agencies in our ports, for selling the various articles with which they supply us, and purchasing those they receive in return.

Another, and one among the most effectual means of restoring the commerce of the state to its former healthy and flourishing condition, is the improvement of the channels of communication between the Atlantic border and the great West. How vastly this would increase the sum of our exports, and improve the demand for the merchandise imported into our own cities, must be apparent to all who consider with what facility a profitable trade with that immense region might be secured. Our natural advantages of climate and position would enable us, if not to engross, at least to participate largely in the benefits of an intercourse, which is now almost exclusively enjoyed by our more enterprising rivals.

The committee do not deem it necessary to enter into a detailed argument to show the beneficial effects of a liberal system of internal improvement, upon the commercial interests of the state, still less do they propose to discuss the merits of the various schemes which have been suggested from time to time. They leave this duty to the committee to whom this subject has been specially confided. Let it suffice to call attention to the happy results which have attended the adoption of such a system in other states; and to notice an objection that is not unfrequently heard, that the effect of this policy is to tax the general property for the advantage of a favored region. Few measures, of whatever nature, would ever receive the sanction of any legislative body, if their adoption were delayed until it could be ascertained, that the interests of every single individual would be promoted by them. If then it were even conceded that the costs of constructing works of improvement of the kind we have supposed would be partly borne by some, who could derive no benefit from their completion, the objection would only be one which may equally be urged against almost every measure of policy that can be devised. But can it be correctly said that the benefits of those great improvements by which distant sections of country, are, as it were, approximated to each other, and their wealth reciprocally received and imparted, are confined to those whose commodities are sped to their destination through the improved channels of communication? Is the application of steam to the purposes of navigation only advantageous to those whose merchandise is transported in the steam vessel? Are the great inventions of Whitney and Arkwright and Hargrave only beneficial to those whose cotton is submitted to the gin and to the spinning machine? Their happy effects are felt wherever civilisation extends. It is impossible to set limits to the results of those improvements, whether in the arts which produce, or in the means of effecting an exchange of production, by which human labor is abridged, and the wealth of every clime distributed throughout the world. How unfounded then is the objection we have noticed. We are ourselves, at this moment, reaping the advantage of the enterprise of other countries. There is hardly a canal, rail-road or turnpike in the most distinct section of the globe which does not, directly or remotely, advance the prosperity of Virginia.

The promotion of the great agricultural and manufacturing interests of the state, is intimately connected with the objects of this convention. As these important interests, however, have been especially entrusted to other committees, we forbear to say more in relation to them, than to express our sense of their magnitude.

The committee cannot conclude without congratulating the convention upon the bright auguries which are every where seen, of their final and complete success. The spirit which has been recently displayed in this commonwealth—nay, throughout the whole southern country, shows the intense interest felt by our people in the great cause of COMMERCIAL REGENERATION. Let it not be doubted that their acts will be correspondent with their resolutions. Already has one patriotic county, securing the proud distinction of being the first to strike for commercial independence, adopted measures which are in themselves the consummation of their purposes. But though *first*, it will not be *alone*. An example so worthy of imitation, cannot fail of its effect. From the sea-coast to the mountain range, its contagion will be spread, until it shall deprive of power, those who may still retain inclination to disregard its influence.

And is there no warrant for this expectation. Were it even necessary to achieve our object by voluntary sacrifices, have our people ever been remarkable for a disinclination to submit to them? Have they held at a cheap price the interest, the honor, the independence of the state? Have they forgotten their duty, when it might be irksome to perform it; and shall it be doubted that they will be equally mindful of their obligations, when private advantage, and national good conspire to direct their course?

What is it that is expected from them? That they will use the proper means to improve the advantages with which they have been so liberally supplied;—that they will augment the resources of their country—exalt its character, and increase its strength—that they will free their commerce from a taxation, which is not the less severe, that it is voluntary, and discharge a duty to themselves, which apart from all nobler considerations, every principle of selfishness would compel.

More than this will not be demanded—less cannot be expected. It is therefore with the most undoubting confidence, that we anticipate the ultimate triumph of our cause. The indulgence of such an expectation is surely no evidence of an over-sanguine temperament. Success indeed may be delayed. Time may roll on—difficulties may avert—indolence may dissuade and prejudice may revile. But of final success, let us be all assured. Success *must be* the prize of exertion; and exertion cannot flag, when there is so much to stimulate it, in private interest and the general good—in "self love and social"—in all our hopes of the future, and all our recollections of the past.

1. Resolved, That exchanges between nations of their commodities should be effected with the least possible delay and expense; and all other things being equal, that an indirect and circuitous transportation is mutually disadvantageous in subjecting the trade conducted through such channels

to charges and burdens which would be avoided by the establishment of a direct intercourse.

2. Resolved, That the trade by which the people of Virginia are supplied with those articles which they receive in exchange for the products of their industry is, for the most part, an indirect trade, being through the chief ports of the northern states; and that united and unremitted exertions should be made to restore the direct communication which was formerly productive of so much benefit.

3. Resolved, That this convention do recommend that immediate steps be taken to induce manufacturers and other capitalists in foreign countries to establish agencies from commercial connexions among us, in order that the goods exported by them to this country may be sent to their final destination, without being subjected to those expenses arising from intermediate agencies, which are injurious alike to the producer and the consumer.

4. Resolved, That the President appoint a committee of seven, whose duty it shall be, after the adjournment of the convention, to use all means which they may deem necessary and proper to secure the objects contemplated in the next preceding resolution.

5. Resolved, That this convention do recommend to all merchants and traders to give preference in procuring their supplies to the importers in the cities of Virginia and North Carolina, whenever they can be obtained upon as good terms as when purchased abroad; and that the banks of these two states be requested to co-operate with the views of the convention.

6. Resolved, That with a view to the efficient employment of such of our surplus capital as is not invested in commercial pursuits, and to the encouragement of those persons, who with industry and intelligence, are prevented by want of means from engaging in mercantile operations, this convention do earnestly recommend the formation of limited partnerships under the act recently passed by the legislature of Virginia.

7. Resolved, That it be recommended to the importers and exporters of Virginia and North Carolina, to give the preference to vessels belonging to these two states, when the freights can be obtained on terms equally advantageous.

Report of the Committee on Agriculture.

The duty assigned to the committee on agriculture was so suddenly and unexpectedly imposed, that there can be little confidence entertained in its being properly or acceptably discharged. The performance of the duty is therefore attempted with reluctance; and no effort would have been made, but for the respect due to the commands of this convention. It is not that there are not abundant and weighty materials, both of facts and of argument, for a report on this subject, and which might demonstrate the importance of the improvement of agriculture to the commercial and general interests of Virginia, and the necessity for legislative aid being asked, and granted, to promote such improvement. But as your committee are instructed and called upon forthwith to act, without access to authorities on agricultural statistics, or any other materials that would need reference and examination, they are sensible that they can as little do justice to the subject, as they can hope, in this or any better manner, to exert influence on the legislation of the state for the benefit of agriculture.

Besides these difficulties, your committee are at some loss to know the precise kind of inquiry and labor required of them, by the very concise and general terms of the resolution, which directs the formation and action of the committee. And even if they should not mistake the direction of their duty, they may err by overstepping its proper limits. The interests and the claims of agriculture are even more important than any and all others that this body will endeavor to aid; but still your committee must bear in mind that the primary and main design of this convention is to re-establish the commerce of Virginia; and that other objects and interests, however important in other respects, should *here* be treated as merely subsidiary to, or in connexion with, the commercial business and interest of the country.

Whatever can be done to aid the commerce, the manufactures, the canals and railways of the country, in a legitimate and proper manner, will operate to increase the profits, and thereby encourage the improvement of agriculture. Still more truly, because admitting of no exception, may it be affirmed, that whatever will extend the knowledge, and promote the improvement of agriculture, will, in proportion to that direct effect produced, also act indirectly to improve the commercial and manufacturing interests of the country. Neither of these truisms need more than to be announced. From such premises, it follows that the promotion of agricultural instruction and improvement are proper subjects for the notice and favor of this convention, as an important mean for advancing the interests of commerce, the especial object of the assembling of this body. And even on this ground, though it be far less important than others, (which would be out of place if presented *here*,) there would be found sufficient reasons for the legislature to extend to agriculture that fostering care which, by a narrow and niggardly policy, has heretofore been refused.

When aid to agricultural improvement was asked at several of the recent sessions of the legislature of Virginia, the claim was but feebly sustained by its friends, and met with neglect or derision and contempt from all others. The former were at a loss to determine what particular measures of relief to propose, or support; and the latter class have deemed it a sufficient answer to *misapply* the old saying of "*laissez-nous faire,*" declaring that the best thing for agriculture is "to let it alone." Your committee claim to be as true disciples of the free trade school of political economy, as those who thus misapply and abuse this doctrine; and they fully concur in the propriety of leaving all pursuits of industry untrammelled by legislative burdens, and unaided by legislative bounties, to their own direction and their own rewards. But agriculture does not want, nor have its advocates asked for, any pecuniary or other support, except for the purpose of diffusing knowledge, and to induce and extend instruction; and this your committee maintain to be one of the few legitimate and proper subjects for governmental action, even according to the most strict doctrine and limitation of sound political economy. If it be pronounced to be proper that the government should refuse to aid in diffusing light and instruction in agriculture, as a correct deduction from the "let alone" policy, then it is no less necessary that it should abandon, as a matter of principle and consistency, the giving of all or any aid to primary schools and to colleges, for the purpose of literary instruction and education in general.

It would be more difficult within the narrow bounds prescribed by propriety to this report, to answer the friends, than the enemies to the improvement of agriculture by legislative action. In reply to their inquiry, "what can the legislature do to improve agriculture?" your committee will merely state, in general terms, that every means will be useful and profitable, by which light and knowledge will be diffused; and that no other action, no other aid, or boon, is desirable, or would be beneficial. There are so many valuable modes of diffusing agricultural knowledge, that the difficulty is not to find, but to choose among them. Boards of agriculture, agricultural societies and premiums upon a suitable and judicious plan, agricultural schools and experimental farms, and agricultural surveys and publications, each and all, elsewhere have worked admirably to forward the great end in view. But if no more were done at first by legislative action, than the institution of a board of agriculture, as merely an investigating, consulting and advising body, incalculable benefit might be expected to grow out of this one and cheap mode. Such a board (if the system of furnishing aid should go no farther,) might be limited in annual expense to $1500—or barely more than the General Assembly has spent, year after year, merely in the time used for electing an individual to execute the mechanical business of printing their journal and documents—less than the expense of time and money, caused by each single elaborate speech, delivered in that body upon federal relations—not one-fourth part of the annual expense of the geological survey—and perhaps not one-hundredth part of the money wasted in every session in useless or worse than useless debate.

With these views, and in the earnest hope that the recommendation of this highly respectable convention may have more influence on the legislature than any previous expressions of opinion, or petitions, of separate or private individuals, to induce the commencement of the great work of diffusing agricultural instruction and improvement, your committee recommend for the adoption of this convention, the following resolution:

Resolved, as the opinion of this convention, that the commercial and general interest of Virginia and North Carolina, as well as the peculiar interests of the agricultural class, require that legislative aid should be given, promptly and effectually, to the diffusion of agricultural instruction and knowledge, and to the promotion of agricultural improvement.

The foregoing resolution was adopted unanimously; and then the following was moved and adopted:

Resolved, That a committee of five be appointed to wait on the legislature of Virginia, in order to obtain from that body such aid as the agricultural interest of Virginia may require, and that a committee of five be also appointed to wait on the legislature of North Carolina for the like purpose.

Report of the Committee on Banking Capital.

The committee on banks submitted the following report:

At an early period, when bank capital in any part of the Union was small, the southern states enjoyed a large and profitable import trade. They made their exports directly to foreign markets, and in return imported whatever they needed of foreign fabrics. Then, if southern staples were proposed to be purchased on foreign account, or exportations to the states were made by foreign capitalists, the operation was not, as it now is, almost exclusively through northern agency, but in either case the intercourse was immediately and directly with the south. The south did not need any intermediate intercourse with foreign markets; possessing in the number and value of her agricultural staples the elements of foreign trade, and in this respect enjoying advantages over the north, she was her own factor; and her commercial prosperity, and as that involves almost every internal interest, her domestic welfare, were not liable to be affected by the vicissitudes which might occur in the markets of the east or north. An extraordinary change has occurred in the foreign commerce of the country—a change which exhibits the south in the attitude of dependence on the north for the supply of her demand of foreign goods, and what is alike remarkable, for the sale, to a mortifying extent, of her staples, intended for foreign consumption.

The change commenced about the time that the north decided in favor of a policy, which she has ever since steadily encouraged, to her manifest and great benefit, but of which the south was reluctant to avail herself, and has not yet profited by, as she should. That policy is the banking system, and to its powerful agency, as the north has applied it, may be ascribed, in a great degree, her commercial ascendency.

The effect of this policy in concentrating at New York, where it has been appealed to with equal judgment and vigor, a large portion of the entire business of the whole country is obvious. It gave her capital, and capital was alone wanted to secure commercial success. The effect of establishing banks was first to bring together, for commercial purposes, the money of those who should subscribe to its stock, and secondly, to render capital so raised, capable of performing the office of a far greater amount distributed among individuals. As then, an individual of large capital, is an unequal competitor with one of small, so a state or city, which brings to any branch of commerce the advantages of ample means and extended credit, must obtain the superiority of one less favored in these particulars.

By means of her banks, and their large capitals, New York has presented a market in which every commodity may be sold, and in which there is no danger of an overstock by the accumulation of commodities. She has not been under the necessity of restraining her dealings in the products of our own, or of foreign commodities, to some small advance on the actual private capital employed in trade; but has been encouraged to enter largely into whatsoever attracted commercial enterprise, by having it in her power to substitute credit for capital. So far is she in advance of the south, in all the facilities which are essential to commercial activity, that for the want of like facilities, many of our enterprising citizens, of no inconsiderable private fortunes, go thither to profit by advantages denied to them at home.

Your committee do not refer to the commercial ascendency of New York, and to the influence of her bank capital in building up and sustaining it, in any spirit of jealousy or complaint; on the contrary, their object is to direct public attention to what they regard as a valuable and powerful agent in her policy, in the hope that it may lead to more enlightened and liberal opinions among us.

If there be those who would seek for an explanation of northern commercial ascendency in other causes than the one to which the committee has referred, none, it is presumed, can question that it has been an efficient auxiliary. To doubt it, would be to question the connexion between commerce and credit, which the experience, not of this country only, but of the whole world, has ascertained to be inseparable. The inevitable tendency of commerce is to those points where credit may be obtained with the least discouragement, and upon advantageous terms; and without credit, commerce cannot rise far above simple barter, and merchants have neither inducements nor space for their vocation.

It would have been desirable to annex to this report, a table, showing the bank capitals of the great cities of the north and east, and in comparison, the small and inconsiderable capitals of Virginia and North Carolina. This has been omitted for the want of documents from which to compile it. The fact is however notorious, that there is not a point in any part of our country distinguished for commercial activity, which does not possess, in an eminent degree, all the facilities for banking; whilst the bank capital of this state and of North Carolina, has been, and is, not only relatively, but absolutely small, and wholly inadequate to their vast capabilities, and the exigencies of trade.

The legislature of this state, at the session of 1837, authorized an addition to the bank capital, which has been in part only so far realised. The law in respect to a part of this increase has been suspended; and if it should be the pleasure of the legislature at an early day, again to bring the important subject under review, which is most earnestly and respectfully recommended, it is hoped that the terms may be so settled as to attract subscriptions from abroad. The true policy being to recommend her institutions by relieving them from onerous and unnecessary restrictions whilst provisions be made against the abuse and perversion of their powers.

Resolved, as the opinion of this convention, That an increase of banking capital upon principles so liberal as to attract capital from abroad as well as at home, is necessary and indispensable to aid our manufacturers in granting to the southern merchants the same credits that are granted elsewhere, and without which extended credits all the natural and local advantages which enable us to be eminently successful in competition with our northern brethren, are either neutralized, or materially impaired.

Report of the Committee on Manufactures.

The committee very much regret that the necessity for despatch, denies them the opportunity of fulfilling their duties as they would desire. They labor under the further disadvantage of having no precise information in respect to several important points, where many branches of manufactures have been in successful operation upon a large and constantly increasing scale. They are in a measure compelled to limit themselves to an exhibition of the manufacturing condition of one place only. But for this, their apology is, that they have been furnished with no statements from other places. For this, however, there is less cause for regret, as it may be safely concluded of the entire manufacturing interest of the state, that it will advance and flourish, under the same common influence; and that, hitherto, wherever it has been industriously and prudently conducted, it has yielded an adequate return for the capital invested, and made valuable additions to the resources of the state.

The aggregate amount of capital of the several companies of Petersburg engaged in the manufacture of cotton is $772,000. There are 20,000 spindles and 670 looms, requiring 5500 bales of cotton annually. The operatives employed are 1000, whose wages exceed $130,000 per annum. For the machinery and lights, they consume about 5,000 gallons of oil, and for sizing about 1000 barrels of flour. The product is about 3,950,000 yards of cloth and 530,000 lbs. of yarns. Accompanying this report is a table showing the capital of each company, the extent of its business, &c., and by it will be seen that the dividends of two of the companies for the first six months of the present year have been 10 per cent., and of a third company 13 per cent. on its capital. The other companies having been but recently put into operation, have as yet declared no dividends. The dividends of past years have seldom (if ever) fallen under 15 per cent. per annum, and have generally reached beyond 20 per cent. This is an encouraging view of this branch of industry; it has been in existence about ten years, beginning under many discouragements; but showing as it has advanced, its capacity to sustain itself and to reach a state of yet higher and more extended usefulness. And it is obvious to remark, just as it progresses it will elevate the south from the condition of dependence on the industry of the north and east, and furnish the direct and indirect elements of foreign commerce. Whatever therefore tends to encourage cotton manufactures, and for like reasons, whatever tends to encourage all other branches of manufacturing interest, comes directly in aid of the objects of this convention.

Although these manufactories have continued gradually to increase, and we believe the same may be said of all the cotton manufactories of Virginia, yet they have been laboring under *one* great and serious disadvantage, which operates alike upon all the manufactures of the state, whether individuals or incorporated companies; namely, the want of sufficient banking capital, or the application of a portion of that in a different channel, so that the manufacturer who is compelled to pay cash for the raw material and sell on credit may be enabled to reduce into *cash* the paper for which he sells his goods. We believe that the cotton manufacturers throughout the state, agree that, were this want supplied, they have nothing more to ask and nothing to fear from the entire repeal of all protective duties; and still less from any competition with our northern brethren.

The northern manufacturers owing to their liberal system of credits, are enabled to sell their goods on a credit of 8 months, and immediately to have the paper cashed for which they were sold; and thus the southern merchant, who must necessarily sell on a long credit at home, is tempted to buy at the north even at higher prices, and certainly in larger quantities.

The manufacturers of the south having been enabled to succeed thus far, are not the less to expect all the countenance and support from the people and the legislature which can be granted without detriment to, and indeed in common with, the other great interests of the commonwealth.

All that is asked, is to enable them to cash their sales made at 6 to 8 months' time. This granted, and their march is onward; instead of 20 per cent. per annum upon *thousands*, they would make like dividends upon *millions*, and the wealth thus created would presently become a ready and powerful auxiliary to internal improvements, and to all the great interests of the commonwealth.

Your committee conclude this very hasty and imperfect report by a single resolution as follows:

Resolved, as the opinion of this convention that an increase of banking capital upon principles so liberal as to attract capital from abroad as well as at home is necessary and indispensable to aid our manufacturers in granting to the southern merchants the same credits that are granted elsewhere, and without which extended credits all the natural and local advantages, which enable us to be eminently successful in competition with our northern brethren, are either neutralized or materially impaired.

Addenda.

Statistics of the cotton manufactories of Petersburg.

Petersburg Manufacturing Company, incorporated in 1828, capital $120,000; operates 4000 spindles and 106 looms; consumes about 1600 bales cotton annually, when in full operation, 450,000 lbs. of which is sold in the form of yarns, and the balance wove into cloth; employs 200 hands, whose wages amount to more than $25,000 annually.

Last dividend for six months 10 per cent.

Merchant's Manufacturing Company, incorporated in 1832 capital $15,000, operates 4000 spindles and 112 looms; consumes about 1400 bales cotton annually, which produces about 800,000 yards of heavy cloth, besides about 70,000 lbs. sold as yarns; employs about 200 hands, pays more than $25,000 per annum wages.

Last dividend for six months 13 per cent.

Matoaca Manufacturing Company, incorporated in 1835, capital $150,000; operates 4000 spindles and 152 looms; consumes about 800 bales cotton annually, which produces about 850,000 yards cloth; employs 200 hands.

Last dividend for six months 10 per cent.

This company also have a paper mill, capital $75,000; employing at present 30 hands and will very soon employ 30 more.

Ettrick Manufacturing Company, incorporated in 1838, capital $152,000; operates 4000 spindles and 146 looms; consumes about 1,000 bales cotton annually, which produces about 1,000,000 yards cloth; employs 200 hands. But lately gone into operation, and have not yet declared a dividend.

Mechanics' Manufacturing Company, incorporated in 1838, capital $125,000; operates 4000 spindles and 154 looms; will consume when in full operation about 700 bales cotton annually, which will produce 1,000,000 yards cloth; employs 180 hands. But lately gone into operation and has not declared a dividend.

Recapitulation: the whole amount of capital is $772,000; operates 20,000 spindles and 670 looms, consumes 5,500 bales cotton annually, which produce about 3,950,000 yards of cloth and 530,000 lbs. of yarns; employs 1000 hands, whose wages exceeed $130,000. Consumes for machinery and lights, about 5,000 gallons of oil and 1000 barrels flour for sizing.

From the Genesee Farmer.

PRESERVATION OF THE POTATO.

One can form something of an estimate how extensively the potato enters into use as an article of food among the American people, from the complaints we hear from all parts of the country, or at least with very few exceptions, of the partial failure of that crop the present season. We frequently hear people when instituting a comparison between that root and bread, declare they would sooner part with their wheat bread, than with their potato; and these are not the poorer classes, but respectable wealthy people. Now, though we do not carry our affection to this esculent as far as this, yet we are "free to acknowledge" that a good potato is a good thing, and an inferior one, the worst of bad things. An unripe or defective potato, is one of the most indigestible and unwholesome kinds of aliments that can be taken into the stomach, if indeed there is any aliment about it at all; and from the specimens we have seen at numerous tables this year, we have no doubt that many of the cases of illness that have been charged upon hot weather, bad water, *malaria*, and a variety of other things, are justly due to the swallowing potatoes as hard and as heavy, as well as about the size of ounce balls.

The potato, in its original uncultivated state, is decidedly poisonous; and whenever it is used in an imperfect or unripe state, the result is not widely different now. Owing most likely to the hot dry weather, potatoes, this year, are generally of an inferior quality, and hence more pains and care should be taken in selecting those intended for food, and greater attention paid to preserving them, than in years like the last, when among thousands of bushels there was scarcely a defective one. Ireland, on the other side of the Atlantic, and Nova Scotia on this side, are the most celebrated for the excellence of their potatoes, and both have a temperature comparatively low, and an atmosphere moist and humid. If such a climate and temperature is required for the perfection of this root, will not the hot weather we have had the present year, account most satisfactorily for its little value, and also show why its growth is impossible in our more southern states, or still nearer the equinox.

Potatoes almost instinctively shun the light and air. These things so indispensable to the perfection of many other things, are most injurious to the potato, and the grand secret of its preservation lies in the most perfect exclusion of these silent but active agents. To perceive the difference between roots exposed, and those secluded, we have only to take one which has grown partially above ground, and one that has ripened in its proper place. The one will be green on the exterior, hard, heavy, and bitter in the interior, while the other will be of the natural color, farinaceous, and fine flavored. Farmers should take lessons from these facts, and conform their practice to the teachings of nature. In England and Scotland, where most serious complaints have arisen from the failures of the planted tubers, it is acknowledged by all, that roots which are allowed to remain in the ground during the winter never fail of vegetating, and that those secured by pitting are more likely to succeed than those put into cellars, and thus partially exposed to light and air.

The most common method of preserving potatoes is to put them into bins in the cellar, where they are left without any covering or other preparation, and used as wanted. It is also customary to get in as little dirt with them as possible, and one standard of good farming has been the clean state of a farmer's potatoes when deposited in his cellar. For the reasons given above, and from our own experience, we think both these modes of securing potatoes, or preparing them, erroneous. If put into bins, they should be covered as closely as possible from light and air; and if there is dirt enough thrown into the bin to completely fill all the interstices between them, so much the better for the roots. It has been recommended by some potato growers, and the practice is founded in reason, to line the sides of the bins with turf, the lower sides placed inwards, and when the bin was filled, to cover it closely in the same way, and with the same material.

Owing to the severity of our winters, potatoes cannot be allowed to remain where they grow; else their mealiness and freshness would be much increased by allowing those that are to be used the coming season to remain where they are till the spring opens. Since this cannot be, the method of preservation that approaches the nearest to this will be found the best, and this method doubtless is pitting, or as most of our farmers term it, burying in holes in the field. In burying in this way care should be taken not to put too many in a pit, or, in other words, not make the heaps too large. Twenty or twenty-five bushels is quite enough; and some prefer even a smaller number. The cone should be regular so as to be covered equally. The covering of straw and earth first put on should not be too thick, as otherwise the roots will heat, and be injured: but at the latest period allowable, the thickness of the covering should be increased so as effectually to prevent freezing. In covering potatoes in the fall, it should be remembered that the great object of the first covering, is simply to exclude air and light, and preserve them from rain or unfavorable weather, and the last covering is the one to be relied on as a defence against the frost. If the roots are dug and pitted immediately, without unnecessary exposure, and if the ground and the process of covering is properly selected and performed, the potatoes will come out in the spring, in excellent order rather improved than deteriorated by their winter's keeping.

Farmers who are in the habit of making their pork from potatoes, or feeding them extensively to their stock, will undoubtedly see the propriety from the present high prices, of sorting their roots more carefully than they have hitherto done, in order to sell, or preserve, as many as possible. The apprehended scarcity of this root will also prompt to this course; and should induce all to adopt the best and most effectual measures to preserve through the winter uninjured, or, if possible, improved, this root on which so many rely for sustenance.

THE CORN AND SMALLER CROPS OF NANSEMOND COUNTY.

To the Editor of the Farmers' Register.

Clifton, Nansemond Co. Nov. 15, 1838.

I have had it in contemplation for several weeks to address you a few lines, on the state of the crops of our county; but delayed doing so, until this time, so as to be able to ascertain more certainly and distinctly their real state and condition. We are generally very apt to over-estimate our crops; it is not safe, therefore, to judge them until they are got in, when something like certainty may be arrived at. The corn crop (the staple of our county) has been housed, or nearly so; and from the best information I can get, after diligent inquiry of the most intelligent of our farmers, and from my own personal observation, I think I may safely say that it is fully, if not over an average one. The prospect at one period was exceedingly gloomy and unpromising; but, thanks to the Author of all good, our dismal forebodings have been scattered to the winds.

The *truck* crops of the river farms have also yielded well, and sold well. I cannot say, however, that the sweet-potato, which may be justly ranked next in importance to the corn crop, has been altogether as productive as in former years; but, considering all things, it has been a fair yield, and is generally a source of much revenue to the county. It comes, too, at a very convenient time, to pay taxes, and to keep the sheriff at a respectable distance.

It has been estimated by competent judges, that the refuse, or, if I may be allowed the expression, the offal of an acre of suitable land, well cultivated in sweet potatoes, is worth as much as the same quantity of land would produce in corn—an acre of good and suitable land will make, in a tolerable season, one hundred and twenty bushels *marketable* potatoes, which, at fifty cents per bushel, (and for two years the price has ranged from fifty-five to seventy-five cents,) would be sixty dollars—certainly a very handsome profit, admitting the refuse or offal part of the crop to be as valuable as supposed.

The water-melon crop is also entitled to a passing notice. It is one that is easily cultivated, quick over, often very profitable, and has been particularly so this year. A gentleman told me that he sold from twelve acres of land *seven hundred and fifty dollars* worth; and I think it very probable that others did equally as well, if not better.

Cotton as a sale crop has been almost abandoned in our county. The low price and the unsuitableness of our climate to its production, I have no doubt, will ultimately drive it back to the more genial and sunny regions of the south.

It may probably excite the risible faculties of the large wheat growers and tobacco planters of the upper regions of our country, to hear us low-landers prating about our sweet potatoes, water-melons, and other small matters; but whilst we are permitted to enjoy the valuable profits arising from their culture, and the oysters to boot, they are perfectly welcome to the full benefit of the laugh.

When I commenced this letter, I did not design to go further than simply to give you a statement of the condition of our crops; but having a little space left, I will say a few words more. The science of agriculture, the natural employment of man, seems to be making rapid strides towards improvement in many parts of our country, and I hope I may (without the imputation of boasting,) be permitted to say, that few regions are more alive to the great improvements of the age than the county of Nansemond. Her citizens, after slumbering for ages, over almost unrivalled advantages, have at last roused up from their lethargy, and seem disposed to appreciate and to profit by the many advantages that surround them. With a climate mild and temperate, a tolerably good soil, and a vast abundance of all the elements necessary to make it permanently rich and fertile, and a convenient and ready market for every species of produce, down to the very smallest article, surely, her citizens have every inducement to "go ahead" in that career of improvement, which is abroad in the land.

We have established an agricultural society, in the neighborhood of Chuckatuck, and placed at its head one of our most intelligent and enterprising farmers. It is the first society of the kind that ever had existence in our county. They are generally the harbingers of improvement and usefulness, by the rivalry which they excite and the valuable information which they collect and disseminate. JOSHUA M. HARRELL.

[We entirely agree with our correspondent in his high estimation of the advantages of the lands of Nansemond. We have long entertained the opinion, that if a single preliminary improvement were made, these lands would be among the best situated in the U. States, for desirable residence, for the enjoyment of all the comforts and many of the luxuries of life—for agricultural profit—and particularly for increasing that profit by cheap fertilization. The one great improvement which we deem so desirable, is to cut every mill-dam, and dry every mill-pond in the county and its vicinity. That one improvement, by adding to health, physical power, and happiness, would double the value and the income of the lands, and even make meal itself cheaper, by increasing the corn.—ED. FAR. REG.

From the Silk Grower.

SILK-CULTURE.

Messrs. Editors—The worms of my second feeding have just done winding. They are the two crop variety, and were produced from worms fed in the early part of the season, exclusively on the white or Italian mulberry, of four or five summers' growth. They did well, but the expense and trouble of collecting leaves was great, and the cocoons small. But my second crop, as before stated, the product of these first worms, fed entirely on the morus multicaulis, of but one summer's growth, and made cocoons a third, or at least a fourth larger, and more in proportion to the worms hatched. Their being longer going through the various stages, was owing to the late cool weather.

After my first crop of worms had deposited their eggs, I removed them to an ice-house, which is necessary only to produce simultaneous hatching. In a few days they were brought out to the warm air, and as the young ones came they were separated from the eggs, and removed to the feeding shelves, by means of leaves cut in small strips, to which they immediately adhered. In this way each day's hatching may be removed to the shelves allotted them, and kept separate with great facility. The advantage of keeping the worms of each day's hatching by themselves, is great. After being removed, they are suffered to feed on the shelves for a week or ten days, after which hurdles of netting are placing above them, over which fresh leaves are sprinkled, to which they immediately attach themselves, if done in the morning, or when they have eaten their previous food. After this they are regularly cleaned, by means of the hurdle, each succeeding day until they commence rising. As far as my experience extends, I can say that the worm appears to prefer this leaf to all others, is less liable to disease, grows larger, and produces larger cocoons. JAMES B. HOOPER.

Allentown, N. J., Oct. 6, 1838.

From the Silk Grower.

REMOVING MULBERRY TREES.

Mulberry trees which are to be taken out of the ground before winter can be ploughed up easily and expeditiously. Attach two horses to the plough, one before the other; turn a furrow from one side of the row of trees, then run the plough on the opposite side under the roots. They can then be removed by the hands without injury to the plant. Ten thousand can be taken up in this way in an hour.

From the Maine Farmer.

SOUP.

Soup is one of the cheapest, and, to some palates, the most agreeable dish that can be set upon a table, and the following is the most convenient way of preparing it we know of. After taking your meat, potatoes and cabbage from the pot, put into the liquor a little thickening of meal or flour, previously stirred up in cold water, and let it boil up, and you have a soup that is superior to the best French cookery. It is a great waste to throw away the liquor in which meat and vegetables have been boiled.

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

Markets have undergone little change during the month. Wheat and flour command nearly the same prices as in October. The former 1,55 to 1,70 per bushel; the latter 8 to 8,25 per barrel. The averages of wheat in England continued to decline, until the duty reached nearly 22 shillings per quarter; but at latest dates prices were again advancing; and during the winter, whilst the Baltic is closed by ice, it is probable the stoppage of supplies from thence may cause the duty to recede again to its minimum. The receipts of flour at New York from the west have been about the same as last year; but these will now cease until the spring, when the supply will be very large. Indian corn has fallen to 90 cts. per bushel. Tobacco continued to advance in England until the price reached 6d. to 12d.—embracing common leaf to fine strips; and in our markets, prices range from $7 to $16—including inferior lugs to good stemmed. Scarcely any of the old crop remains to be brought to market; and the receipts of new are confined chiefly to primings and suckers. The high price inducing the planters to save what has generally been worthless.

The new cotton of Virginia and North Carolina is of inferior quality, and the quantity far short of an average crop; it sells at 10 to 11½ cts., while old commands 11 to 12½ cts. Prices abroad are well sustained, considering the great increase of supply. Few droves of hogs have arrived; and the price is $9,50 to $10 per 100 lbs. Exchange on London 9½ to 10 premium. X.

Nov. 28, 1838.

PLANTING FRUIT TREES.

From the Maine Farmer.

It should be remembered that the proper time for planting fruit seeds and nuts of all kinds is the fall, or at any rate the seeds should be suffered to freeze in the ground during the winter. The action of the frost cracks the hard shell and gives the sprout an opportunity to grow. It is sometimes the case that the frost is not sufficiently severe to crack the shell of hard nuts, such as walnuts, oilnuts peach stones, &c. In such case they should be taken up in the spring and the shell cracked, care being taken not to bruise or injure the meat, and then plant them where your wish them to remain.

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ORIGINAL COMMUNICATIONS.

SELECTIONS.

TO CORRESPONDENTS.

The following communications were received too late to be inserted in this number.

"Proceedings of Fredericksburg Agricultural Society"—"Remarks on Princeana, and on mulberry culture"—"Humbug, No. I."—"Mistake in the figure or description of the marl indicator."

THE FARMERS' REGISTER.

VOL. VI.—NO. 11.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ELEMENTS

OF

AGRICULTURAL CHEMISTRY:

BY SIR HUMPHRY DAVY, BART. LL. D., F. R. S. &c.

PREFACE

TO THE FIRST AMERICAN FROM THE FIFTH AND LAST ENGLISH EDITION.

The text of the last English edition of Davy's Elements of Agricultural Chemistry, is precisely the same with that of 1827, which received the latest alterations and improvements made by its illustrious author. But besides that entire text, this, which will be an exact reprint of the last London edition, has the notes then appended by the pen of the author's brother, and co-laborer in chemical investigation, Dr. John Davy.

No American edition of this valuable work has been published from any later than the first English; and even of those early and imperfect editions, few if any copies can now be found for sale. The work, in booksellers' phrase, has long been "out of print;" and there are very few works that so well deserve to be reprinted, or are more essential to the library of every intelligent agriculturist.

It has therefore been thought that it would be an acceptable and important service to the readers of the Farmers' Register, to furnish them with the last edition of this valuable work, in so cheap a form as the pages of this journal will afford.—ED. FAR. REG.

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ADVERTISEMENT TO THE FIFTH EDITION.

In this edition, the text of the last, to which the advertisement of the author prefixed refers, has been scrupulously preserved unaltered. The only liberty I have taken has been in adding a few foot notes, at the request of the publishers, chiefly relating to facts ascertained since 1826.

JOHN DAVY.

Fort Pitt, Chatham, Nov. 5, 1835.

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ADVERTISEMENT TO THE FOURTH EDITION.

During ten years, from 1802 to 1812, I had the honor, every session, of delivering courses of lectures before the Board of Agriculture. I endeavored, at all times, to follow in them the progress of discovery; they therefore varied every year; and since they were first published in 1813, some considerable improvements have been made in chemical science, which have rendered many alterations and additions necessary.

I am indebted for much useful information to many gentlemen who have endeavored to improve agriculture, and to apply scientific principles to this most important of the arts; of which acknowledgments will be found in the body of the work. I hope there are no omissions on this head; but should they exist, I trust they will be attributed to defect of recollection, and not to any want of candor or of gratitude.

Where I have derived any specific statements from books, I have always quoted them; but I have not always made references to such doctrines as are become current, the authors of which are well known; and which may be almost considered as the property of all enlightened minds.

In revising this work for the fourth edition, I have been forcibly struck with its imperfections, and I regret that I have been able to do so little to render it more worthy of the approbation of those readers for whom it was designed. My object has been principally to dwell upon practical principles, and practical applications of science; and it is in the farm, and not in the laboratory, that these can be put to the test of experiment; and my duties and pursuits have rendered it impossible for me to do more than point out the path of inquiry—to indicate the road to improvement. The manner in which the work has been received, both in this country and the continent, induces me to hope that its object, however humble, has been to a certain extent attained, and that it has not been without its utility.

I have retained an appendix containing an account of the experiments on grasses instituted by the Duke of Bedford at Woburn, because many of these experiments are alluded to in the body of the work. I am happy, however, to be able to refer my readers to a much fuller and more detailed account of this subject of investigation, in a treatise published by Mr. George Sinclair, entitled *Hort. Gram. Woburnensis*, and which, from the nature of the details, and the singular modesty and clearness with which they are given, is well worthy the perusal of all persons interested in agricultural pursuits.

H. DAVY.

Park Street, January 1, 1827.

LECTURE I.

INTRODUCTION. GENERAL VIEWS OF THE OBJECTS OF THE COURSE, AND OF THE ORDER IN WHICH THEY ARE TO BE DISCUSSED.

It is with great pleasure that I receive the permission to address so distinguished and enlightened an audience on the subject of agricultural chemistry.

That any thing which I am able to bring forward, should be thought worthy the attention of the Board of Agriculture, I consider as an honor; and I shall endeavour to prove my gratitude, by employing every exertion to illustrate this department of knowledge, and to point out its uses.

In attempting these objects, the peculiar state of the inquiry presents many difficulties to a lecturer. Agricultural chemistry has not yet received a regular and systematic form. It has been pursued by competent experimenters for a short time only: the doctrines have not as yet been collected into any elementary treatise; and on an occasion when I am obliged to trust so much to my own arrangements, and to my own limited information, I cannot but feel diffident as to the interest that may be excited, and doubtful of the success of the undertaking. I know, however, that your candor will induce you not to expect any thing like a finished work upon a science as yet in its infancy; and I am sure you will receive with indulgence the first attempt made in this country to illustrate it, by a series of experimental demonstrations.

Agricultural chemistry has for its objects all those changes in the arrangements of matter connected with the growth and nourishment of plants; the comparative values of their produce as food; the constitution of soils; the manner in which lands are enriched by manure, or rendered fertile by the different processes of cultivation. Inquiries of such a nature cannot but be interesting and important, both to the theoretical agriculturist, and to the practical farmer. To the first they are necessary in supplying most of the fundamental principles on which the theory of the art depends. To the second they are useful in affording simple and easy experiments for directing his labors, and for enabling him to pursue a certain and systematic plan of improvement.

It is scarcely possible to enter upon any investigation in agriculture without finding it connected, more or less, with doctrines or elucidations derived from chemistry.

If land be unproductive, and a system of ameliorating it is to be attempted, the sure method of obtaining the object is by determining the cause of its sterility, which must necessarily depend upon some defect in the constituton of the soil, which may be easily discovered by chemical analysis.

Some lands of good apparent texture are yet steril in a high degree; and common observaton and common practice afford no means of ascertaining the cause, or of removing the effect. The application of chemical tests in such cases is obvious; for the soil must contain some noxious principle, which may be easily discovered, and probably easily destroyed.

Are any of the salts of iron present? they may be decomposed by lime. Is there an excess of siliceous sand? the system of improvement must depend on the application of clay and calcareous matter. Is there a defect of calcareous matter? the remedy is obvious. Is an excess of vegetable matter indicated? it may be removed by liming, paring, and burning. Is there a deficiency of vegetable matter? it is to be supplied by manure.

A question concerning the different kinds of limestone to be employed in cultivation often occurs. To determine this fully in the common way of experience, would demand a considerable time, perhaps some years, and trials which might be injurious to crops; but by simple chemical tests the nature of a limestone is discovered in a few minutes; and the fitness of its application, whether as a manure for different soils, or as a cement, determined.

Peat earth of a certain consistence and composition is an excellent manure; but there are some varieties of peats which contain so large a quantity of ferruginous matter as to be absolutely poisonous to plants. Nothing can be more simple than the chemical operation for determining the nature, and the probable uses of a subtance of this kind.

There has been no question on which more difference of opinion has existed, than that of the state in which manure ought to be ploughed into the land; whether recent, or when it has gone through the process of fermentation; and this question is still a subject of discussion. But whoever will refer to the simplest principles of chemistry, cannot entertain a doubt on the subject. As soon as dung begins to decompose, it throws off its volatile parts, which are the most valuable and most efficient. Dung which has fermented, so as to become a mere soft cohesive mass, has generally lost from one third to one half of its most useful constituent elements; and, that it may exert its full action upon the plant, and lose none of its nutritive powers, it should evidently be applied much sooner, and long before decomposition has arrived at its ultimate results.

It would be easy to adduce a multitude of other instances of the same kind; but sufficient, I trust, has been said to prove, that the connection of chemistry with agriculture, is not founded on mere vague speculation, but that it offers principles which ought to be understood and followed, and which, in their progression and application, can hardly fail to be highly beneficial to the community.

A view of the objects in this course of lectures, and of the manner in which they are to be treated, will not, I hope, be considered as an improper introduction. It will inform you what you are to expect; it will afford a general idea of the connection of the different parts of the subject, and of their relative importance; it will enable me to give some historical details of the progress of this branch of knowledge, and to reason from what has been ascertained, concerning what remains to be investigated and discovered.

The phenomena of vegetation must be considered as an important branch of the science of organized nature; but though exalted above inorganic matter, vegetables are yet in a great measure dependent for their existence upon its laws. They receive their nourishment from the external elements; they assimilate it by means of peculiar organs; and it is by examining their physical and chemical constitution, and the substances and powers which act upon them, and the modifications which they undergo, that the scientific principles of agricultural chemistry are obtained.

According to these ideas, it is evident that the study ought to be commenced by some general inquiries into the composition and nature of material bodies, and the laws of their changes. The surface of the earth, the atmosphere, and the water deposited from it, must either together or separately afford all the principles concerned in vegetation; and it is only by examining the chemical nature of these principles, that we are capable of discovering what is the food of plants, and the manner in which this food is supplied and prepared for their nourishment. The principles of the constitution of bodies, consequently, will form the first subject for our consideration.

By methods of analysis dependent upon chemical and electrical instruments dicovered in late times, it has been ascertained that all the varieties of material substances may be resolved into a comparatively small number of bodies, which, as they are not capable of being decompounded, are considered in the present state of chemical knowledge, as elements. The bodies incapable of decomposition at present known are fifty-two.* Of these, forty are metals; eight are inflammable bodies; and five are substances which unite with metals and inflammable bodies, and form with them acids, alkalies, earths, or other analogous compounds. The chemical elements acted upon by attractive powers combine in different aggregates. In their simpler combinations, they produce various crystalline substances, distinguished by the regularity of their forms. In more complicated arrangements, they constitute the varieties of vegetable and animal substances, bear the higher character of organization, and are rendered subservient to the purposes of life. And by the influence of heat, light, and electrical powers, there is a constant series of changes; matter assumes new forms, the destruction of one order of beings tends to the conservation of another; solution and consolidation, decay and renovation, are connected; and whilst the parts of the system continue in a state of fluctuation and change, the order and harmony of the whole remain unalterable.

After a general view has been taken of the nature of the elements, and of the principles of chemical changes, the next object will be the structure and constitution of plants. In all plants there exists a system of tubes or vessels, which in one extremity terminate in roots, and at the other in leaves. It is by the capillary action of the roots that fluid matter is taken up from the soil. The sap, in passing upwards, becomes denser, and more fitted to deposite solid matter: it is modified by exposure to heat, light, and air in the leaves; descends through the bark, in its progress produces new organized matter; and is thus, in its vernal and autumnal flow, the cause of the formation of new parts, and of the more perfect evolution of parts already formed.

* The number is now fifty-four. Since the above was written, thorium has been discovered by Berzelius, and vanadium by Sefstrom; both of them metals, as their termination indicates.—J. D.

In this part of the inquiry, I shall endeavor to connect together into a general view, the observations of the most enlightened philosophers who have studied the physiology of vegetation. Those of Grew, Malphighi, Sennebier, Darwin, De Candolle, Mirbel, and, above all, of Mr. Knight. He is the latest inquirer into these interesting subjects, and his labors have tended most to illustrate this part of the economy of nature.

The chemical composition of plants has, within the last ten years, been elucidated by the experiments of a number of chemical philosopers, both in this and in other countries; and it forms a beautiful part of general chemistry. It is too extensive to be treated of minutely; but it will be necessary to dwell upon such parts of it, as afford practical inferences.

If the organs of plants be submitted to chemical analysis, it is found that their almost infinite diversity of form depends upon different arrangements and combinations of a very few of the elements; seldom more than seven or eight belong to them, and three constitute the greatest part of their organized matter; and according to the manner in which these elements are disposed, arise the different properties of the products of vegetation, whether employed as food, or for other purposes and wants of life.

The value and uses of every species of agricultural produce, are most correctly estimated and applied, when practical knowledge is assisted by principles derived from chemistry. The compounds in vegetables really nutritive as the food of animals, are very few; farina or the pure matter of starch, gluten,sugar, vegetable jelly, oil, and extract.* Of these the most nutritive is gluten; which approaches nearest in its nature to animal matter, and which is the substance that gives to wheat its superiority over other grain. The next in order as to nourishing power is oil, then sugar, then farina; and last of all, gelatinous and extractive matters. Simple tests of the relative nourishing powers of the different species of food, are the relative quantities of these substances that they afford by analysis; and though taste and appearance must influence the consumption of all articles in years of plenty, yet they are less attended to in times of scarcity, and on such occasions this kind of knowledge may be of the greatest importance. Sugar and farina, or starch, are very similar in composition, and are capable of being converted into each other, by simple chemical processes. In the discussion of their relations, I shall detail to you the results of some recent experiments, which will be found possessed of applications both to the economy of vegetation, and to some important processes of manufacture.

All the varieties of substances found in plants, are produced from the sap; and the sap of plants is derived from water, or from the fluids of the soil, and

* Doubt may be entertained of the number being so limited. As the saw-dust of wood is capable of being converted into a kind of bread, by a peculiar process, it is not improbable that, by the digestive powers of animals, nourishment may be derived from substances analogous to saw-dust, as chaff, &c. In the Ionian islands, where cattle are miserably kept during the winter months, they are fed chiefly on straw, and the horses of the farmer on straw and the cuttings of the vine.—J. D.

it is altered by, or combined with, principles derived from the atmosphere. The influence of the soil, of water, and of air, will therefore be the next subject of consideration. Soils in all cases consist of a mixture of different finely divided earthy matters; with animal or vegetable substances in a state of decomposition, and certain saline ingredients. The earthy matters are the true basis of the soil; the other parts, whether natural, or artificially introduced, operate in the same manner as manures. Four earths generally abound in soils; the aluminous, the silicious, the calcareous, and the magnesian. These earths, as I have discovered, consist of highly inflammable metals united to pure air, or oxygen; and they are not, as far as we know, decomposed or altered in vegetation.

The great use of the soil is to afford support to the plant, to enable it to fix its roots, and to derive nourishment by its tubes slowly and gradually, from the soluble and dissolved substances mixed with the earths.

That a particular mixture of the earths is connected with fertility, cannot be doubted: and almost all steril soils are capable of being improved, by a modification of their earthy constituent parts. I shall describe the simplest method as yet discovered of analysing soils, and of ascertaining the constitution and chemical ingredients which appear to be connected with fertility; and on this subject many of the former difficulties of investigation will be found to be removed by recent inquiries.

The necessity of water to vegetation, and the luxuriancy of the growth of plants connected with the presence of moisture in the southern countries of the old continent, led to the opinion so prevalent in the early schools of philosophy, that water was the great productive element, the substance from which all things were capable of being composed, and into which they were finally resolved. The "*ariston men hydor*" of the poet, "water is the noblest," seems to have been an expression of this opinion, adopted by the Greeks from the Egyptians, taught by Thales, and revived by the alchemists in late times. Van Helmont, in 1610, conceived that he had proved, by a decisive experiment, that all the products of vegetables were capable of being generated from water. His results were shown to be fallacious by Woodward in 1691; but the true use of water in vegetation was unknown till 1785; when Mr. Cavendish made the discovery, that it was composed of two elastic fluids or gases, inflammable gas or hydrogen, and vital gas or oxygen.

Air, like water, was regarded as a pure element by most of the ancient philosophers: a few of the chemical inquirers in the sixteenth and seventeenth centuries, formed some happy conjectures respecting its real nature. Sir Kenelm Digby, in 1660, supposed that it contained some saline matter, which was an essential food of plants. Boyle, Hook, and Mayow, between 1665 and 1680, stated, that a small part of it only was consumed in the respiration of animals, and in the combustion of inflammable bodies; but the true statical analysis of the atmosphere is comparatively a recent labor, achieved towards the end of the last century by Scheele, Priestley, and Lavoisier. These celebrated men showed that its principal elements are two gases, oxygen and azote, of which the first is essential to flame, and to the life of animals and that it likewise contains small quantities of aqueous vapor, and of carbonic acid gas; and Lavoisier proved that this last body is itself a compound elastic fluid, consisting of charcoal dissolved in oxygen.

Jethro Tull, in his Treatise on Horse-hoeing, published in 1733, advanced the opinion, that minute earthy particles supplied the whole nourishment of the vegetable world; that air and water were chiefly useful in producing these particles from the land; and that manures acted in no other way than in ameliorating the texture of the soil, in short, that their agency was mechanical. This ingenious author of the new system of agriculture having observed the excellent effects produced in farming, by a minute division of the soil, and the pulverization of it by exposure to dew and air, was misled, by carrying his principles too far. Duhamel, in a work printed in 1754, adopted the opinion of Tull; and stated, that by finely dividing the soil, any number of crops might be raised in succession from the same land. He attempted also to prove, by direct experiments, that vegetables of every kind were capable of being raised without manure. This celebrated horticulturist lived, however, sufficiently long to alter his opinion. The results of his later and most refined observations led him to the conclusion, that no single material afforded the food of plants. The general experience of farmers had long before convinced the unprejudiced of the truth of the same opinion, and that manures were absolutely consumed in the process of vegetation. The exhaustion of soils, by carrying off corn crops from them, and the effects of feeding cattle on lands, and of preserving their manure, offer familiar illustrations of the principle; and several philosophical inquirers, particularly Hassenfratz and Saussure, have shown, by satisfactory experiments, that animal and vegetable matters deposited in soils are absorbed by plants, and become a part of their organized matter. But though neither water, nor air, nor earth, supplies the whole of the food of plants, yet they all operate in the process of vegetation. The soil is the laboratory in which the food is prepared. No manure can be taken up by the roots of plants, unless water is present; and water, or its elements, exist in all the products of vegetation. The germination of seeds does not take place without the presence of air or oxygen gas: and in the sunshine, vegetables decompose the carbonic acid gas of the atmosphere, the carbon of which is absorbed, and becomes a part of their organized matter, and the oxygen gas, the other constituent, is given off;* and, in consequence of a variety of agencies, the economy of vegetation is made subservient to the general order of the system of nature.

It is shown by various researches, that the constitution of the atmosphere has been always the same since the time that it was first accurately analyzed; and this must, in a great measure, de-

* The great accumulation of carbon in forests and in peat mosses, not to lay stress on beds of mineral coal, which there is good reason to consider of vegetable origin, affords demonstrative proof, as it appears to me, of the truth in the text, that plants, in active vegetation and growth, either mediately or immediately derive from the atmosphere carbon, by the decomposition of carbonic acid and the liberation of its oxygen. J. D.

pend upon the powers of plants to absorb or decompose the putrefying or decaying remains of animals and vegetables, and the gaseous effluvia which they are constantly emitting. Carbonic acid gas is formed in a variety of processes of fermentation and combustion, and in the respiration of animals; and, as yet, no other process is known in nature by which it can be consumed, except vegetation. Animals produce a substance which appears to be a necessary food of vegetables; vegetables evolve a principle necessary to the existence of animals; and these different classes of beings seem to be thus connected together in the exercise of their living functions, and to a certain extent made to depend upon each other for their existence. Water is raised from the ocean, diffused through the air, and poured down upon the soil, so as to be applied to the purposes of life. The different parts of the atmosphere are mingled together by winds or changes of temperature, and successively brought in contact with the surface of the earth, so as to exert their fertilizing influence. The modifications of the soil, and the application of manures, are placed within the power of man, as if for the purpose of awakening his industry, and of calling forth his powers.

The theory of the general operation of the more compound manures, may be rendered very obvious by simple chemical principles; but there is still much to be discovered, with regard to the best methods of rendering animal and vegetable substances soluble; with respect to the processes of decomposition, how they may be accelerated or retarded, and the means of producing the greatest effects from the materials employed: these subjects will be attended to in the lecture on manures.

Plants are found by analysis to consist principally of charcoal and aëriform matter. They give out by distillation volatile compounds, the elements of which are pure air, inflammable air, coally matter, and azote, or that elastic substance which forms a great part of the atmosphere, and which is incapable of supporting combustion. These elements they gain, either by their leaves from the air, or by their roots from the soil. All manures from organized substances contain the principles of vegetable matter, which, during putrefaction, are rendered either soluble in water or aëriform—and in these states, they are capable of being assimilated to the vegetable organs. No one principle affords the pabulum of vegetable life; it is neither charcoal nor hydrogen, nor azote, nor oxygen alone; but all of them together, in various states and various combinations. Organic substances, as soon as they are deprived of vitality, begin to pass through a series of changes, which ends in their complete destruction, in the entire separation and dissipation of the parts. Animal matters are the soonest destroyed by the operation of air, heat, and light. Vegetable substances yield more slowly, but finally obey the same laws.* The periods of the application of manures from decomposing animal and vegetable substances depend upon the knowledge of these principles; and I shall be able to produce some new and important facts founded upon them, which I trust will remove all doubt from this part of agricultural theory.

The chemistry of the more simple manures, the manures which act in very small quantities, such as gypsum, alkalies, and various saline substances, has hitherto been exceedingly obscure. It has been generally supposed that these materials act in the vegetable economy in the same manner as condiments or stimulants in the animal economy, and that they render the common food more nutritive. It seems, however, a much more probable idea, that they are actually a part of the true food of plants, and that they supply that kind of matter to the vegetable fibre, which is analogous to the bony matter in animal structures.

The operation of gypsum, it is well known, is extremely capricious in this country, and no certain data have hitherto been offered for its application. There is, however, good ground for supposing that the subject will be fully elucidated by chemical inquiry. Those plants which seem most benefited by its application are plants which always afford it on analysis. Clover, and most of the artificial grasses, contain it; but it exists in very minute quantity only in barley, wheat, and turnips. Many peat ashes, which are sold at a considerable price, consist in great part of gypsum, with a little iron; and the first seems to be their most active ingredient. I have examined several of the soils to which these ashes are successfully applied, and I have found in them no sensible quantity of gypsum. In general, cultivated soils contain sufficient of this substance for the use of the grasses; in such cases, its application cannot be advantageous. For plants require only a certain quantity of manure; an excess may be detrimental, and cannot be useful.

The theory of the operation of alkaline substances is one of the parts of the chemistry of agriculture most simple and distinct. They are found in all plants, and therefore may be regarded as amongst their essential ingredients. From their powers of combination, likewise, they may be useful in introducing various principles into the sap of vegetables, which may be subservient to their nourishment.

The fixed alkalies, which were formerly regarded as elementary bodies, it has been my good fortune to decompose. They consist of pure air, united to highly inflammable metallic substances; but there is no reason to suppose that they are reduced into their elements in any of the processes of vegetation.

In this part of the course I shall dwell at considerable length on the important subject of lime, and I shall be able to offer some novel views.

Slacked lime was used by the Romans for manuring the soil in which fruit-trees grew. This we are informed by Pliny. Marl had been employed by the Britons and the Gauls from the earliest times, as a top-dressing for land. But the precise period in which burnt lime first came into general use in the cultivation of land, is, I believe, unknown. The origin of the application from the early practices is sufficiently obvious; a substance, which had been used with success in gardening, must have been soon tried in farming; and in

* This statement in the text, though correct generally, is not without exception. Some vegetable substances undergo change very rapidly; some animal substances very slowly. The expressed juices of most fruits enter into the vinous fermentation as rapidly, or even more rapidly, at the temperature of 70° Fahr. than the animal fluids do the putrefactive; the white tissues of animals, as tendons, &c. resist change with great pertinacity.—J. D.

countries where marl was not to be found, calcined limestone would be naturally employed as a substitute.

The elder writers on agriculture had no correct notions of the nature of lime, limestone, and marl, or of their effects; and this was the necessary consequence of the imperfection of the chemistry of the age. Calcareous matter was considered by the alchemists as a peculiar earth, which, in the fire became combined with inflammable acid; and Evelyn and Hartlib, and, still later, Lisle, in their works on husbandry, have characterized it merely as a hot manure, of use in cold lands. It is to Dr. Black, of Edinburgh, that our first distinct rudiments of knowledge on the subject are owing About the year 1755, this celebrated professor proved, by the most decisive experiments, that limestone and all its modifications, marbles, chalks, and marls, consist principally of a peculiar earth united to an aërial acid: that the acid is given out in burning, occasioning a loss of more than 40 per cent., and that the lime in consequence becomes caustic.

These important facts immediately applied, with equal certainty, to the explanation of the uses of lime, both as a cement and as a manure. As a cement, lime, applied in its caustic state, acquires its hardness and durability, by absorbing the aërial (or, as it has been since called, carbonic) acid, which always exists in small quantities in the atmosphere; it becomes, as it were, again limestone.

Chalks, calcareous marls, or powdered limestones, act merely by forming an useful earthy ingredient of the soil, and their efficacy is proportioned to the deficiency of calcareous matter, which, in larger or smaller quantities, seems to be an essential ingredient of all fertile soils; necessary, perhaps, to their proper texture, and as an ingredient in the organs of plants.

Burnt lime, in its first effect, acts as a decomposing agent upon animal or vegetable matter, and seems to bring it into a state in which it becomes more rapidly a vegetable nourishment; gradually, however, the lime is neutralized by carbonic acid, and converted into a substance analogous to chalk; but in this case it more perfectly mixes with the other ingredients of the soil, is more generally diffused and finely divided; and it is probably more useful to land than any calcareous substance in its natural state.

The most considerable fact made known, with regard to limestone, within the last few years, is owing to Mr. Tennant. It had been long known, that a particular species of limestone, found in different parts of the north of England, when applied in its burnt and slacked state to land in considerable quantities, occasioned sterility, or considerably injured the crops for many years. Mr. Tennant in 1800, by a chemical examination of this species of limestone, ascertained that it differed from common limestones by containing magnesian earth; and by several experiments he proved, that this earth was prejudicial to vegetation, when applied in large quantities in its caustic state. Under common circumstances, the lime from the magnesian limestone is, however, used in moderate quantities upon fertile soils in Leicestershire, Derbyshire, and Yorkshire, with good effect; and it may be applied in greater quantities to soils containing very large proportions of vegetable matter. Magnesia, when combined with carbonic acid gas seems not to be prejudicial to vegetation, and in soils rich in manure it is speedily supplied with this principle from the decomposition of the manure.

After the nature and operation of manures have been discussed, the next, and the last subject for our consideration, will be some of the operations of husbandry capable of elucidation by chemical principles.

The chemical theory of fallowing is very simple. Fallowing affords a source of riches to the soil, in consequence of the absorption of oxygen and the aqueous principles of the atmosphere, and so tends to produce an accumulation of decomposing matter, which, in the common course of crops, would be employed as it is formed. Yet in highly cultivated soils, under a regular succession of crops, properly manured, this practice can rarely be advantageous: and the cases in which it is really beneficial are for the destruction of weeds, and for cleansing foul soils.

The chemical theory of paring and burning, I shall discuss fully in this part of the course.

It is obvious, that in all cases it must destroy a certain quantity of vegetable matter, and must be principally useful in cases in which there is an excess of this matter in soils. Burning, likewise, renders clays less coherent, and in this way greatly improves their texture, and causes them to be less permeable to water.

The instances in which it must be obviously prejudicial are those of sandy, dry siliceous soils, containing little animal or vegetable matter. Here it can only be destructive, for it decomposes that on which the soil depends for its productiveness.

The advantages of irrigation, though so lately a subject of much attention, were well known to the ancients; and more than two centuries ago the practice was recommended to the farmers of our country by Lord Bacon: "meadow-watering," according to the statements of this illustrious personage, (given in his Natural History, in the article Vegetation,) "acts not only by supplying useful moisture to the grass; but likewise the water carries nourishment dissolved in it, and defends the roots from the effects of cold."

No general principles can be laid down respecting the comparative merit of the different systems of cultivation and the various systems of crops adopted in different districts, unless the chemical nature of the soil, and the physical circumstances to which it is exposed, are fully known. Stiff coherent soils are those most benefited by minute division and aëration, and in the drill system of husbandry these effects are produced to the greatest extent; but still the labor and expense connected with its application in certain districts may not be compensated for by the advantages produced, and there are some stiff soils which must be left in clods when sown with wheat. Moist climates are best fitted for raising the artificial grasses, oats, and broad-leaved crops; stiff aluminous soils, in general, are most adapted for wheat crops, and calcareous soils produce excellent sain-foin and clover.

Nothing is more wanting in agriculture than experiments in which all the circumstances are minutely and scientifically detailed. This art will advance with rapidity in proportion as it becomes exact in its methods. As in physical researches, all the causes should be considered; a difference in the results may be produced, even by the fall of a half an inch of rain more or less in the course of a season, or a few degrees of temperature, or even by a slight difference in the sub-soil, or in the inclination of the land.

Information collected after views of distinct inquiry would necessarily be fitted for inductive reasoning, and capable of being connected with the general principles of science; and a few histories of the results of truly philosophical experiments in agricultural chemistry would be of more value in enlightening and benefiting the farmer, than the greatest possble accumulation of imperfect trials conducted merely in the empirical spirit. It is no unusual occurrence for persons who argue in favor of practice and experience, to condemn generally all attempts to improve agriculture by philosophical inquiries and chemical methods. That much vague speculation may be found in the works of those who have lightly taken up agricultural chemistry, it is impossible to deny. It is not uncommon to find a number of changes rung upon a string of technical terms, such as oxygen, hydrogen, carbon, and azote, as if the science depended upon words rather than upon things. But this is, in fact, an argument for the necessity of the establishment of just principles of chemistry on the subject. Whoever reasons upon agriculture is obliged to recur to this science. He feels that it is scarcely possible to advance a step without it; and if he is satisfied with insufficient views, it is not because he prefers them to accurate knowledge, but generally because they are more current. If a person journeying in the night wishes to avaid being led astray by the ignis fatuus, the most secure method is to carry a lamp in his own hand.

It has been said, and undoubtedly with great truth, that a philosophical chemist would most probably make a very unprofitable business of farming; and this certainly would be the case, if he were a mere philosophical chemist; and unless he had served his apprenticeship to the practice of the art as well as to the theory.* But there is reason to believe that he would be a more successful agriculturist than a person equally uninitiated in farming, but ignorant of chemistry altogether; his science, as far as it went, would be useful to him. But chemistry is not the only kind of knowledge required; it forms a small part of the philosophical basis of agriculture; but it is an important part, and, whenever applied in a proper manner, must produce advantages.

In proportion as science advances, all the principles become less complicated, and consequently more useful. And it is then that their application is most advantageously made to the arts. The common laborer can never be enlightened by the general doctrines of philosophy, but he will not refuse to adopt any practice, of the utility of which he is fully convinced, because it has been founded upon these principles. The mariner can trust to the compass, though he may be wholly unacquainted with the discoveries of Gilbert on magnetism, or the refined principles of that science developed by the genius of Æpinus. The dyer will use his bleaching liquor, even though he is perhaps ignorant not only of the constitution, but even of the name of the substance on which its powers depend. The great purpose of chemical investigation in agriculture ought undoubtedly to be, the discovery of improved methods of cultivation, But to this end general scientific principles and practical knowledge are alike necessary. The germs of discovery are often found in rational speculations; and industry is never so efficacious as when assisted by science.

It is from the higher classes of the community, from the proprietors of land; those who are fitted, by their education, to form enlightened plans, and by their fortunes, to carry such plans into execution: it is from these that the principles of improvement must flow to the laboring classes of the community; and in all cases the benefit is mutual; for the interest of the tenantry must be always likewise the interest of the proprietors of the soil. The attention of the laborer will be more minute, and he will exert himself more for improvement, when he is certain he cannot deceive his employer, and has a conviction of the extent of his knowledge. Ignorance in the possessor of an estate, of the manner in which it ought to be treated, generally leads either to inattention, or injudicious practices in the tenant or the bailiff. "*Agrum pessimum mulctari cujus Dominus non docet sed audit villicum.*"

There is no idea more unfounded than that a great devotion of time, and a minute knowledge of general chemistry, is necessary for pursuing experiments on the nature of soils, or the properties of manures. Nothing can be more easy than to discover whether a soil effervesces, or changes color by the action of an acid, or whether it burns when heated, or what weight it loses by heat; and yet these simple indications may be of great importance in a system of cultivation. The expense connected with chemical inquiries is extremely trifling; a small closet is sufficient for containing all the materials required. The most important experiments may be made by means of a small portable apparatus; a few phials, containing acids, alkalies, and chemical re-agents; some foil and wire of platinum; a lamp, a crucible, some filtrating paper, some funnels and glasses, for receiving products, are all that can be considered as absolutely essential for pursuing useful researches.

It undoubtedly happens in agricultural chemical experiments conducted after the most refined theoretical views, that there are many instances of failure for one of success; and this is inevitable from the capricious and uncertain nature of the causes that operate, and from the impossibility of calculating on all the circumstances that may interfere: but this is far from proving the inutility of such trials; one happy result, which can generally improve the methods of cultivation, is worth the labor of a whole life; and an unsuccessful experiment, well observed, must establish some truth, or tend to remove some prejudice.

Even considered merely as a philosophical science, this department of knowledge is highly worthy of cultivation. For what can be more delightful than to trace the forms of living beings

*Lavoisier is a remarkable example of the advantages which may be derived from the applicaton of science to agriculture, even without a minute knowledge of the art of farming. By following an enlightened system, he is said to have doubled in nine years the produce in grain of his land, whilst he quintupled the number of his flocks.—*Notice sur Lavoisier*, in *Bibliothcque du chimiste*, tom, vii. p. 121.—J. D.

and their adaptations and peculiar purposes; to examine the progress of inorganic matter in its different processes of change, till it attain its ultimate and highest destination,—its subserviency to the purposes of man?

Many of the sciences are ardently pursued, and considered as proper objects of study for all refined minds, merely on account of the intellectual pleasure they afford; merely because they enlarge our views of nature, and enable us to think more correctly with respect to the beings and objects surrounding us. How much more, then, is this department of inquiry worthy of attention, in which the pleasure resulting from the love of truth and of knowledge is as great as in any other branch of philosophy, and in which it is likewise connected with much greater practical benefits and advantages? *"Nihil est melius, nihil uberius, nihil homine libero dignius."*

Discoveries made in the cultivation of the earth are not merely for the time and country in which they are developed, but they may be considered as extending to future ages, and as ultimately tending to benefit the whole human race; as affording subsistence for generations yet to come; as multiplying life, and not only multiplying life, but likewise providing for its enjoyment.

LECTURE II.

OF THE GENERAL POWERS OF MATTER WHICH INFLUENCE VEGETATION. OF GRAVITATION, OF COHESION, OF CHEMICAL ATTRACTION, OF HEAT, OF LIGHT, OF ELECTRICITY, PONDERABLE SUBSTANCES, ELEMENTS OF MATTER, PARTICULARLY THOSE FOUND IN VEGETABLES, LAWS OF THEIR COMBINATIONS AND ARRANGEMENTS.

The great operations of the farmer are directed towards the production or improvement of certain classes of vegetables; they are either mechanical or chemical, and are, consequently, dependent upon the laws which govern common matter. Plants themselves are, to a certain extent, submitted to these laws; and it is necessary to study their effects, both in considering the phenomena of vegetation, and the cultivation of the vegetable kingdom.

One of the most important properties belonging to matter is *gravitation*, or the power by which masses of matter are attracted towards each other. It is in consequence of gravitation that bodies thrown into the atmosphere fall to the surface of the earth, and that the different parts of the globe are preserved in their proper positions. Gravity is exerted in proportion to the quantity of matter. Hence all bodies placed above the surface of the earth fall to it in right lines, which, if produced, would pass through its centre; and a body falling near a high mountain is a little bent out of the perpendicular direction by the attraction of the mountain, as has been shown by the experiments of Dr. Maskelyne on Schehallien.

Gravitation has a very important influence on the growth of plants; and it is rendered probable, by the experiments of Mr. Knight, that they owe the peculiar direction of their roots and branches almost entirely to this force.

That gentleman fixed some seeds of the garden bean on the circumference of a wheel, which in one instance was placed vertically, and in the other horizontally, and made to revolve, by means of another wheel worked by water, in such a manner, that the number of the revolutions could be regulated; the beans were supplied with moisture, and were placed under circumstances favorable to germination. The beans all grew, notwithstanding the violence of revolution, which was sometimes as much as 250 revolutions in a minute on the vertical wheel, which always revolved rapidly, and with little variation of velocity; the radicles, or roots, pointed precisely in the direction of radii in whatever direction they were first placed. The germs took precisely the opposite direction, and pointed to the centre of the wheel, where they soon met each other. Upon the horizontal wheel, the conflicting operation of gravitation and centrifugal force, occasioned the germs to form a cone, more or less obtuse, according to the velocity of the wheel, the radicles always taking a course diametrically opposite to that taken by the germs, and, consequently, pointing as much below as the germs pointed above the plane of the wheel's motion.

These facts afford a rational solution of this curious problem, respecting which different philosophers have given such different opinions; some referring it to the nature of the sap, as De la Hire; others, as Darwin, to the living powers of the plant, and the stimulus of air upon the leaves, and of moisture upon the roots. The effect is now shown to be connected with mechanical causes; and there seems no other power in nature to which it can with propriety be referred, but gravity, which acts universally, and which must tend to dispose the parts to take a uniform direction.*

If plants in general owe their perpendicular direction to gravity, it is evident that the number of plants upon a given part of the earth's circumference cannot be increased by making the surface irregular, as some persons have supposed. Nor can more stalks rise on a hill than on a spot equal to its base; for the slight effect of the attraction of the hill, would be only to make the plants deviate a very little from the perpendicular. Where horizontal layers are pushed forth, as in certain grasses, particularly such as the fiorin, lately brought into notice by Dr. Richardson, more food may, however, be produced upon an irregular surface; but the principle seems to apply strictly to corn crops.

The direction of the radicles and germens is such, that both are supplied with food, and acted upon by those external agents which are necessary for their developement and growth. The roots come in contact with the fluids in the ground; the leaves are exposed to light and air; and the same grand law which preserves the planets in their orbits is thus essential to the functions of vegetable life.

When two pieces of polished glass are pressed together, they adhere to each other, and it requires some force to separate them. This is said to depend upon the *attraction of cohesion*. The same

* Fig. 1. represents the case in which the horizontal wheel performed 250 revolutions.

Fig. 2. represents the form of the experiment when the vertical wheel was made to perform 150 revolutions in a minute.

Fig. 1.

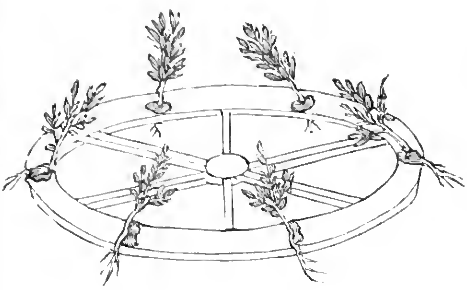
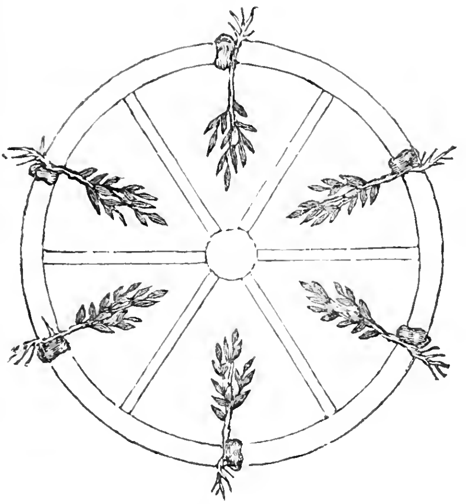


Fig. 2.



attraction gives the globular form to drops of water, and enables fluids to rise in capillary tubes; and hence it is sometimes called *capillary attraction*. This attraction, like gravitation, seems common to all matter, and may be a modification of the same general force; like gravitation, it is of great importance in vegetation. It preserves the forms of aggregation of the parts of plants, and it seems to be a principal cause of the absorption of fluids by their roots.

If some pure magnesia, the calcined magnesia of druggists, be thrown into distilled vinegar, it gradually dissolves. This is said to be owing to *chemical attraction*, the power by which different species of matter tend to unite into one compound. Various kinds of matter unite with different degrees of force: thus sulphuric acid and magnesia unite with more readiness than distilled vinegar and magnesia; and if sulphuric acid be poured into a mixture of vinegar and magnesia, in which the acid properties of the vinegar have been destroyed by the magnesia, the vinegar will be set free, and the sulphuric acid will take its place. This chemical attraction is likewise called *chemical affinity*. It is active in most of the phenomena of vegetation. The sap consists of a number of ingredients, dissolved in water by chemical attraction; and it appears to be in consequence of the operation of this power, that certain principles derived from the sap are united to the vegetable organs. By the laws of chemical attraction, different products of vegetation are changed, and assume new forms: the food of plants is prepared in the soil; vegetable and animal remains are changed by the action of air and water, and made fluid or aëriform; rocks are broken down and converted into soils; and soils are more finely divided and fitted as receptacles for the roots of plants.

The different powers of attraction tend to preserve the arrangements of matter, or to unite them in new forms. If there were no opposing powers there would soon be a state of perfect quiescence in nature, a kind of eternal sleep in the physical world. Gravitation is continually counteracted by mechanical powers, by projectile motion, or the centrifugal force; and their joint agencies occasion the motion of the heavenly bodies. Cohesion and chemical attraction are opposed by the *repulsive energy* of *heat*, and the harmonious cycle of terrestrial changes is produced by their mutual operations.

Heat is capable of being communicated from one body to other bodies; and its common effect is to expand them, to enlarge them in all their dimensions. This is easily exemplified. A solid cylinder of metal after being heated will not pass through a ring barely sufficient to receive it when cold. When water is heated in a globe of glass having a long slender neck, it rises in the neck; and if heat be applied to air confined in such a vessel inverted above water, it makes its escape from the vessel and passes through the water. Thermometers are instruments for measuring degrees of heat by the expansion of fluids in narrow tubes. Mercury is generally used, of which 100,000 parts at the freezing point of water become 101,835 parts at the boiling point, and on Fahrenheit's scale these parts are divided into 180 degrees. Solids, by a certain increase of heat, become fluids, and fluids gases; or elastic fluids. Thus ice is converted by heat into water, and by still more heat it becomes steam; and heat disappears, or, as it is called, is rendered *latent*, during the conversion of solids into fluids, or fluids into gases, and re-appears, or becomes sensible, when gases become fluids, or fluids solids; hence cold is produced during evaporation, and heat during the condensation of steam.

There are a few exceptions to the law of expansion of bodies by heat, which seem to depend either upon some change in their chemical constitution, or on their becoming crystallised. Clay contracts by heat, which seems to be owing to its giving off water. Cast iron and antimony, when melted, crystallise, in cooling, and expand. Ice is much lighter than water. Water expands a little even before it freezes, and it is of the greatest density at about 41° or 42°, the freezing point being 32°; and this circumstance is of considerable importance in the general economy of nature. The influence of the changes of seasons and of the position of the sun on the phenomena of vegetation demonstrates the effects of heat on the functions of plants. The matter absorbed from the soil must be in a fluid state to pass into their roots, and when the surface is frozen they can derive no nourishment from it. The activity of chemical changes likewise is increased by a certain increase of temperature, and even the rapidity of the ascent of fluids by capillary attraction.

This last fact is easily shown by placing in each of two wine glasses a similar hollow stalk of grass, so bent as to discharge any fluid in the glasses slowly by capillary attraction: if hot water be in one glass. and cold water in the other, the hot water will be discharged much more rapidly than the cold water. The fermentation and decomposition of animal and vegetable substances require a certain degree of heat, which is consequently necessary for the preparation of the food of plants; and, as evaporation is more rapid in proportion as the temperature is higher, the superfluous parts of the sap are most readily carried off at the time its ascent is quickest.

Two opinions are current respecting the nature of heat. By one School it is conceived to be a peculiar subtile fluid, of which the particles repel each other, but have a strong attraction for the particles of other matter. By another it is considered as a motion or vibration of the particles of matter, which is supposed to differ in velocity in different cases, and thus to produce the different degrees of temperature. Whatever decision be ultimately made respecting these opinions, it is certain that there is matter moving in the space between us and the heavenly bodies capable of communicating heat; the motions of which are rectilinear: thus the solar rays produce heat in acting on the surface of the earth. The experiments of Sir W. Herschel have shown that the calorific effects of the solar rays bear no relation to their illuminating powers, the red rays producing a much greater effect of heat than any of the other colored rays; and it appears that there are *invisible* rays distinguished by very different degrees of refrangibility, some of which produce *heat*, and others of which are distinguished by their *chemical* effects.

The different influence of the different solar rays on vegetation have not yet been studied; but it is certain that the rays exercise an influence independent of the heat they produce. Thus plants kept in the dark in a hot-house grow luxuriantly, but they never gain their natural colors; their leaves are white or pale, and their juices watery and peculiarly saccharine.

The earth, when not exposed to the solar rays, is constantly losing heat by radiation, and different soils have their temperature differently diminished by this cause.

When a piece of sealing-wax is rubbed by a woollen cloth, it gains the power of attracting light bodies, such as feathers or ashes. In this state it is said to be *electrical;* and if a metallic cylinder, placed upon a rod of glass, is brought in contact with the sealing-wax, it likewise gains the momentary power of attracting light bodies, so that electricity, like heat, is communicable. When two light bodies receive the same electrical influence, or are electrified by the same body, they repel each other. When one of them is acted on by sealing-wax, and the other by glass that has been rubbed by woollen, they attract each other; hence it is said that bodies similarly electrified repel each other: and bodies dissimilarly electrified attract each other: and the electricity of glass is called vitreous or positive electricity, and that of sealing-wax, resinous or negative electricity.

When, of two bodies made to rub each other, one is found positively electrified, the other is always found negatively electrified, and, as in the common electrical machine, these states are capable of being communicated to metals placed upon rods or pillars of glass. Electricity is produced likewise by the contact of bodies; thus a piece of zinc and of silver give a slight electrical shock when they are made to touch each other, and to touch the tongue; and when a number of plates of copper and zinc, 100 for instance, are arranged in a pile with clothes moistened in salt and water, in the order of zinc, copper, moistened cloth, zinc, copper, moistened cloth, and so on, they form an electrical battery which will give strong shocks and sparks, and which is possessed of remarkable chemical powers. The luminous phenomena produced by common electricity are well known. It would be improper to dwell upon them in this place. They are the most impressive effects occasioned by this agent; and they offer illustrations of lightning and thunder.

Electrical changes are constantly taking place in nature, on the surface of the earth, and in the atmosphere; but as yet the effects of this power in vegetation have not been correctly estimated. It has been shown by experiments made by means of the Voltaic battery (the instrument composed of zinc, copper, and water) that compound bodies in general are capable of being decomposed by electrical powers; and it is probable that the various electrical phenomena occuring in our system must influence both the germination of seeds and the growth of plants. I found that corn sprouted much more rapidly in water positively electrified by the Voltaic instrument than in water negatively electrified; and experiments made upon the atmosphere show that clouds are usually negative; and as, when a cloud is in one state of electricity, the surface of the earth beneath is brought into the opposite state, it is probable that in common cases the surface of the earth is positive.

Different opinions are entertained amongst scientific men respecting the nature of electricity. By some the phenomena are conceived to depend upon a single subtile fluid in excess in the bodies said to be positively electrified, in deficiency in the bodies said to be negatively electrified. A second class suppose the effects to be produced by two different fluids, called by them the vitreous fluid and the resinous fluid; and an hypothesis has been advanced in which they are considered as affections or motions of matter, or an exhibition of attractive powers, similar to those which produce chemical combination and decomposition; but usually exerting their action on masses.*

The power which gives to a bar or needle of steel the property of directing itself to two points of the globe, called north and south poles, depends upon what is called magnetism. It agrees with electricity in many of its laws; but, as far as our researches have hitherto gone, it is most active in its operation on metals and certain of their combinations. Iron, nickel, and cobalt, are most susceptible of magnetic impressions, and in the harder compounds of iron these impressions produce permanent effects; but the recent experiments of M. Arago show, that copper, metals in general, and,

*In a series of experiments on the electricity of the atmosphere, made in Malta during the course of several months, I had ample proof of the truth of the above opinion. Chemical effects were almost constantly taking place, even in serene weather, in a very slight degree. The subject of the experiment was commonly the gelatinous compound of the iodide of potassium and starch; and almost invariably, excepting occasionally in thunder-storms, the iodine was precipitated round the platina wire connected with the earth.—J. D.

probably, all other substances, receive very weak and evanescent magnetism, which seems to differ in intensity for every body. Magnetism is capable of being communicated from bodies endowed with it, to others that do not possess it, and is produced whenever concentrated electricity passes through space, its sphere of action or communication being at right angles to the course of the electricity. Thus a bar of steel, placed transversely over a wire conveying an electrical shock, becomes a magnet. The connexion of magnetism and electricity is of recent discovery, and the fact which served to established it was made known by M. Œrsted, a Danish philosopher. It will ultimately probably tend to a more intimate acquaintance with the nature of these two extraordinary agents. The attractive powers of the magnet may be made use of to show the existence of iron in soils, as will be mentioned more particularly hereafter.

The different powers that have been thus generally described continually act upon common matter so as to change its form, and produce arrangements fitted for the purposes of life. Bodies are either simple or compound. A body is said to be simple, when it is incapable of being resolved into any other forms of matter. Thus, gold or silver, though they may be melted by heat, or dissolved in corrosive menstrua, yet are recovered unchanged in their properties, and they are said to be simple bodies. A body is considered as compound, when two or more distinct substances are capable of being produced from it: thus marble is a compound body, for by a strong heat it is converted into lime, and an elastic fluid is disengaged in the process; and the proof of our knowledge of the true composition of a body is, that it is capable of being reproduced by the same substances as those into which it had been decomposed; thus, by exposing lime for a long while to the elastic fluid disengaged during its calcination, it becomes converted into a substance similar to powdered marble. The term element has the same meaning as simple or undecompounded body; but it is applied merely with reference to the present state of chemical knowledge. It is probable that, as yet, we are not acquainted with any of the true elements of matter: many substances, formerly supposed to be simple, have been lately decompounded, and the chemical arrangement of bodies must be considered as a mere expression of facts, the results of accurate statical experiments.

Vegetable substances in general are of a very compound nature, and consist of a great number of elements, most of which belong likewise to the other kingdoms of nature, and are found in various forms. Their more complicated arrangements are best understood after their simpler forms of combination have been examined.

The number of bodies which I shall consider as at present undecomposed, are, as was stated in the introductory lecture, five acidifying or solvent substances, eight inflammable bodies, and forty metals.*

In most of the inorganic compounds, the nature of which is well known, into which these elements enter, they are combined in definite proportions; so that, if the elements be represented by numbers, the proportions in which they combine are expressed either by those numbers, or by some simple multiples of them.

* Now forty-two.—*Vide note, ante.*

I shall mention, in a few words, the characteristic properties of the most important simple substances, and the numbers representing the proportions in which they combine in those cases where they have been accurately ascertained.

1. *Oxygen* forms about one-fifth of the air of our atmosphere. It is an elastic fluid, at all known temperatures. Its specific gravity is to that of air as 10,967 to 10,000. It supports combustion with much more vividness than common air; so that if a small steel wire or a watch-spring, having a bit of inflamed wood attached to it, be introduced into a bottle filled with the gas, it burns with great splendor. It is respirable. It is very slightly soluble in water. The number representing the proportion in which it combines is 15. It may be made by heating a mixture of the mineral called manganese and sulphuric acid together in a proper vessel, or by heating strongly red lead, or red precipitate of mercury.

2. *Chlorine* is, like oxygen, a permanent elastic fluid. Its color is yellowish green; its smell is very disagreeable; it is not respirable; it supports the combustion of all the common inflammable bodies except charcoal; its specific gravity is to that of air as 24,677 to 10,000; it is soluble in about half its volume of water, and its solution in water destroys vegetable colors. Many of the metals (such as arsenic or copper) take fire spontaneously when introduced into a jar or bottle filled with the gas. Chlorine may be procured by heating together a mixture of spirits of salt, or muriatic acid, and manganese. The number representing the proportion in which this gas enters into combination is 67.

3. *Fluorine*, or the fluoric principle. This substance has such strong tendencies to combination, that as yet no vessels have been found capable of containing it in its pure form. It may be obtained, combined with hydrogen, by applying heat to a mixture of fluor, or Derbyshire spar, and sulphuric acid; and in this state it is an intensely acid compound, a little heavier than water, and which becomes still denser by combining with water. The existence of fluorine as an element is proved by its expulsion from certain compounds by chlorine, and by its transference from place to place. In attempts made to confine it, so as to examine its properties, it always combines with, or decomposes the vessels employed; so that, as yet, its physical qualities are unknown: 16 is an approximation to the number representing it.

4. *Iodine.* This substance is procured from the ashes of marine plants, after the extraction of the carbonate of soda, by acting upon them by sulphuric acid. It appears as a dark-colored solid, having the color and lustre of plumbago: its specific gravity is about 4; that of water being 1. It fuses at a low temperature, and at a heat above that of boiling water becomes a violet-colored gas. It forms an active acid by uniting to hydrogen. The alkaline metals burn, when heated in it. It unites to all the metals upon which its action has been examined.

5. *Brome.* This body has been very recently discovered in sea-water. It is in its nature analogous to iodine, and resembles a compound of these two bodies. It is a dense liquid, and forms an orange-colored gas by a gentle heat.

6. *Hydrogen*, or inflammable air, is the lightest known substance; its specific gravity is to that of air as 732 to 10,000. It burns by the action of an

inflamed taper, when in contact with the atmosphere. The proportion in which it combines is represented by unity, or 1. It is procured by the action of diluted oil of vitriol, or hydro-sulphuric acid on filings of zinc or iron. It is the substance employed for filling air-balloons.

7. *Azote* is a gaseous substance, not capable of being condensed by any known degree of cold: its specific gravity is to that of common air as 9516 to 10,000. It does not enter into combustion under common circumstances, but may be made to unite with oxygen by the agency of electrical fire. It forms nearly four-fifths of the air of the atmosphere; and may be procured by burning phosphorus in a confined portion of air. The number representing the proportion in which it combines is 26.

8. *Carbon* is considered as the pure matter of charcoal, and it may be procured by passing spirits of wine through a tube heated red. It has not yet been fused; but raises in vapour at an intense heat. Its specific gravity cannot be easily ascertained; but that of the diamond, which cannot chemically be distinguished from pure carbon, is to that of water as 3500 to 1000. Charcoal has the remarkable property of absorbing several times its volume of different elastic fluids, which are capable of being expelled from it by heat. The number representing it is 11.4.

9. *Sulphur* is the pure substance so well known by that name: its specific gravity is to that of water as 1990 to 1000. It fuses at about 220° Fahrenheit; and at between 500° and 600° takes fire, if in contact with the air, and burns with a pale blue flame. In this process it dissolves in the oxygen of the air, and produces a peculiar acid elastic fluid. The number representing it is 30.

10. *Phosphorus* is a solid of a pale red color, of specific gravity 1770. It fuses at 90°, and boils at 550°. It is luminous in the air at common temperatures, and burns with great violence at 150°, so that it must be handled with great caution. The number representing it is 222. It is procured by digesting together bone ashes and oil of vitriol, and strongly heating the fluid substance so produced with powdered charcoal.

11. *Boron* is a solid of a dark olive color, infusible at any known temperature. It is a substance very lately discovered, and procured from boracic acid. It burns with brilliant sparks, when heated in oxygen, but not in chlorine. Its specific gravity, and the number representing it, are not yet accurately known.

12. *Silicon** is procured from silica, or the earth of flints, by the action of potassium: it appears as a dark fawn-colored powder, which is inflammable, and which produces silica by combustion. It decomposes water and acids; and detonates when heated with alkaline carbonates. It is more analogous to boron in its properties and chemical habitudes than to any other substance. 32 is an approximation to the number representing silicon.

13. *Selenion*, or, as M. Berzelius, the discoverer, names it, selenium, is a substance which forms a sort of intermediate link between the inflammable solids and the metals. It is semi-transparent, of a red color, a non-conductor of electricity, of specific gravity about 4300.

14. *Platinum* is one of the noble metals, of rather a duller white than silver, and the heaviest body in nature; its specific gravity being 21,500. It is not acted upon by any acid menstrua except such as contain chlorine; it requires an intense degree of heat for its fusion.

15. The properties of gold are well known. Its specific gravity is 19,277. It bears the same relation to acid menstrua as platinum: it is one of the characteristics of both these bodies, that they are very difficultly acted upon by sulphur.

16. *Silver* is of specific gravity 10,400; it burns more readily than platinum or gold, which require the intense heat of electricity. It readily unites to sulphur. The number representing it is 205.

17. *Mercury* is the only known metal fluid at the common temperature of the atmosphere; it boils at 660°, and freezes at 39° below 0. Its specific gravity is 13,560. The number representing it is 380.

18. *Copper* is of specific gravity 8890. It burns, when strongly heated, with red flame, tinged with green. The number representing it is 120.

19. *Cobalt* is of specific gravity 7700. Its point of fusion is very high, nearly equal to that of iron. In its calcined or oxidated state, it is employed for giving a blue color to glass.

20. *Nickel* is of a white color: its specific gravity is 8820. This metal and cobalt agree with iron, in being attractible by the magnet. The number representing nickel is 111.

21. *Iron* is of specific gravity 7700. Its other properties are well known. The number representing it is 103.

22. *Tin* is of specific gravity 7291; it is a very fusible metal, and burns when ignited in the air: the number representing the proportion in which it combines is 110.

23. *Cadmium* is a newly discovered metal, very similar to tin in its sensible properties, of specific gravity about 9000, and is very fusible and volatile.

24. *Zinc* is one of the most combustible of the common metals. Its specific gravity is about 7210. It is a brittle metal under common circumstances; but when heated may be hammered or rolled into thin leaves, and after this operation is malleable. The number representing it is 66.

25. *Lead* is of specific gravity 11,352; it fuses at a temperature rather higher than tin. The number representing it is 398.

26. *Bismuth* is a brittle metal of specific gravity 9,822. It is nearly as fusible as tin; when cooled slowly it crystallises in cubes. The number representing it is 135.

27. *Antimony* is a metal capable of being volatilised by a strong red heat. Its specific gravity is 6,800. It burns, when ignited, with a faint white light. The number representing it is 170.

28. *Arsenic* is of a blueish white color, of specific gravity 8310. It may be procured by heating the powder of common white arsenic of the shops strongly in a Florence flask with oil. The metal raises in vapor, and condenses in the neck of the flask. The number representing it is 90.

29. *Manganesum* may be procured from the mineral called manganese, by intensely igniting it

* According to the more recent experiments of Berzelius, pure silicon is of a dark nut-brown color; a non-conductor of electricity: incombustible even in oxygen gas, and infusible before the blow-pipe. It deflagrates, and even explodes, when thrown into fused hydrate of potash or soda.—J. D.

in a forge mixed with charcoal powder. It is a metal very difficult of fusion, and very combustible: its specific gravity is 6850. The number representing it is 177.

30. *Potassium* is the lightest known metal, being only of specific gravity 850. It fuses at about 150°, and rises in vapour at heat a little below redness. It is a highly combustible substance, takes fire when thrown upon water, burns with great brilliancy, and the product of its combustion dissolves in the water. The number representing it is 75. It may be made by passing fused caustic vegetable alkali, the pure kali of druggists, through iron turnings strongly ignited in a gun barrel, or by the electrization of potash by a strong Voltaic battery.

31. *Sodium* may be made in a similar manner to potassium; soda, or the mineral alkali, being substituted for the vegetable alkali. It is of specific gravity 940. It is very combustible. When thrown upon water, it swims on its surface, hisses violently, and dissolves, but does not inflame. The number representing it is 88.

32. *Lithium* is a metal procured from a newly-discovered mineral alkali, very similar to sodium in its properties.

33. *Barium* has, as yet, been procured only by electrical powers, and in very minute quantities, so that its properties have not been accurately examined. The number representing it appears to be 130.

Strontium the 34th, *Calcium* the 35th, *Magnesium* the 36th, *Aluminum* the 37th, *Zirconum* the 38th, *Glucinum* the 39th, and *Ittrium* the 40th of the undecompounded bodies, like barium, have either not been procured absolutely pure, or only in such minute quantities that their properties are little known; they are formed either by electrical powers, or by the agency of potassium, from the different earths whose names they bear, with the change of the termination in *um;* and the numbers representing them are believed to be 90 strontium, 40 calcium, 29 magnesium, 33 aluminum, 70 zirconum, 39 glucinum, 111 ittrium.

The remaining simple bodies are metals, most of which, like those just mentioned, can only be procured with very great difficulty; and the substances in general from which they are procured are very rare in nature. They are *Palladium, Rhodium, Osmium, Iridium, Columbium, Chromium, Molybdenum, Cerium, Tellurium, Tungstenum, Titanium, Uranium.* The numbers representing these last bodies have not yet been determined with sufficient accuracy to render a reference to them of any utility.

The undecompounded substances unite with each other, and the most remarkable compounds are formed by the combinations of oxygen and chlorine with inflammable bodies and metals; and these combinations usually take place with much energy, and are associated with fire.

Combustion in fact, in common cases, is the process of the solution of a body in oxygen, as happens when sulphur or charcoal is burnt; or the fixation of oxygen by the combustible body in a solid form which takes place when most metals are burnt, or when phosphorus inflames; or the production of a fluid from both bodies, as when hydrogen and oxygen unite to form water.

When considerable quantities of oxygen or of chlorine unite to metals or inflammable bodies, they often produce acids; thus sulphureous, phosphoric, and boracic acids are formed by a union of considerable quantities of oxygen with sulphur, phosphorus, and boron: and muriatic acid gas is formed by the union of chlorine and hydrogen.

When smaller quantities of oxygen or chlorine unite with inflammable bodies or metals, they form substances not acid, and more or less soluble in water; and the metallic oxides, the fixed alkalies, and the earths, all bodies connected by analogies, are produced by the union of metals with oxygen.

The composition of any compounds, the nature of which is well known, may be easily learned from the numbers representing their elements; all that is necessary is to know how many proportions enter into union. Thus *potassa,* or the pure caustic vegetable alkali, consists of one proportion of potassium and one of oxygen, and its constitution is consequently 75 potassium, 15 oxygen.

Carbonic acid is composed of two proportions of oxygen 30, and one of carbon 11·4.

Again, *lime* consists of one proportion of calcium and one of oxygen, and it is composed of 40 of calcium and 15 of oxygen. And *carbonate of lime*, or pure chalk, consists of one proportion of carbonic acid 41·4, and one of lime 55.

Water consists of two proportions of hydrogen 2, and one of oxygen 15; and when water unites to other bodies in definite proportions, the quantity is 17, or some multiple of 17, *i. e.* 34 or 51, or 68, &c.

Soda, or the mineral alkali, contains two proportions of oxygen to one of sodium.

Ammonia, or the volatile alkali, is composed of six proportions of hydrogen and one of azote.

Amongst the earths, *Silica*, or the earth of flints, probably consists of two proportions of oxygen to one of silicon; and *Magnesia, Strontia, Baryta or Barytes, Alumina, Zircona, Glucina,* and *Ittria*, of one proportion of metal and one of oxygen.

The *metallic oxides* in general consist of the metals united to from one to four proportions of oxygen; and there are, in some cases, many different oxides of the same metal; thus there are three oxides of lead; the yellow oxide, or massicot, contains two *proportions* of oxygen; the *red oxide*, or *minium*, three; and the *puce-coloured oxide* four proportions. Again there are two *oxides* of *copper*, the *black* and the *orange;* the black contains two proportions of oxygen, the orange one.

For pursuing such experiments on the composition of bodies as are connected with agricultural chemistry, a few only of the undecompounded substances are necessary; and amongst the compounded bodies, the common acids, the alkalies, and the earths, are the most essential substances. The elements found in vegetables, as has been stated in the introductory lecture, are very few. Oxygen, hydrogen, and carbon constitute the greatest part of their organized matter. Azote, phosphorus, sulphur, manganesum, iron, silicum, calcium, aluminum, and magnesium, likewise in different arrangements, enter into their composition, or are found in the agents to which they are exposed; and these twelve undecompounded substances are the elements, the study of which is of the most importance to the agricultural chemist.

The doctrine of definite combinations, as will be shown in the following lectures, will assist us in gaining just views respecting the composition of plants, and the economy of the vegetable kingdom; but the same accuracy of weight and measure, the same statical results which depend upon the uniformity of the laws that govern dead matter, cannot be expected in operations where the powers of life are concerned, and where a diversity of organs and of functions exists. The classes of definite inorganic bodies, even if we include all the crystalline arrangements of the mineral kingdom, are few, compared with the forms and substances belonging to animated nature. Life gives a peculiar character to all its productions; the power of attraction and repulsion, combination and decomposition, are subservient to it; a few elements, by the diversity of their arrangement, are made to form the most different substances; and similar substances are produced from compounds which, when superficially examined, appear entirely different.

LECTURE III.

ON THE ORGANIZATION OF PLANTS. OF THE ROOTS, TRUNK, AND BRANCHES. OF THEIR STRUCTURE. OF THE EPIDERMIS. OF THE CORTICAL AND ALBURNOUS PARTS. OF LEAVES, FLOWERS, AND SEEDS. OF THE CHEMICAL CONSTITUTION OF THE ORGANS OF PLANTS, AND THE SUBSTANCES FOUND IN THEM. OF MUCILAGINOUS, SACCHARINE, EXTRACTIVE, RESINOUS, AND OILY SUBSTANCES. AND OTHER VEGETABLE COMPOUNDS; THEIR ARRANGEMENTS IN THE ORGANS OF PLANTS, THEIR COMPOSITION, CHANGES, AND USES.

Variety characterises the vegetable kingdom; yet there is an analogy between the forms and the functions of all the different classes of plants, and on this analogy the scientific principles relating to their organization depend.

Vegetables are living structures distinguished from animals by exhibiting no signs of preception, or of voluntary motion; and their organs are either organs of nourishment or of reproduction; organs for the preservation and increase of the individual, or for the multiplication of the species.

In the living vegetable system there are to be considered the exterior form, and the interior constitution.

Every plant examined as to external structure, displays at least four systems of organs—or some analogous parts. First, the *root*. Secondly, the *trunk and branches*, or *stem*. Thirdly, the *leaves*; and, fourthly, the *flowers* or *seeds*.

The *root* is that part of the vegetable which least impresses the eye; but it is absolutely necessary. It attaches the plant to the surface, is its organ of nourishment, and the apparatus by which it imbibes food from the soil. The roots of plants, in their anatomical division, are very similar to the trunk and branches. The root may indeed be said to be a continuation of the trunk terminating in minute ramifications and filaments, and not in leaves.

When the branch or the root of a tree is cut transversely, it usually exhibits three distinct bodies: the bark, the wood, and the pith: and these again are individually susceptible of a new division.

The bark, when perfectly formed, is covered by a thin cuticle or *epidermis*, which may be easily separated. It is generally composed of a number of laminæ or scales, which in old trees are usually in a loose and decaying state. The epidermis is not vascular, and it merely defends the interior parts from injury. In forest trees, and in the larger shrubs, the bodies of which are firm, and of strong texture, it is a part of little importance; but in the reeds, the grasses, canes, and the plants having hollow stalks, it is of great use, and is exceedingly strong, and in the microscope seems composed of a kind of glassy net-work, which is principally siliceous earth.

This is the case in wheat, in the oat, in different species of equisetum, and, above all, in the rattan, the epidermis of which contains a sufficient quantity of flint to give light when struck by steel; or two pieces rubbed together produce sparks. This fact first occurred to me in 1798, and it led to experiments by which I ascertained that siliceous earth existed generally in the epidermis of the hollow plants.

The siliceous epidermis serves as a support, protects the bark from the action of insects, and seems to perform a part in the economy of these feeble vegetable tribes, similar to that performed in the animal kingdom by the shell of the crustaceous insects.

Immediately beneath the epidermis is the *parenchyma*. It is a soft substance, consisting of cells filled with fluid, having almost always a greenish tint. The cells in the parenchymatous part, when examined by the microscope, appear hexagonal. This form, indeed, is that usually affected by the cellular membranes in vegetables, and it seems to be the result of the general reaction of the solid parts, similar to that which takes place in the honeycomb. This arrangement, which has usually been ascribed to the skill and artifice of the bee, seems, as Dr. Wollaston has observed, to be merely the result of the mechanical laws which influence the pressure of cylinders composed of soft materials, the nests of solitary bees being uniformly circular.*

The innermost part of the bark is constituted by the *cortical layers*, and their numbers vary with the age of the tree. On cutting the bark of a tree of several years' standing, the productions of different periods may be distinctly seen, though the layer of every particular year can seldom be accurately defined.

The cortical layers are composed of fibrous parts which appear interwoven, and which are transverse and longitudinal. The transverse are membranous and porous, and the longitudinal are generally composed of tubes.

The functions of the parenchymatous and cortical parts of the bark are of great importance. The tubes of the fibrous parts appear to be the organs that receive the sap; the sells seem destined for the elaboration of its parts, and for the exposure of them to the action of the atmosphere, and the new matter is annually produced in the spring, immediately on the inner surface of the cortical layer of the last year.

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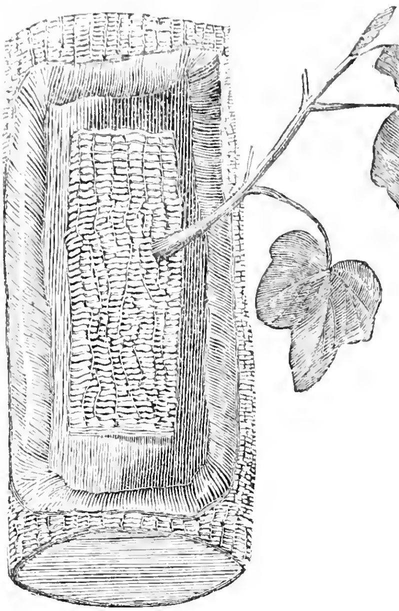
* My brother told me, that Dr. Wollaston, on further inquiry, relinquished the idea expressed above, and adopted the common opinion regarding the manner in which the hexagonal cells are formed.—J. D.

3



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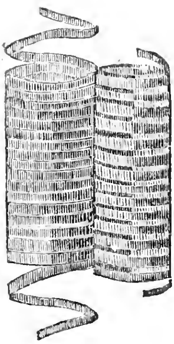

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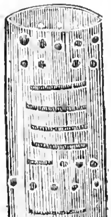

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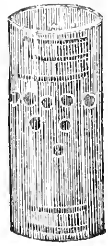

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It has been shown by the experiments of Mr. Knight, and those made by other physiologists, that the sap descending through the bark after being modified in the leaves, is the principal cause of the growth of the tree; thus, if the bark is wounded, the principal formation of new bark is on the upper edge of the wound; and when the wood has been removed, the formation of new wood takes place immediately beneath the bark: and every vessel and passage in the bark and wood of trees seems capable of carrying fluids in different and opposite directions, though more readily and copiously in one direction than in others, which offers something analogous to the anastomosis of vessels in animal bodies. A fact noticed by M. Palisot de Beauvois, is explained on this principle. That gentleman separated different portions of cortical layers from the rest of the bark in several trees, and found that in most instances the separated bark grew in the same manner as the bark in its natural state. The experiment was tried with most success on the lime-tree, the maple, and the lilac; the layers of bark were removed in August 1810, and in the spring of the next year, in the case of the maple and the lilac, small annual shoots were produced in the parts where the bark was insulated.*

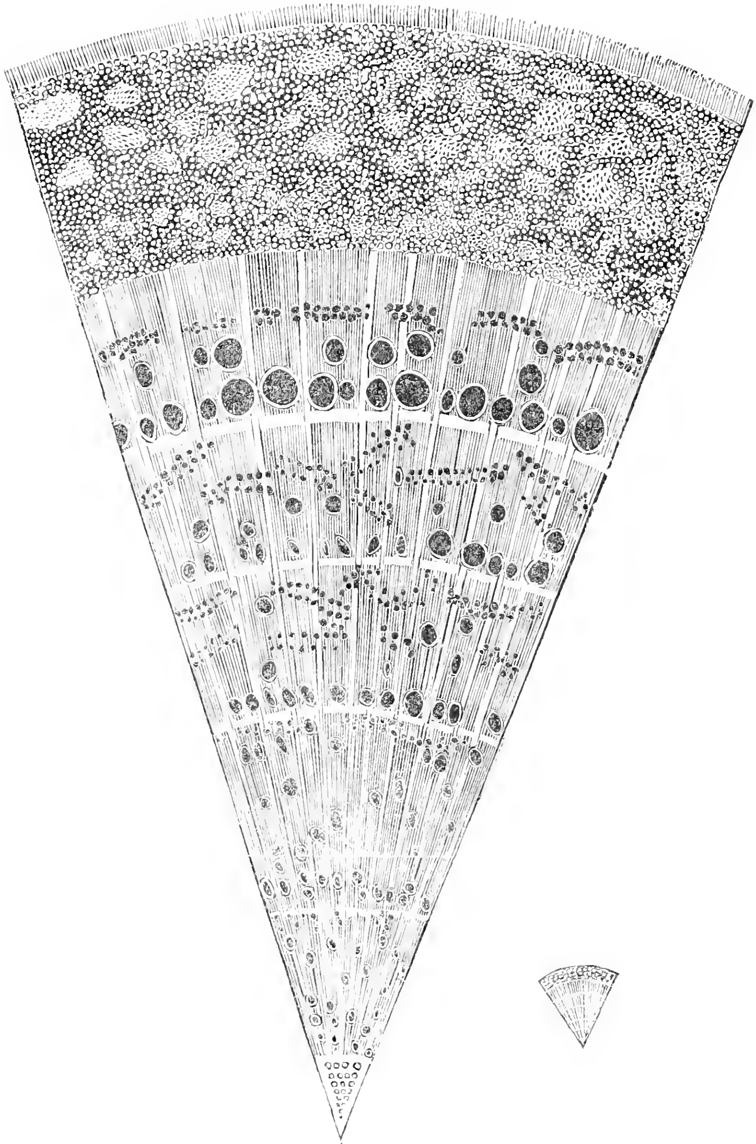
The wood of trees is composed of an external part, called *alburnum* or *sap-wood,* and of an internal part, the *heart-wood.* The alburnum is white, and full of moisture, and in young trees and annual shoots it reaches even to the pith. The alburnum is the great vascular system of the vegetable through which the sap rises, and the vessels in it extend from the leaves to the minutest filaments in the roots.

There is in the alburnum a membranous substance, composed of cells, which are constantly filled with the sap of the plant; and there are in the vascular system several different kinds of tubes; Mirbel has distinguished four species—the *simple tubes,* the *porous tubes,* the *tracheæ,* and the *false tracheæ.*†

* Fig. 3. represents the result of the experiment on the maple. Journal de Phisique, September 1811, p. 210.

† Fig. 4, 5, 6, and 7. represent Mirbel's idea of the simple tubes, the porous tubes, the tracheæ, and the false tracheæ.

Fig. 8, 9, 10.



The tubes, which he has called simple tubes, seem to contain the resinous or oily fluids peculiar to different plants.

The porous tubes likewise contain these fluids; and their use is probably that of conveying them into the sap for the production of new arrangements.

The tracheæ contain fluid matter, which is always thin, watery, and pellucid; and these organs, as well as the false tracheæ, probably carry off water from the denser juices, which are thus enabled to consolidate for the production of new wood.

In the arrangement of the fibres of the wood, there are two distinct appearances. There are series of white and shining laminæ, which shoot from the centre towards the circumference, and these constitute what is called the *silver grain* of the wood.

There are likewise numerous series of concentric layers, which are usually called the *spurious grain*, and their number denotes the age of the tree.*

The silver grain is elastic and contractile; and it has been supposed by Mr. Knight, that the contractions produced in it by changes of temperature are the principal causes of the ascent of the sap.

The silver grain is most distinct in forest trees; but even annual shrubs have a system of fibres

* Fig. 8. represents the section of an elm branch, which exhibits the tubular structure and the silver and spurious grain.

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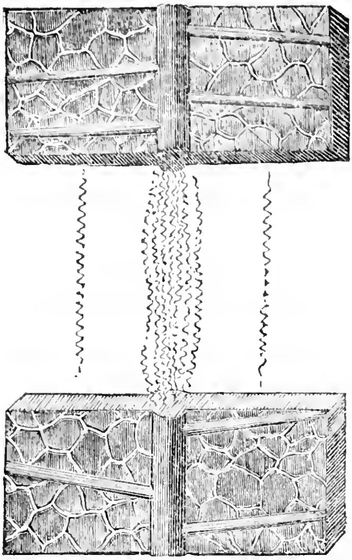

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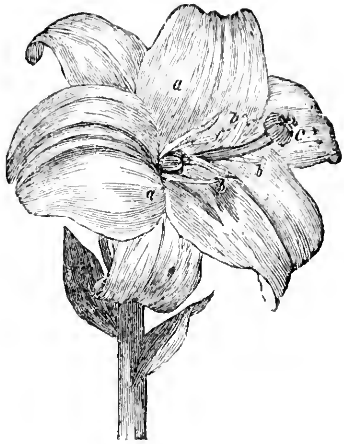

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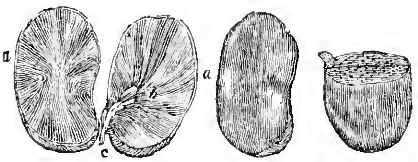

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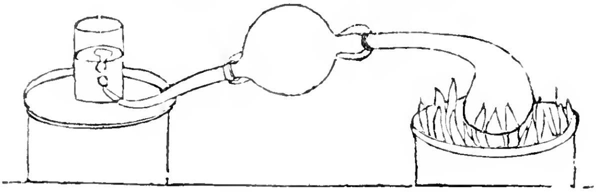

similar to it. The analogy of nature is constant and uniform, and similar effects are usually produced by similar organs.

The *pith* occupies the centre of the wood; its texture is membranous; it is composed of cells, which are circular towards the extremity, and hexagonal in the centre of the substance. In the first infancy of the vegetable, the pith occupies but a small space. It gradually dilates, and in annual shoots and young trees offers a considerable diameter. In the more advanced age of the tree, acted on by the heart-wood, pressed by the new layers of the alburnum, it begins to diminish, and in very old forest trees becomes almost imperceptible.

Many different opinions have prevailed with regard to the use of the pith. Dr. Hales supposed that it was the great cause of the expansion and developement of the other parts of the plant; that being the most interior, it was likewise the most acted upon of all the organs, and that from its reaction the phenomena of their developement and growth resulted.

Linnæus, whose lively imagination was continually employed in endeavors to discover analogies between the animal and vegetable systems, conceived "that the pith performed for the plant the same functions as the brain and nerves in animated beings." He considered it as the organ of irritability, and the seat of life.

The latest discoveries have proved that these two opinions are equally erroneous. Mr. Knight has removed the pith in several young trees, and they continued to live and to increase.

It is evidently, then, only an organ of secondary importance. In early shoots, in vigorous growth, it is filled with moisture; and it is a reservoir, perhaps, of fluid nourishment at the time it is most wanted. As the heart-wood forms, it is more and more separated from the living part, the alburnum; its functions become extinct, it diminishes, dies, and at last disappears.

The *tendrils*, the *spines*, and other similar parts of plants, are analogous in their organization to the branches, and offer a similar cortical and alburnous organization. It has been shown, by the late observations of Mr. Knight, that the directions of tendrils, and the spiral form they assume, depend upon the unequal action of light upon them, and a similar reason has been assigned by M. De Candolle to account for the turning of the parts of plants towards the sun; that ingenious physiologist supposes that the fibres are shortened by the chemical agency of the solar rays upon them, and that, consequently, the parts will move towards the light.*

The *leaves*, the great sources of the permanent beauty of vegetation, though infinitely diversified in their forms, are in all cases similar in interior organization, and perform the same functions.

The alburnum spreads itself from the foot-stalks into the very extremity of the leaf; it retains its vascular system and its living powers; and its peculiar tubes, particularly the tracheæ, may be distinctly seen in the leaf.†

The green membranous substance may be considered as an extension of the parenchyma, and the fine and thin covering as the epidermis. Thus the organization of the roots and branches may be traced into the leaves, which present, however, a more perfect, refined, and minute structure.

One great use of the leaves is for the exposure of the sap to the influence of the air, heat and light. Their surface is extensive, the tubes and cells very delicate, and their texture porous and transparent.

In the leaves much of the water of the sap is evaporated; it is combined with new principles, and fitted for its organizing functions, and probably passes, in its prepared state, from the extreme tubes of the alburnum into the ramifications of the cortical tubes, and then descends through the bark.

On the upper surface of leaves, which is exposed to the sun, the epidermis is thick but transparent, and is composed of matter possessed of little organization, which is either principally earthy, or consists of some homogeneous chemical substance. In the grasses it is partly siliceous, in the laurel resinous, and in the maple and thorn it is principally constituted by a substance analogous to wax. By these arrangements any evaporation, except from the appropriated tubes, is prevented.

On the lower surface the epidermis is a thin transparent membrane full of cavities, and it is probably altogether by this surface that moisture and the principles of the atmosphere necessary to vegetation are absorbed.

If a leaf be turned, so as to present its lower surface to the sun, its fibres will twist so as to bring it as much as possible into its original position; and all leaves elevate themselves on the foot-stalk during their exposure to the solar light, and as it were move towards the sun.

This effect seems, in a great measure, dependent upon the mechanical and chemical agency of light and heat. Bonnet made artificial leaves, which, when a moist sponge was held under the lower surface, and a heated iron above the upper surface, turned exactly in the same manner as the natural leaves. This, however, can be considered only as a very rude imitation of the natural process.

What Linnæus has called the sleep of the leaves, appears to depend wholly upon the suspension of the action of light and heat, and on the operation of moisture.

This singular but constant phenomenon had never been scientifically observed, till the attention of the botanist of Upsal was fortunately directed to it. He was examining particularly a species of lotus, in which four flowers had appeared during the day, and he missed two in the evening; by accurate inspection, he soon discovered that these two were hidden by the leaves, which had closed round them. Such a circumstance could not be lost upon so acute an observer. He immediately took a lantern, went into his garden, and witnessed a series of curious facts before unknown. All the simple leaves of the plants he examined had an arrangement totally different from their arrangement in the day: and the greater number of them were seen closed or folded together.

The sleep of leaves is, in some cases, capable of being produced artificially. De Candolle made this experiment on the sensitive plant. By confining it in a dark place in the day-time, the leaves soon closed; but on illuminating the chamber with many lamps, they again expanded. So sensible were they to the effects of light and radiant heat.

In the greater number of plants the leaves annually decay, and are reproduced, their decay takes place either at the conclusion of the summer, as in very hot climates, when they are no longer supplied with sap, in consequence of the dryness of the soil, and the evaporating powers of heat; or in the autumn, as in the northern climates at the commencement of the frosts. The leaves preserve their functions, in common cases, no longer than there is a circulation of fluids through them. In the decay of the leaf, the color assumed seems to depend upon the nature of the chemical change; and as acids are generally developed, it is usually either reddish-brown or yellow; yet there are great varieties. Thus in the oak, it is bright brown; in the beech, orange; in the elm, yellow; in the vine, red; in the sycamore, dark-brown; in the cornel tree, purple; and in the woodbine, blue.

The cause of the preservation of the leaves of evergreens through the winter is not accurately known. From the experiments of Hales, it appears that the force of the sap is much less in plants of this species, and probably there is a certain degree of motion in it, in warm days, even in winter; their juices are less watery than those of other plants, and probably less liable to be congealed by cold, and certainly not so easy of decomposition; and their vessels are defended by stronger coatings from the action of the elements.

The production of the other parts of the plant takes place at the time the leaves are most vigorously performing their functions. If the leaves are stripped off from a tree in spring, it uniformly dies; and when many of the leaves of forest trees are injured by blasts, or long-continued dryness,

* According to M. De Candolle, in the side of a branch most exposed to light, more carbonic acid is decomposed and more carbon is fixed in its tissue, and consequently it sooner becomes firm and solid than on the other side where least exposed to the agent in question, and therefore the latter elongates in a greater degree than the former. The curvature towards the light is the result. *Vide* Phisiologie Végétale, par M. De Candolle, p. 832. Paris, 1832.—J. D.

† Fig. 11. represents part of a leaf of a vine magnified and cut, so as to exhibit the tracheæ; it is copied, as are also the preceding figures, from Grew's Anatomy of Plants.

the trees always become stag-headed and unhealthy.

The leaves are necessary for the existence of the individual tree; the *flowers* for the continuance of the species. Of all the parts of plants they are the most refined, the most beautiful in their structure, and appear as the master-work of nature in the vegetable kingdom. The elegance of their tints, the variety of their forms, the delicacy of their organization, and the adaptation of their parts, are all calculated to awaken our curiosity, and excite our admiration.

In the flower there are to be observed, 1st, the *calyx*, or green membranous part forming the support for the colored floral leaves. This is vascular, and agrees with the common leaf in its texture and organization; it defends, supports, and nourishes the more perfect parts. 2d, The *corolla*, which consists either of a single piece, when it is called monopetalous; or of many pieces, when it is called polypetalous. It is usually very vivid in in its colors, is filled with an almost infinite variety of small tubes of the porous kind; it incloses and defends the essential parts in the interior, and supplies the juices of the sap to them. These parts are, 3d, the *stamens* and the *pistils*.

The essential part of the stamens are the summits or *anthers*, which are usually circular and of a highly vascular texture, and covered with a fine dust called the *pollen*.

The pistil is cylindrical, and surmounted by the *style;* the top of which is generally round and protuberant.*

In the pistil, when it is examined by the microscope, congeries of spherical forms may usually be perceived, which seem to be the bases of the future seeds.

It is upon the arrangement of the stamens and the pistils that the Linnæan classification is founded. The numbers of the stamens and pistils in the same flower, their arrangements, or their division in different flowers, are the circumstances which guided the Swedish philosopher, and enabled him to form a system admirably adapted to assist the memory, and render botany of easy acquisition; and which, though it does not always associate together the plants most analogous to each other in their general characters, is yet so ingeniously contrived as to denote all the analogies of their most essential parts.

The pistil is the organ which contains the rudiments of the seed; but the seed is never formed as a reproductive germ, without the influence of the pollen, or dust on the anthers.

This mysterious impression is necessary to the continued succession of the different vegetable tribes. It is a feature which extends the resemblances of the different orders of beings, and establishes, on a great scale, the beautiful analogy of nature.

The ancients had observed that different date trees bore different flowers, and that those trees producing flowers which contained pistils bore no fruit, unless in the immediate vicinity of such trees as produced flowers containing stamens. This long-established fact strongly impressed the mind of Malpighi, who ascertained several analogous facts with regard to other vegetables. Grew, however, was the first person who attempted to generalize upon them, and much just reasoning on the subject may be found in his works. Linnæus gave a scientific and distinct form to that which Grew had only generally observed, and has the glory of establishing what has been called the sexual system, upon the basis of minute observations and accurate experiments.

The *seed*, the last production of vigorous vegetation, is wonderfully diversified in form. Being of the highest importance to the resources of nature, it is defended above all other parts of the plant; by soft pulpy substances, as in the esculent fruits; by thick membranes, as in the leguminous vegetables; and by hard shells, or a thick epidermis, as in the palms and grasses.

In every seed there is to be distinguished, 1. the *organ of nourishment;* 2. the nascent plant, or the *plume;* 3. the nascent root, or the *radicle*.

In the common garden bean, the organ of nourishment is divided into two lobes called *cotyledons;* the plume is the small white point between the upper part of the lobes; and the radicle is the small curved cone at their base.*

In wheat, and in many of the grasses, the organ of nourishment is a single part, and these plants are called *monocotyledonous*. In other cases it consists of more than two parts, when the plants are called *polycotyledonous*. In the greater number of instances, it is, however, simply divided into two, and is *dicotyledonous*.

The matter of the seed, when examined in its common state, appears dead and inert: it exhibits neither the forms nor the functions of life. But let it be acted upon by moisture, heat, and air, and its organized powers are soon distinctly developed. The cotyledons expand, the membranes burst, the radicle acquires new matter, descends into the soil, and the plume rises towards the free air. By degrees the organs of nourishment of dicotyledonous plants become vascular, and are converted into seed leaves, and the perfect plant appears above the soil. Nature has provided the elements of germination on every part of the surface, water and pure air and heat are universally active, and the means for the preservation and multiplication of life are at once simple and grand.

To enter into more minute details on the vegetable physiology would be incompatible with the objects of these lectures. I have attempted only to give such general ideas on the subject as may enable the philosophical agriculturist to understand the functions of plants; those who wish to study the anatomy of vegetables, as a distinct science, will find abundant materials in the works of the authors I have quoted, and likewise in the writings of Linnæus, Desfontaines, De Candolle, De Saussure, Bonnet, and Smith.

The history of the peculiarities of structure in the different vegetable classes rather belongs to botanical than agricultural knowledge. As I mentioned in the commencement of this lecture, their organs are possessed of the most distinct analogies, and are governed by the same laws. In the grasses and palms, the cortical layers are larger in proportion than the other parts; but their uses seem to be the same as in forest trees.

In bulbous roots, the alburnous substance forms

* Fig. 12. represents the common lily; *a* the corolla, *bbbbb* the anthers, *c* the pistil.

* Fig. 13. represents the garden bean; *aa* the cotyledons, *b* the plume, *c* the radicle.

the largest part of the vegetable; but in all cases it seems to contain the sap, or solid materials deposited from the sap.

The slender and comparatively dry leaves of the pine and the cedar perform the same functions as the large and juicy leave of the fig-tree, or the walnut.

Even in the cryptogamia class, where no flowers are distinct, still there is every reason to believe that the production of the seed is effected in the same way as in the more perfect plants. The mosses and lichens, which belong to this family, have no distinct leaves, or roots, but they are furnished with filaments which perform the same functions; and even in the fungus and the mushroom there is a system for the absorption and aëration of the sap.

It was stated in the last lecture, that all the different parts of plants are capable of being decomposed into a few elements. Their uses as food, or for the purposes of the arts, depend upon compound arrangements of those elements which are capable of being produced either from their organized parts, or from the juices they contain; and the examination of the nature of these substances is an essential part of agricultural chemistry.

Oils are expressed from the fruits of many plants: resinous fluids exude from the wood; saccharine matters are afforded by the sap; and dying materials are furnished by leaves, or the petals of flowers: but particular processes are necessary to separate the different compound vegetable substances from each other; such as maceration, infusion, or digestion in water, or in spirits of wine: but the application and the nature of these processes will be better understood when the chemical nature of the substances is known; the consideration of them will therefore be reserved for another place in this lecture.

The compound substances found in vegetables are, 1. gum, or mucilage, and its different modifications; 2. starch; 3. sugar; 4. albumen; 5. gluten; 6. gum elastic; 7. extract; 8. tannin; 9. indigo; 10. coloring principles; 11. bitter principles; 12. wax; 13. resins; 14. camphor; 15. fixed oils; 16. volatile oils; 17. woody fibre; 18. acids; 19. alkalies, earths, metallic oxides, and saline compounds.

I shall describe generally the properties and composition of these bodies, and the manner in which they are procured.

1. *Gum* is a substance which exudes from certain trees; it appears in the form of a thick fluid, but soon hardens in the air, and becomes solid: when it is white, or yellowish white, more or less transparent, and somewhat brittle, its specific gravity varies from 1300 to 1490.

There is a great variety of gums, but the best known are gum arabic, gum senegal, gum tragacanth, and the gum of the plum or cherry tree. Gum is soluble in water, but not soluble in spirits of wine. If a solution of gum be made in water, and spirits of wine or alcohol be added to it, the gum separates in the form of white flakes. Gum can be made to inflame only with difficulty; much moisture is given off in the process, which takes place with a dark smoke and feeble blue flame, and a coal remains.

The characteristic properties of gum are its easy solubility in water, and its insolubility in alcohol. Different chemical substances have been proposed for ascertaining the presence of gum, but there is reason to believe that few of them afford accurate results; and most of them (particularly the metallic salts), which produce changes in solutions of gum, may be conceived to act rather upon some saline compounds existing in the gum, than upon the pure vegetable principle.*

Mucilage must be considered as a variety of gum; it agrees with it in its most important properties, but seems to have less attraction for water. According to Hermbstadt, when gum and mucilage are dissolved together in water, the mucilage may be separated by means of sulphuric acid. Mucilage may be procured from linseed, from the bulbs of the hyacinth, from the leaves of the marsh-mallows, from several of the lichens, and from many other vegetable substances.

From the analysis of MM. Gay Lussac and Thenard, it appears that gum arabic contains in 100 parts,

Of Carbon	42.23
Oxygen	50.84
Hydrogen	6.93

With a small quantity of saline and earthy matter.

Or, of carbon	42.23
Oxygen and hydrogen in the proportions necessary to form water	57.77

This estimation agrees very nearly with the definite proportions of 11 of carbon, 10 of oxygen, and 20 of hydrogen.

All the varieties of gum and mucilage are nutritious as food. They either partially or wholly lose their solubility in water by being exposed to a heat of 500° or 600° Fahrenheit, but their nutritive powers are not destroyed unless they are decomposed. Gum and mucilage are employed in some of the arts, particularly in calico-printing: till lately, in this country, the calico-printers used gum arabic; but many of them, at the suggestion of Lord Dundonald, now employ the mucilage from lichens.

2. *Starch* is procured from different vegetables, but particularly from wheat or from potatoes. To make starch from wheat, the grain is steeped in cold water till it becomes soft, and yields a milky juice by pressure; it is then put into sacks of linen, and pressed in a vat filled with water: as long as any milky juice exudes the pressure is continued: the fluid gradually becomes clear, and a white powder subsides, which is starch.

Starch is soluble in boiling water, but not in cold water, nor in spirits of wine.† It is a characteristic property of starch to be rendered blue by iodine.

Starch is more readily combustible than gum; when thrown upon red-hot iron, it burns with a kind of explosion, and scarcely any residuum remains. According to MM. Gay Lussac and Thenard, 100 parts of starch are composed of

* The subacetate of lead appears to be the most delicate test of gum; according to the experiments of Berzelius, the precipitate which it occasions is composed of 38.25 oxide of lead, and 61.75 gum.—J. D.

† Exposed to a temperature a little exceeding 212°, it is rendered soluble in cold water, it becomes very similar to gum; is what De Saussure has called amidine, and is best fitted for the use of the calico-printer. Boiling water has an analogous effect on starch; boiled starch, rendered gelatinous, has the properties of amidine.—J. D.

Carbon, with a small quantity of saline and earthly matter	43.55
Oxygen - - - - -	49.68
Hydrogen - - - - -	6.77
Or,	
Carbon - - - - -	43.55
Oxygen and hydrogen in the proportions necessary to form water	56.45

Supposing this estimation correct, starch may be conceived to be constituted by 15 proportions of carbon, 13 of oxygen, and 26 of hydrogen.

Starch forms a principal part of a number of esculent vegetable substances. Sowans, cassava, salop, sago, all of them owe their nutritive powers principally to the starch they contain.

Starch has been found in the following plants: Burdock, (*Arctium Lappa,*) Deadly Nightshade (*Atropa Belladona,*) Bistort (*Polygonum Bistorta,*) White Bryony (*Bryonia alba,*) Meadow Saffron (*Colchicum autumnale,*) Dropwort (*Spiræa Filipendula,*) Buttercup (*Ranunculus bulbosus,*) Figwort (*Scrophularia nodosa,*) Dwarf Elder (*Sambucus ebulus,*) Common Elder (*Sambucus Nigra,*) Foolstones (*Orchis Morio,*) Alexanders (*Imperatoria Ostruthium,*) Henbane (*Hyoscyamus niger,*) Broad-leaved Dock (*Rumex obtusifolius,*) Sharp-pointed Dock (*Rumex acutus,*) Water Dock (*Rumex aquaticus,*) Wake Robin (*Arum maculatum,*) Salep (*Orchis mascula,*) Flower de Luce or Water-flag (*Iris Pseudacorus,*) Stinking Gladwyn (*Iris fœtidissima,*) Earthnut (*Bunium Bulbocastanum.*)

3. *Sugar* in its purest state is prepared from the expressed juice of the *Saccharum officinarum*, or sugar-cane: the acid in this juice is neutralized by lime, and the sugar is crystallized by the evaporation of the aqueous parts of the juice, and slow cooling: it is rendered white by the gradual filtration of water through it. In the common process of manufacture, the whitening or refining of sugar is only effected in a great length of time; the water being gradually suffered to percolate through a stratum of clay above the sugar. As the coloring matter of sugar is soluble in a saturated solution of sugar, or syrup, it appears that refining may be much more rapidly and economically performed by the action of syrup on colored sugar.* The sensible properties of sugar are well known. Its specific gravity according to Fahrenheit is about 1.6. It is soluble in its own weight of water at 50°; it is likewise soluble in alcohol, but in smaller proportions.

Lavoisier concluded from his experiments, that sugar consists in 100 parts, of

28 carbon,
8 hydrogen,
64 oxygen.

Dr. Thompson considers 100 parts of sugar as composed of 27.5 carbon,
7.8 hydrogen,
64.7 oxygen.

According to the recent experiments of Gay Lussac and Thenard, sugar consists of 42.47 of carbon, and 57.53 of water or its elements.

Lavoisier's and Dr. Thompson's analyses agree very nearly with the proportions of

3 of carbon,
4 of oxygen,
and 8 of hydrogen.

Gay Lussac's and Thenard's estimation gives the same elements as in gum; 11 of carbon, 10 of oxygen, 20 of hydrogen.

It appears from the experiments of Proust, Achard, Goettling, and Parmentier, that there are many different species of sugar ready formed in the vegetable kingdom. The sugar of the American maple, *Acer saccharinum*, is precisely the same as that of the cane. This sugar is used by the North American farmers, who procure it by a kind of domestic manufacture. The trunk of the tree is bored early in spring, to the depth of about two inches; a wooden spout is introduced into the hole; the juice flows for about five or six weeks. A common-sized tree, that is, a tree from two to three feet in diameter, will yield about 200 pints of sap, and every 40 pints of sap afford about a pound of sugar. The sap is neutralized by lime, and deposits crystals of sugar by evaporation.

The *sugar of grapes*, has been lately employed in France as a substitute for colonial sugar. It is procured from the juice of ripe grapes by evaporation and the action of pot-ashes; it is less sweet than common sugar, and its taste is peculiar: it produces a sensation of cold while dissolving in the mouth; and, it is probable, contains a larger portion of water, or its elements.

The roots of the beet (*Beta vulgaris* and *cicla*) afford sugar, by boiling, and the evaporation of the extract: it crystallizes, and does not differ in its properties from the sugar of the cane in France.

Manna, a substance which exudes from various trees, particularly from the *Fraxinus Ornus*, a species of ash, which grows abundantly in Sicily and Calabria, may be regarded as a variety of sugar very analogous to the sugar of grapes.* A substance analogous to manna has been extracted by Fourcroy and Vauquelin from the juice of the common onion (*Allium Cepa.*)

Besides the crystallized and solid sugars, there appears to be a sugar which cannot be separated from water, and which exists only in a fluid form; it constitutes a principal part of melasses or treacle; and it is found in a variety of fruits: it is more soluble in alcohol than solid sugar.

The simplest mode of detecting sugar is that recommended by Margraaf. The vegetable is to be boiled in a small quantity of alcohol; solid sugar, if any exist, will separate during the cooling of the solution.

Sugar has been extracted from the following vegetable substances:—

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* A French gentleman lately in this country stated to the West India planters, that he was in possession of a very expeditious and economical method of purifying and refining sugar, which he was willing to communicate to them for a very great pecuniary compensation. His terms were too high to be acceded to. Conversing on the subject with Sir Joseph Banks, I mentioned to him that I thought it probable that raw sugar might be easily purified by passing syrup through it; which would dissolve the coloring matter. The same idea seems to have occurred about the same time, or before, to the late Edward Howard, Esq., who proved its efficacy experimentally, and some time before his death took out a patent for various improvements in the manufacture of sugar.

* The substance to which manna owes its sweetness has recently been considered distinct, and called mannite. It is said not to ferment when leaven is added to its solution in water; thus differing from all the varieties of sugar.—J. D.

The sap of the Birch (*Betula alba.*) of the Sycamore (*Acer Pseudoplatanus,*) of the Bamboo (*Arundo Bambos,*) of the Maize (*Zea mays,*) of the Cow Parsnip (*Heracleum Spondylium,*) of the Cocoa-nut tree (*Cocos nucifera,*) of the Walnut tree (*Juglans alba,*) of the American aloes (*Agave Americana,*) of the Dulse (*Fucus Palmatus,*) of the Common Parsnip (*Pastanica sativa,*) of St. John's bread (*Ceratonia Siliqua;*) the fruit of the common Arbutus (*Arbutus Unedo,*) and other sweet-tasted fruits; the roots of the Turnip (*Brassica Rapa,*) of the Carrot (*Daucus Carota*) of Parsley (*Apium petroselinum,*) the flower of the Euxine Rhododendron (*Rhododendron ponticum,*) and from the nectarium of most other flowers.

The nutritive properties of sugar are well known. At the time the British market was over-stocked with this article from the West India islands, proposals were made for applying it as the food of cattle; experiments had been instituted, which proved that they might be fattened by it: but difficulties connected with the duties laid on sugar prevented the plan from being tried to any extent.

4. *Albumen* is a substance which has only lately been discovered in the vegetable kingdom. It abounds in the juice of the Papaw-tree (*Carica papaya:*) when the juice is boiled, the albumen falls down in a coagulated state. It is likewise found in mushrooms, and in different species of funguses.

Albumen, in its pure form, is a thick, glairy, tasteless fluid; precisely the same as the white of the egg; it is soluble in cold water; its solution, when not too diluted, is coagulated by boiling, and the albumen separates in the form of thin flakes. Albumen is likewise coagulated by acids and by alcohol: a solution of albumen gives a precipitate when mixed with a cold solution of nutgalls. Albumen, when burnt, produces a smell of volatile alkali, and affords carbonic acid and water; it is therefore evidently principally composed of carbon, hydrogen, oxygen, and azote.

According to the experiments of Gay Lussac and Thenard, 100 parts of albumen from the white of the egg are composed of

Carbon - -	52.883
Oxygen - -	23.872
Hydrogen - -	7.540
Azote - - -	15.705

This estimation would authorize the supposition that Albumen is composed of 2 proportions of azote, 5 oxygen, 9 carbon, 32 hydrogen.

The principal part of the almond, and of the kernels of many other nuts, appears, from the experiments of Proust, to be a substance analogous to coagulated albumen.

The juice of the fruit of the Ochra (*Hibiscus esculentus,*) according to Dr. Clarke, contains a liquid albumen in such quantities, that it is employed in Dominica, as a substitute for the white of eggs in clarifying the juice of the sugar cane.

Albumen may be distinguished from other substances by its property of coagulating by the action of heat or acids, when dissolved in water. According to Dr. Bostock, when the solution contains only one grain of albumen to 1000 grains of water, it becomes cloudy by being heated.

Albumen is a substance common to the animal as well as to the vegetable kingdom, and much more abundant in the former.

5. *Gluten* may be obtained from wheaten flour by the following process: the flower is to be made into a paste, which is to be cautiously washed, by kneading it under a small stream of water, till the water has carried off from it all the starch; what remains is gluten. It is a tenacious, ductile, elastic substance. It has no taste. By exposure to air, it becomes of a brown color. It is very slightly soluble in cold water; but not soluble in alcohol. When a solution of it in water is heated, the gluten separates in the form of yellow flakes; in this respect it agrees with albumen, but differs from it in being infinitely less soluble in water. The solution of albumen does not coagulate when it contains much less than 1000 parts of albumen: but it appears that gluten requires more than 1000 parts of cold water for its solution.

Gluten, when burnt, affords similar products to albumen, and probably differs very little from it in composition. Gluten is found in a great number of plants: Proust discovered it in acorns, chestnuts, horse-chestnuts, apples, and quinces; barley, rye, peas, and beans; likewise in the leaves of rue, cabbage, cresses, hemlock, borage, saffron, in the berries of the elder, and in the grape. Gluten appears to be one of the most nutritive of the vegetable substances; and wheat seems to owe its superiority to other grain from the circumstance of its containing it in larger quantities.

6. *Gum elastic,* or *Caoutchouc,* is procured from the juice of a tree which grows in the Brazils, called Hævea. When the tree is punctured, a milky juice exudes from it, which gradually deposits a solid substance, and this is gum elastic.

Gum elastic is pliable and soft like leather, and becomes softer when heated. In its pure state, it is white; its specific gravity is 9335. It is combustible, and burns with a white flame, throwing off a dense smoke, with a very disagreeable smell. It is insoluble in water and in alcohol; it is soluble in ether, volatile oils, and in petroleum, and may be procured from ether in an unaltered state. by evaporating its solution in that liquid. Gum elastic seems to exist in a great variety of plants: amongst them are, *Jatropha elastica, Ficus indica, Artocarpus integrifolia,* and *Urceola elastica.*

Bird-lime, a substance which may be procured from the holly, is very analogous to gum elastic in its properties. Species of gum elastic may be obtained from the misletoe, from gum-mastic, opium, and from the berries of the *Smilax caduca,* in which last plant it has been lately discovered by Dr. Barton.

Gum elastic, when distilled, affords volatile alkali, water, hydrogen, and carbon, in different combinations. It therefore consists principally of azote, hydrogen, oxygen, and carbon; but the proportions in which they are combined, have not yet been ascertained. Gum elastic is an indigestible substance, not fitted for the food of animals; its uses in the arts are well known.*

7. *Extract,* or the *extractive principle,* exists in almost all plants. It may be procured in a state of tolerable purity from saffron, by merely infusing it in water, and evaporating the solution. It may likewise be obtained from catechu, or *Terra japonica,* a substance brought from India. This

* By a very careful distillation, a very volatile fluid may be obtained from it, of sp. gr. 0.64: it is a powerful solvent of caoutchouc, and of the resins used in the preparation of varnishes.—J. D.

substance consists principally of astringent matter, and extract; by the action of water upon it, the astringent matter is first dissolved, and may be separated from the extract. Extract is always more or less colored: it is soluble in alcohol and water, but not soluble in ether. It unites with alumina, when that earth is boiled in a solution of extract; and it is precipitated by the salts of alumina, and by many metallic solutions, particularly the solution of muriate of tin.

From the products of its distillation, it seems to be composed principally of hydrogen, oxygen, carbon, and a little azote.

There appears to be almost as many varieties of extract as there are species of plants. The difference of their properties probably in many cases depends upon their being combined with small quantities of other vegetable principles, or to their containing different saline, alkaline, acid, or earthy ingredients. Many dying substances seem to be of the nature of extractive principle; such as the red coloring matter of madder, and the yellow dye, procured from weld.

Extract has a strong attraction for the fibres of cotton or linen, and combines with these substances when they are boiled in a solution of it. The combination is made stronger by the intervention of mordants, which are earthy or metallic combinations that unite to the cloth, and enable the coloring matter to adhere more strongly to its fibres.

Extract, in its pure form, cannot be used as an article of food, but it is probably nutritive when united to starch, mucilage, or sugar.

8. *Tannin*, or the tanning principle, may be procured by the action of a small quantity of cold water on bruised grape-seeds, or pounded gall-nuts; and by the evaporation of the solution to dryness.* It appears as a yellow substance, possessed of a highly astringent taste. It is difficult of combustion. It is very soluble, both in water and alcohol, but insoluble in ether. When a solution of glue, or isinglass, (*gelatine*,) is mixed with an aqueous solution of tannin, the two substances, *i. e.* the animal and vegetable matters, fall down in combination, and form an insoluble precipitate.

When tannin is distilled in close vessels, the principal products are charcoal, carbonic acid, and inflammable gases, with a minute quantity of volatile alkali. Hence its elements seem the same as those of extract, but probably in different proportions. The characteristic property of tannin is its action upon solutions of isinglass or jelly; this particularly distinguishes it from extract, with which it agrees in most other chemical qualities.

There are many varieties of tannin, which probably owe the difference of their properties to combinations with other principles, especially extract, from which it is not easy to free tannin. The purest species of tannin is that obtained from the seeds of the grape; this forms a white precipitate, with solution of isinglass. The tannin from gall-nuts resembles it in its properties. That from sumach affords a yellow precipitate; that from kino a rose-colored; that from catechu a fawn-colored one. The coloring matter of Brazil-wood, which M. Chevreul considers as a peculiar principle, and which he has called *Hematine*, differs from other species of tannin, in affording a precipitate with gelatine, which is soluble in abundance of hot water. Its taste is much sweeter than that of the other varieties of tannin, and it may perhaps be regarded as a substance intermediate between tannin and extract.

Tannin is not a nutritive substance, but is of great importance in its application to the art of tanning. Skin consists almost entirely of jelly or *gelatine*, in an organized state, and is soluble by the long-continued action of boiling water. When skin is exposed to solutions containing tannin, it slowly combines with that principle; its fibrous texture and coherence are preserved; it is rendered perfectly insoluble in water, and is no longer liable to putrefaction: in short, it becomes a substance in chemical composition precisely analogous to that furnished by the solution of jelly and the solution of tannin.

In general, in this country, the bark of the oak is used for affording tannin in the manufacture of leather: but the barks of some other trees, particularly the Spanish chestnut, have lately come into use. The following table will give a general idea of the relative value of different species of barks. It is founded on the result of experiments made by myself.

Table of numbers exhibiting the quantity of Tannin afforded by 480 lbs. of different Barks, which express nearly their relative values.

	LB.
Average of entire Bark of middle-sized Oak, cut in spring	29
" " " of Spanish Chestnut - -	21
" " " of Leicester Willow, large size - - -	33
" " " of Elm - - -	13
" " " of Common Willow, large	11
" " " of Ash - - -	16
" " " of Beech - - -	10
" " " of Horse Chestnut -	9
" " " of Sycamore - -	11
" " " of Lombardy Poplar -	15
" " " of Birch - -	8
" " " of Hazel - -	14
" " " of Black Thorn - -	16
" " " of Coppice Oak - -	32
" " " of Oak, cut in autumn -	21
" " " of Larch, cut in autumn -	8
White interior cortical layers of Oak Bark - -	72

The quantity of the tannin principle in barks differs in different seasons; when the spring has been very cold the quantity is smallest. On an average, 4 or 5 lbs. of good oak bark are required to form 1 lb. of leather. The inner cortical layers in all barks contain the largest quantity of tannin. Barks contain the greatest proportion of tannin at the time the buds begin to open—the smallest quantity in winter.

The extractive or coloring matters found in barks, or in substances used in tanning, influence the quality of leather. Thus skin tanned with gall-nuts is much paler than skin tanned with oak bark, which contains a brown extractive matter. Leather made from catechu is of a reddish tint. It is probable that in the process of tanning, the matter of skin and the tanning principle first enter into union, and that the leather, at the moment of its formation, unites to the extractive matter.

In general, skins in being converted into leather increase in weight about one-third; * and the ope-

* In the purest form in which it has been obtained by M. Pelouze, it is colorless, has distinct acid properties, and is converted into gallic acid by an absorption of oxygen on exposure to the atmosphere. The term tannic acid has recently been applied to it.—J. D.

* This estimation must be considered as applying to *dry* skin and *dry* leather.

ration is most perfect when they are tanned slowly. When skins are introduced into very strong infusions of tannin, the exterior parts immediately combine with that principle, and defend the interior parts from the action of the solution: such leather is liable to crack and to decay by the action of water.

The precipitates obtained from infusions containing tannin by isinglass, when dried, contain at a medium rate about 40 per cent. of vegetable matter. It is easy to obtain the comparative value of different substances for the use of the tanner, by comparing the quantities of precipitate afforded by infusions of given weights mixed with solutions of glue or isinglass.

To make experiments of this kind, an ounce or 180 grains of the vegetable substance, in coarse powder, should be acted upon by half a pint of boiling water. The mixture should be frequently stirred, and suffered to stand 24 hours; the fluid should then be passed through a fine linen cloth, and mixed with an equal quantity of solution of gelatine, made by dissolving glue, jelly, or isinglass, in hot water, in the proportion of a drachm of glue or isinglass, or six table-spoonfuls of jelly, to a pint of water. The precipitate should be collected by passing the mixture of the solution and infusion through folds of blotting-paper, and the paper exposed to the air till its contents are quite dry. If pieces of paper of equal weights are used, in cases in which different vegetable substances are employed, the difference of the weights of the papers, when dried, will indicate with tolerable accuracy the quantities of tannin contained by the substances, and their relative value, for the purposes of manufacture. Four-tenths of the increase of weight, in grains, must be taken, which will be in relation to the weights in the table.

Besides the barks already mentioned, there are a number of others which contain the tanning principle. Few barks, indeed, are entirely free from it. It is likewise found in the wood and leaves of a number of trees and shrubs, and is one of the most generally diffused of the vegetable principles.

A substance very similar to tannin has been formed by Mr. Hatchett, by the action of heated diluted nitric acid on charcoal, and evaporation of the mixture to dryness. From 100 grains of charcoal Mr. Hatchett obtained 120 grains of artificial tannin, which, like natural tannin, possessed the property of rendering skin insoluble in water.

Both natural and artificial tannin form compounds with the alkalies and the alkaline earths; and these compounds are not decomposable by skin. The attempts that have been made to render oak bark more efficient as a tanning material by infusion in lime water, are consequently founded on erroneous principles. Lime forms with tannin a compound not soluble in water.

The acids unite to tannin, and produce compounds that are more or less soluble in water. It is probable that in some vegetable substances tannin exists combined with alkaline or earthy matter; and such substances will be rendered more efficacious for the use of the tanner by the action of diluted acids.

9. *Indigo* may be procured from woad (*Isatis tinctoria,*) by digesting alcohol on it, and evaporating the solution. White crystalline grains are obtained, which gradually become blue by the action of the atmosphere: these grains are the substance in question.

The indigo of commerce is principally brought from America. It is procured from the *Indigofera argentea*, or wild indigo, the *Indigofera disperma*, or Guatimala indigo, and the *Indigofera tinctoria*, or French indigo. It is prepared by fermenting the leaves of those trees in water. Indigo, in its common form, appears as a fine deep blue powder.* It is insoluble in water, and but slightly soluble in alcohol: its true solvent is sulphuric acid: 8 parts of sulphuric acid dissolve 1 part of indigo; and the solution diluted with water forms a very fine blue dye.

Indigo by its distillation affords carbonic acid gas, water, charcoal, ammonia, and some oily and acid matter: the charcoal is in very large proportion. Pure indigo, therefore, most probably consists of carbon, hydrogen, oxygen, and azote.

Indigo owes its blue color to combination with oxygen. For the uses of the dyers, it is partly deprived of oxygen, by digesting it with orpiment and lime water, when it becomes soluble in the lime water, and of a greenish color. Cloths steeped in this solution combine with the indigo; they are green when taken out of the liquor, but become blue by absorbing oxygen when exposed to air.

Indigo is one of the most valuable and most extensively used of the dying materials.

10. There are a number of coloring principles found in different vegetable productions, the properties of which are less marked than those of indigo, and the separation more difficult. The coloring matters of carthamus and madder are the most fixed amongst the red vegetable colors. A number of vegetable substances are rendered red by the action of acids, and green by that of alkalies. They all seem to be composed of different proportions of hydrogen, oxygen, and carbon; but are so liable to change, that few distinct experiments have been made upon their nature. In dying, they are usually applied to cloths prepared for receiving them by combination with certain saline or metallic preparations called mordants; and, in consequence of the triple union formed between the cloth, the mordant, and the coloring matter, the tint is modified, or changed, and rendered more permanent.

11. The *bitter principle* is very extensively diffused in the vegetable kingdom; it is found abundantly in the hop (*Humulus Lupulus*), in the common broom (*Spartium scoparium*), in the chamomile (*Anthemis nobilis*), and in *Quassia amara* and *excelsa*. It is obtained from those substances by the action of water or alcohol, and evaporation. It is usually of pale yellow color; its taste is intensely bitter. It is very soluble, both in water and alcohol; and has little or no action on alkaline, acid, saline, or metallic solution.

An artificial substance, similar to the bitter principle, has been obtained by digesting diluted nitric acid on silk, indigo, and the wood of the white willow. This substance has the property of dying cloth of a bright yellow color; it differs

* By a carefully regulated temperature, it may be sublimed without decomposition, and obtained in a pure crystalline state.—J. D.

from the natural bitter principle in its power of combining with the alkalies; in union with the fixed alkalies, it constitutes crystallized bodies, which have the property of detonating by heat or percussion.

The natural bitter principle is of great importance in the art of brewing; it checks fermentation, and preserves fermented liquors; it is likewise used in medicine.

The bitter principle, like the narcotic principle, appears to consist principally of carbon, hydrogen, and oxygen, with a little azote.

12. *Wax* is found in a number of vegetables; it is procured in abundance from the berries of the Wax Myrtle (*Myrica cerifera*):* it may be likewise obtained from the leaves of many trees: in its pure state it is white. Its specific gravity is ·9662; it melts at 155 degrees: it is dissolved by boiling alcohol; but it is not acted upon by cold alcohol: it is insoluble in water: its properties as a combustible body are well known.

The wax of the vegetable kingdom seems to be precisely of the same nature as that afforded by the bee.†

From the experiments of MM. Gay Lussac and Thenard, it appears that 100 parts of wax consist of

Carbon	-	-	1·784
Oxygen	-	-	5·544
Hydrogen	-	-	12·672

Or otherwise,

Carbon - -	81·784
Oxygen and hydrogen in the proportions necessary to form water - -	6·300
Hydrogen - -	11·916

Which agrees very nearly with 37 proportions of hydrogen, 21 of charcoal, 1 of oxygen.

13. *Resin* is very common in the vegetable kingdom. One of the most usual species is that afforded by the different kinds of fir. When a portion of the bark is removed from a fir-tree in spring, a matter exudes, which is called turpentine; by heating this turpentine gently, a volatile oil rises from it, and a more fixed substance remains: this substance is resin.

The resin of the fir is the substance commonly known by the name of rosin; its properties are well known. Its specific gravity is 1072. It melts readily, burns with a yellow light, throwing off much smoke. Resin is insoluble in water, either hot or cold; but very soluble in alcohol. When a solution of resin in alcohol is mixed with water, the solution becomes milky; the resin is deposited by the stronger attraction of the water for the alcohol.

Resins are obtained from many other species of trees. *Mastich* from the *Pistacia Lentiscus*, *Elemi* from the *Amyris elemifera*, *Copal* from the *Rhus copallinum*, *Sandarach* from the common juniper. Of these resins copal is the most peculiar. It is the most difficultly dissolved in alcohol; and for this purpose must be exposed to that substance in vapor; or the alcohol employed must hold camphor in solution. According to Gay Lussac and Thenard,

100 parts of common resin contain

Carbon	-	-	75·944
Oxygen	-	-	13·337
Hydrogen	-	-	10·719

Or of

Carbon - -	75·944
Oxygen and hydrogen in the proportions necessary to form water	15·156
Hydrogen in excess -	8·900

According to the same chemists, 100 parts of copal consist of

Carbon	-	-	76·811
Oxygen	-	-	10·606
Hydrogen	-	-	12·583

Or,

Carbon - -	76·11
Water or its elements	12·052
Hydrogen - -	11·137

From these results, if resin be a definite compound, it may be supposed to consist of 8 proportions of carbon, 12 of hydrogen, and one of oxygen.

Resins are used for a variety of purposes. Tar and pitch principally consist of resin, in a partially decomposed state. Tar is made by the slow combustion of the fir; and pitch by the evaporation of the more volatile parts of tar. Resins are employed as varnishes, and for these purposes are dissolved in alcohol or oils. Copal forms one of the finest. It may be made by boiling it in powder with oil of rosemary, and then adding alcohol to the solution.

14. *Camphor* is produced by distilling the wood of the camphor-tree (*Laurus Camphora*), which grows in Japan. It is a very volatile body, and may be purified by distillation. Camphor is a white, brittle, semi-transparent substance, having a peculiar odor, and a strong acrid taste. It is very slightly soluble in water; more than 100,000 parts of water are required to dissolve one part of camphor. It is very soluble in alcohol; and by adding water in small quantities at a time to the solution of camphor in alcohol, the camphor separates in a crystallized form. It is soluble in nitric acid, and is separated from it by water.

Camphor is very inflammable; it burns with a bright flame, and throws off a great quantity of carbonaceous matter. It forms, in combustion, water, carbonic acid, and a peculiar acid called *camphoric* acid. No accurate analysis has been made of camphor, but it seems to approach to the resins in its composition; and consists of carbon, hydrogen, and oxygen.

Camphor exists in other plants besides the *Laurus Camphora*. It is procured from species of the Laurus growing in Sumatra, Borneo, and other of the East Indian isles. It has been obtained from Thyme (*Thymus Serpyllum*), Marjorum (*Origanum Majorana*), ginger tree (*Amomum Zingiber*), sage (*Salvia officinalis*). Many volatile oils yield camphor by being merely exposed to the air.

An artificial substance very similar to camphor has been formed by M. Kind, by saturating oil of

* It is also procured from the berries of the cinnamon tree (Laurus Cinnamomum.) The products of this tree are remarkable: its wood is colorless, insipid, and inodorous; its bark, as is well known, contains the oil which bears its name; its leaves, an oil similar to that of cloves; its berries, wax, as above mentioned; and its roots camphor.—J. D.

† According to the recent analysis of bees' wax and of vegetable wax by Oppermann, they differ in the proportions of their elements.—J. D.

turpentine with muriatic acid gas (the gaseous substance procured from common salt by the action of sulphuric acid.) The camphor procured in well-conducted experiments amounts to half of the oil of turpentine used. It agrees with common camphor in most of its sensible properties; but differs materially in its chemical qualities and composition. It is not soluble without decomposition in nitric acid. From the experiments of Gehlen it appears to consist of the elements of oil of turpentine, carbon, hydrogen, and oxygen, united to the elements of muriatic gas, chlorine, and hydrogen.

From the analogy of artificial to natural camphor, it does not appear improbable that natural camphor may be a secondary vegetable compound, consisting of camphoric acid and volatile oil. Camphor is used medicinally, but it has no other application.*

15. *Fixed oil* is obtained by expression from seeds and fruits; the olive, the almond, linseed, and rape-seed, afford the most common vegetable fixed oils. The properties of fixed oils are well known. Their specific gravity is less than that of water; that of olive and of rape-seed oil is ·913; that of linseed and almond oil ·932; that of palm oil ·968; that of walnut and beech-mast oil ·923. Many of the fixed oils congeal at a lower temperature than that at which water freezes. They all require for their evaporation a higher temperature than that at which water boils.† The products of the combustion of oil are water and carbonic acid gas.

From the experiments of Gay Lussac and Thenard, it appears that olive oil contains, in 100 parts.

Carbon	-	-	77·213
Oxygen	-	-	9·427
Hydrogen	-	-	13·360

This estimation is a near approximation to 11 proportions of carbon, 20 hydrogen and 1 oxygen.

The following is a list of fixed oils, and of the trees that afford them.

Olive oil, from the Olive tree (*Olea Europea*), Linseed oil, from the common and perennial Flax (*Linum usitatissimum et perenne*), Nut oil, from the Hazel nut (*Corylus Avellana*), Walnut (*Juglans regia*), Hemp oil, from the Hemp (*Cannabis sativa*), Almond oil, from the sweet Almond (*Amygdalus communis*), Beech oil, from the common Beech (*Fagus sylvatica*), Rape-seed oil, from the Rapes (*Brassica Napus et campestris*), Poppy oil, from the Poppy (*Papaver somniferum*), oil of Sesamum, from the sesamum (*Sesamum orientale*), Cucumber oil, from the gourds (*Cucurbita Pepo et Melopepo*), oil of Mustard (*Sinapos nigra et arvensis*), oil of Sunflower, from the annual and perennial Sunflower (*Helianthus annuus et perennis*), Castor oil, from the Palma Christi (*Ricinus communis*), Tobacco-seed oil, from the Tobacco (*Nicotiana Tabacum et rustica*), Plum kernel oil, from the Plum tree (*Prunus domestica*), Grape-seed oil, from the Vine (*Vitis vinifera*), Butter of cacoa, from the Cacoa tree (*Theobroma Cacao*), Laurel oil, from the sweet Bay tree (*Laurus nobilis*).

The fixed oils are very nutritive substances; they are of great importance in their applications to the purposes of life. Fixed oil, in combination with soda, forms the finest kind of hard soap. The fixed oils are used extensively in the mechanical arts, and for the preparation of pigments and varnishes.

16. *Volatile oil*, likewise called *essential oil*, differs from fixed oil, in being capable of evaporation by a much lower degree of heat, in being soluble in alcohol, and in possessing a very slight degree of solubility in water.

There is a great number of volatile oils, distinguished by their smell, their taste, their specific gravity and other sensible qualities. A strong and peculiar odor may, however, be considered as the great characteristic of each species: the volatile oils inflame with more facility than the fixed oils, and afford, by their combustion, different proportions of the same substances, water, carbonic acid, and carbon.

The following specific gravities of different volatile oils, were ascertained by Dr. Lewis:

Oil of Sassafras	1094	Oil of Tansy	946
" Cinnamon	1035	" Caraway	940
" Cloves	1034	" Origanum	940
" Fennel	997	" Spike	936
" Dill	994	" Rosemary	934
" Penny Royal	978	" Juniper	911
" Cumin	975	" Oranges	888
" Mint	975	" Turpentine	792
" Nutmegs	948		

The peculiar odours of plants seem, in almost all cases, to depend upon the peculiar volatile oils they contain. All the perfumed distilled waters owe their peculiar properties to the volatile oils they hold in solution. By collecting the aromatic oils, the fragrance of flowers, so fugitive in the common course of nature, is as it were embodied and made permanent.

It cannot be doubted that the volatile oils consist of carbon, hydrogen, and oxygen; but no accurate experiments have as yet been made on the proportions in which these elements are combined.

The volatile oils have never been used as articles of food; many of them are employed in the arts, in the manufacture of pigments and varnishes; but their most extensive application is as perfumes.

17. *Woody fibre* is procured from wood, bark, leaves or flowers of trees, by exposing them to the repeated action of boiling water and boiling alcohol. It is the insoluble matter that remains, and is the basis of the solid organized parts of plants. There are as many varieties of woody fibre as there are plants and organs of plants; but they are all distinguished by their fibrous texture, and their insolubility.

Woody fibre burns with a yellow flame, and produces water and carbonic acid in burning. When it is distilled in close vessels, it yields a considerable residuum of charcoal. It is from woody fibre, indeed, that charcoal is procured for the purposes of life.

The following table contains the results of experiments made by Mr. Mushet, on the quantity of charcoal afforded by different wood:—

* From the researches of Dumas, it would appear that camphor is an oxide of camphene, itself a compound of carbon and hydrogen.—J. D.

† From the researches of Chevreul and Le Canu, it would appear that the fixed oils consist of two principles,—a fluid principle oleine, and a solid one margarine,—the proportions of which vary in different instances.—J. D.

100 parts of Lignum Vitæ	-	26·8 of charcoal
Mahogany	-	25·4
Laburnum	-	24·5
Chestnut	-	23·2
Oak	-	22·6
American black Beech	-	21·4
Walnut	-	20·6
Holly	-	19·9
Beech	-	19·9
American Maple	-	19·9
Elm	-	19·5
Norway Pine	-	19·2
Sallow	-	18·4
Ash	-	17·9
Birch	-	17·4
Scottish Fir	-	16·4

MM. Gay Lussac and Thenard have concluded, from their experiments on the wood of the oak and the beech, that 100 parts of the first contain:—

Of Carbon	52·53
Oxygen	41·78
Hydrogen	5·69

and 100 parts of the second—

Of Carbon	51·45
Oxygen	42·73
Hydrogen	5·82

Supposing woody fibre to be a definitive compound, these estimations lead to the conclusion, that it consists of 5 proportions of carbon, 3 of oxygen, and 6 of hydrogen; or 57 carbon, 45 oxygen, and 6 hydrogen.

It will be unnecessary to speak of the applications of woody fibre. The different uses of the woods, cotton, linen, the barks of trees, are sufficiently known. Woody fibre appears to be an indigestible substance. *

18. The acids found in the vegetable kingdom are numerous; the true vegetable acids which exist ready formed in the juices or organs of plants, are the *oxalic*, *citric*, *tartaric*, *benzoic*, *acetic*, *meconic*, *malic*, *gallic*, and *prussic* acids.

All these acids, except the acetic, malic, and prussic acids, are white crystallized bodies. The acetic, malic, and prussic acids have been obtained only in the fluid state; they are all more or less soluble in water; all have a sour taste except the gallic and prussic acids; of which the first has an astringent taste, and the latter a taste like that of bitter almonds. The meconic acid exists in opium.

The oxalic acid exists, uncombined, in the liquor which exudes from the Chich pea (*Cicer arietinum,*) and may be procured from wood Sorrel (*Oxalis Acetosella,*) common sorrel, and other species of Rumex: and from the *Geranium acidum.* Oxalic acid is easily discovered and distinguished from other acids by its property of decomposing all calcareous salts, and forming with lime a salt insoluble in water; and by its crystallizing in four-sided prisms.

The citric acid is the peculiar acid existing in the juice of lemons and oranges. It may likewise be obtained from the cranberry, whortleberry, and hip.

* By trituration and fermentation, and the heat of the oven, woody fibre may be converted into a kind of bread; by the action of strong sulphuric acid on it, it may be changed into a kind of gum, and this gum, by boiling, may be transformed into sugar: and as it is possible that similar changes may be effected in it in the alimentary canal of animals, it may not be entirely indigestible.—J. D.

Citric acid is distinguished by its forming a salt insoluble in water with lime; but decomposable by the mineral acids.

The tartaric acid may be obtained from the juice of mulberries and grapes; and likewise from the pulp of the tamarind. It is characterized by its property of forming a difficultly soluble salt with potassa, and an insoluble salt decomposable by the mineral acids with lime.

Benzoic acid may be procured from several resinous substances by distillation; from benzoin, storax, and balsam of Tolu. It is distinguished from the other acids by its aromatic odour, and by its extreme volatility.

Malic acid may be obtained from the juice of apples, barberries, plums, elderberries, currants, strawberries, and raspberries. It forms a soluble salt with lime; and is easily distinguished by this test from the acids already named.

Acetic acid, or vinegar, may be obtained from the sap of different trees. It is distinguished from malic acid by its peculiar odor; and from the other vegetable acids by forming soluble salts with the alkalies and earths.

Gallic acid may be obtained by gently and gradually heating powdered gall-nuts, and receiving the volatile matter in a cool vessel. A number of white crystals will appear, which are distinguished by their property of rendering solutions of iron deep purple.

The vegetable prussic acid is procured by distilling laurel leaves, or the kernels of the peach, and cherry, or bitter almonds. It is characterized by its property of forming a bluish green precipitate, when a little alkali is added to it, and it is poured into solutions containing iron. It is very analogous in its properties to the prussic acid obtained from animal substances; or by passing ammonia over heated charcoal; but this last body forms, with the red oxide of iron, the deep bright blue substance called Prussian blue.

Some other vegetable acids have been found in the products of plants; the morolyxic acid in a saline exudation from the white mulberry tree, and the kinic acid in a salt afforded by Peruvian bark; but these two bodies have as yet been discovered in no other cases. The igasuric acid is so named by its discoverers, MM. Pelletier and Caventou: and the boletic, nanceic, fungic, and ellagic acids, have been described by M. Braconnot; but their properties are too little interesting to the agriculturist to insert a description in this place. The phosphoric acid is found free in the onion; and the phosphoric, sulphuric, muriatic, and nitric acids, exist in many saline compounds in the vegetable kingdom; but they cannot with propriety be considered as vegetable products. Other acids are produced during the combustion of vegetable compounds, or by the action of nitric acid upon them; they are the camphoric acid, the mucous or saclactic acid, and the suberic acid; the first of which is procured from camphor; the second from gum or mucilage; and the third from cork, by the action of nitric acid.

From the experiments that have been made upon the vegetable acids, it appears that all of them, except the prussic acid, are constituted by different proportions of carbon, hydrogen, and oxygen: the prussic acid consists of carbon, azote, and hydrogen, with a little oxygen. The gallic acid contains more carbon than any of the other vegetable acids.

The following estimates of the composition of some of the vegetable acids have been made by Gay Lussac and Thenard:—

100 parts of oxalic acid contain:

Carbon	- -	26·566
Hydrogen	- -	2·745
Oxygen	- -	70·689

100 parts of tartaric acid contain:

Carbon	- -	24·050
Hydrogen	- -	6·629
Oxygen	- -	69·321

Ditto citric acid:

Carbon	- -	33·811
Hydrogen	- -	6·330
Oxygen	- -	59·859

100 parts of acetic acid:

Carbon	- -	50·224
Hydrogen	- -	5·629
Oxygen	- -	44·147

Ditto mucous or saclactic acid:

Carbon	- -	33·69
Hydrogen	- -	3·62
Oxygen	- -	62·69

These estimations agree nearly with the following definite proportions. In oxalic acid, 7 proportions of carbon, 8 of hydrogen, and 15 oxygen; in tartaric acid, 8 carbon, 28 hydrogen, 18 oxygen; in citric acid, 3 carbon, 6 hydrogen, 4 oxygen; in acetic acid, 18 carbon, 22 hydrogen, 12 oxygen; in mucous acid, 6 carbon, 7 hydrogen, 8 oxygen.

The applications of the vegetable acids are well known. The acetic and citric acids are extensively used. The agreeable taste and wholesomeness of various vegetable substances used as food, materially depend upon the vegetable acid they contain.

19. It is uncertain whether ammonia or the volatile alkali exists ready formed in plants: but it is evolved from many of them by the action of lime or fixed alkali, assisted by a gentle heat; though it may be always imagined to be generated during the process by the combination of azote and carbon. The ingenious researches of M. Serturner, followed by those of other chemists, have made us acquainted with the alkaline properties of several compound vegetable substances, which were not suspected to belong to this class of bodies, such as morphina, strychnina, brucina, picrotoxina, delphina*; these compounds, which are found respectively in opium, nux vomica, Brucea anti-dysenterica, cocculus indicus, and Delphinium Staphisagria, agree with alkalies in their effects upon vegetable colors, and in combining with acids, into peculiar neutrosaline compounds. They form the narcotic or poisonous principles of the plants in which they are found, and probably many more of them will be discovered. They are not very interesting to the agriculturist, except in this point of view, *that possibly many noxious vegetable substances may be rendered useful as the food of cattle*, by extracting their noxious principles by means of acids; and this is a subject well worthy of experimental investigation.

Fixed alkali may be obtained in aqueous solution from most plants by burning them, and treating the ashes with quick-lime and water. The vegetable alkali, or potassa, is the common alkali in the vegetable kingdom. This substance, in its pure state, is white and semi-transparent, requiring a strong heat for its fusion, and possessed of a highly caustic taste. In the matter usually called pure potassa by chemists, it exists, combined with water: and in that commonly called pearl-ashes, or pot-ashes in commerce, it is combined with a small quantity of carbonic acid. Potassa in its uncombined state, as has been mentioned, consists of the highly inflammable metal potassium and oxygen, one proportion of each.

Soda, or the mineral alkali, is found in some plants that grow near the sea; and is obtained combined with water, or carbonic acid in the same manner as potassa; and consists, as has been stated, of one proportion of sodium, and two proportions of oxygen. In its properties it is very similar to potassa; but it may be easily distinguished from it by this character; it forms a hard soap with oil: potassa forms a soft soap.

Pearl ashes, and barilla and kelp, or the impure soda obtained from the ashes of marine plants, are very valuable in commerce, principally on account of their uses in the manufacture of glass and soap. Glass is made from fixed alkali, flint, and certain metallic substances.

To know whether a vegetable yields alkali, it should be burnt, and the ashes washed with a small quantity of water. If the water, after being for some time exposed to the air, reddens paper tinged with turmeric, or renders vegetable blues green, it contains alkali.

To ascertain the relative quantities of pot-ashes afforded by different plants, equal weights of them should be burnt: the ashes washed in twice their volume of water: the washings should be passed through blotting paper, and evaporated to dryness. The relative weights of the salt obtained will indicate very nearly the relative quantities of alkali they contain.

The value of marine plants in producing soda may be estimated in the same manner, with sufficient correctness for all commercial purposes.

Herbs, in general, furnish four or five times, and shrubs two or three times, as much pot-ashes as trees. The leaves produce more than the branches, and the branches more than the trunk. Vegetables burnt in a green state produce more ashes than in a dry state.

The following table* contains a statement of the quantity of pot-ashes afforded by some common trees and plants:—

10,000 parts of	Oak	- -	15
	Elm	- -	39
	Beech	- -	12
	Vine	- -	55
	Poplar	- -	7
	Thistle	- -	53
	Fern	- -	62
	Cow Thistle	-	196
	Wormwood	-	730
	Vetches	- -	275
	Beans	- -	200
	Fumitory	- -	760

The earths found in plants are four; silica or the earth of flints, alumina or pure clay, lime, and mag-

* Many more have since been discovered, as codeia, narceia, aricina, &c. All the compounds of this class are composed of carbon, hydrogen, azote, and oxygen. —J. D.

* It is founded upon the experiments of Kirwan, Vauquelin, and Pertuis.

nesia. They are procured by incineration. The lime is usually combined with carbonic acid. This substance and silica, are much more common in the vegetable kingdom than magnesia, and magnesia more common than alumina. The earths form a principal part of the matter insoluble in water, afforded by the ashes of plants. The silica is known by not being dissolved by acids; the calcareous earth, unless the ashes have been very intensely ignited, dissolves with effervescence in muriatic acid. Magnesia forms a soluble and crystallizable salt, and lime a difficultly soluble one with sulphuric acid. Alumina is distinguished from the other earths by being acted upon very slowly by acids; and in forming salts very soluble in water, and difficult of crystallization with them.

The earths appear to be compounds of the peculiar metals before mentioned, and oxygen, one proportion of each.

The earths afforded by plants, are applied to no uses of common life; and there are few cases in which the knowledge of their nature can be of importance, or afford interest to the farmer.

The only *metallic oxides* found in plants, are those of iron and manganesum: they are detected in the ashes of plants; but in very minute quantities only. When the ashes of plants are reddish brown, they abound in oxides of iron. When black or purple, in oxide of manganesum; when these colours are mixed, they contain both substances.

The saline compounds contained in plants, or afforded by their incineration, are very various. The sulphuric acid combined with potassa, or sulphate of potassa, is one of the most usual. Common salt is likewise very often found in the ashes of plants; likewise phosphate of lime, which is insoluble in water, but soluble in muriatic acid. Compounds of the nitric, muriatic, sulphuric, and phosphoric acids, with alkalies and earths, exist in the sap of many plants, or are afforded by their evaporation and incineration. The salts of potassa are distinguished from those of soda by their producing a precipitate in solutions of platina: those of lime are characterized by the cloudiness they occasion in solutions containing oxalic acid; those of magnesia, by being rendered cloudy by solutions of ammonia. Sulphuric acid is detected in salts by the dense white precipitate it forms in solutions of baryta. Muriatic acid by the cloudiness it communicates to solution of nitrate of silver; and when salts contain nitric acid, they produce scintillations by being thrown upon burning coals.

As no applications have been made of any of the neutral salts or analogous compounds found in plants, in a separate state, it will be useless to describe them individually. The following tables are given from M. Th. de Saussure's Researches on vegetation, and contain results obtained by that philosopher. They exhibit the quantities of soluble salts, metallic oxides, and earths afforded by the ashes of different plants.

Besides the principles, the nature of which has been just discussed, others have been described by chemists as belonging to the vegetable kingdom: thus a substance, somewhat analogous to the muscular fibre of animals, has been detected by Vauquelin in the papaw; and a matter similar to animal gelatine, by Braconnot, in the mushroom; ulmin * and emetine, sarcocol, nicotine, olivile, asparagine, inulin, and other bodies, are generally described in systematic writers on chemistry as specific compounds; but it is likely that few of these bodies will retain their places as definite combinations: their existence, likewise, is extremely limited, and in this place it would be improper to dwell upon peculiarities; my object being to offer such general views of the constitution of vegetables as may be of use to the agriculturist. It is probable, from the taste of sarcocol, that it is gum combined with a little sugar. Inulin is so analogous to starch, that it may be a variety of that principle. If slight differences in chemical and physical properties be considered as sufficient to establish a difference in the species of vegetable substances, the catalogue of them might be enlarged to almost any extent. No two compounds procured from different vegetables are precisely alike; and there are even differences in the qualities of the same compound, according to the time in which it has been collected, and the manner in which it has been prepared. The great use of classification in science is to assist the memory, and it ought to be founded upon the similarity of properties which are distinct, characteristic, and invariable.

The analysis of any substance, containing mixtures of the different vegetable principles, may be made, in such a manner as is necessary for the views of the agriculturist, with facility. A given quantity, say 200 grains, of the substance should be powdered, made into a paste or mass, with a small quantity of water, and kneaded in the hands, or rubbed in a mortar for some time under cold water: if it contain much gluten, that principle will separate in a coherent mass. After this process, whether it has afforded gluten or not, it should be kept in contact with half a pint of cold water for three or four hours, being occasionally rubbed or agitated; the solid matter should be separated from the fluid by means of blotting paper. The fluid should be gradually heated; if any flakes appear, they are to be separated by the same means as the solid matter in the last process, *i. e.* by filtration. The fluid is then to be evaporated to dryness. The matter obtained is to be examined by applying moist paper, tinged with red cabbage juice, or violet juice, to it; if the paper become red, it contains acid matter; if it become green, alkaline matter; and the nature of the acid or alkaline matter may be known by applying the tests already described. If the solid matter be sweet to the taste, it must be supposed to contain sugar; if bitterish, bitter principle, or extract; if astringent, tannin: and if it be nearly insipid, it must be principally gum or mucilage. To separate gum or mucilage from the other principles, alcohol must be boiled upon the solid matter, which will dissolve the sugar and the extract, and leave the mucilage; the weight of which may be ascertained.

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* Ulmin, in relation to agricultural chemistry, would appear, from the researches of M. Boullay, to be a substance of some importance. It is of a dark colour, almost black; nearly insoluble in water, having some of the properties of an acid; readily combining with alkalies and the alkaline earths, with which it forms soluble compounds. It is an ingredient of peat and vegetable mould, and may be considered as a natural manure.—J. D.

No.	Names of Plants.	Ashes from 1000 parts of the Plants green.	Ditto, dry.	Water from 1000 parts of the Plants green.	Constituents of 100 parts of Ashes. Soluble Salts.	Earthy Phosphates.	Earthy Carbonates.	Silica.	Metallic Oxides.	Loss.
1	Leaves of oak *(Quercus Robur,)* May 10	13	53	745	47	24	0·12	3	0·64	25·24
2	Ditto, September 27	24	55	549	17	28·25	23	14·5	1·75	25·5
3	Wood of young oak, May 10		4		26	28·5	12·25	0·12	1	32·58
4	Bark of ditto		60		7	4·5	63·25	0·25	1·75	22·75
5	Entire wood of oak		2		38·6	4·5	32	2	2·25	20·65
6	Alburnum of ditto				32	24	11	7·5	2	23·5
7	Bark of ditto		60		7	3	66	1·5	2	21·5
8	Cortical layers of ditto		73		7	3·75	65	0·5	1	22·75
9	Extract of wood of ditto		61		51	10·5	10	32	14	8·5
10	Soll of wood of ditto		41		24					
11	Extract from ditto		111		66					
12	Leaves of the poplar *(Populus nigra)*, May 26	23	66	652	36	13	29	5	1·25	15·75
13	Ditto, September 12	41	93	565	26	7	36	11·5	1·5	18
14	Wood of ditto. September 12		8	26	6	16·75	27	3·3	1·5	24·5
15	Bark of ditto		72			5·3	60	4	1·5	23·2
16	Leaves of hazel *(Corylus Avellana)*, May 1		61		26	23·3	22	2·5	1·5	24·5
17	Ditto, washed in cold water		57		8·2	19·5	44·1	4	2	22 2
18	Leaves of ditto, June 22	28	62	655	22·7	14	29	11·3	1·5	21.7
19	Ditto, September 20	31	70	557	11	12	36	22	2	17
20	Wood of ditto, May 1		5		24·5	35	8	0·25	0·12	32·2
21	Bark of ditto		62		12·5	5·5	54	0·25	1·75	26
22	Entire wood of mulberry *(Morus nigra)*. November		7		21	2·25	56	0·12	0·25	20·38
23	Alburnum of ditto		13		26	27·25	24	1	0·25	21·5
24	Bark of ditto		89		7	8·5	45	15·25	1·12	23·13
25	Cortical layers of ditto		88		10	16·5	48	0·12	1	24·38
26	Entire wood of hornbeam *(Carpinus Betulus)*, November	4	6	346	22	23	26	0·12	2·25	26·63
27	Alburnum of ditto	4	7	390	18	36	15	1	1	29
28	Bark of ditto	88	134	346	4·5	4·5	59	1·5	0·12	30·38
29	Wood of horse chestnut *(Æsculus Hippocastanum)*, May 10		35		9·5					
30	Leaves of ditto, May 10	16	72	782	50					
31	Leaves of ditto, July 23	29	84	652	24					
32	Ditto, September 27	31	86	630	13·5					
33	Flowers of ditto, May 10	9	71	873	50					
34	Fruit of ditto, October 5	12	34	647	82	12		0·5	0·25	5·25
35	Plants of peas *(Pisum sativum)*, in flower		95		49·8	17·25	6	2·3	1	24·65
36	Plants of peas *(Pisum sativum)*, in flower, ripe		81		34·25	22	14	11	2·5	17.25
37	Plants of vetches *(Vicia Faba)*, before flowering, May 23	16	150	895	55·5	14·5	3·5	1·5	0·5	24·50
38	Ditto, in flower, June 23	20	122	876	55·5	13·5	4·12	1·5	0·5	24·38
39	Ditto, ripe, July 23		66		50	17·75	4	1·75	0·5	26
40	Ditto, seeds separated		115		42	5·75	36	1·75	1	12·9
41	Seeds of ditto		33		69 ·28	27·92			0·5	2·3
42	Ditto, in flower, raised in distilled water		39		60·1	30			0·5	9·4
43	*Solidago vulgaris*, before flowering, May 1		92		67·5	10·75	1·5	1·5	0·75	18 25
44	Ditto, just in flower, July 15		57			59	1·5	1·5	0·75	21
45	Ditto, seeds ripe, September 20		50		48	11	17·25	3·5	1·5	18·75
46	Plants of turnsol *(Helianthas annuus)*, a month before flowering, June 23		147		63	67	11·56	1·5	0·12	16·67
47	Ditto, in flower, July 23	13	137	877	61	6	12·5	1·5	0·12	18·78
48	Ditto, bearing ripe seeds, September 20,	23	93	753	5·15	22·5	4	3·75	0·5	17·75
49	Wheat *(Triticum sativum)*, in flower				43·25	12·75	0·25	32	0·5	12·25
50	Ditto, seeds ripe				11	15	0 25	54	1	18·75
51	Ditto, a month before flowering		79	699	60	11·5	0·25	12·5	0·25	15·5
52	Ditto, in flower, June 14	16	54		41	10·75	0·25	26	0.5	21·5
53	Ditto, seeds ripe		33		10	11·75	0·25	51	0·75	23
54	Straw of wheat		43		22·5	6·2	1	61·5	1	78
55	Seeds of ditto		13		47·16	44·5		0·5	0·25	7·6
56	Bran		52		4·16	46·5		0·5	0·25	8·6
57	Plants of maize *(Zea Mays)*, a month before flowering June 23		122		69	5·75	0·25	7·5	0·25	17·25

	Names of Plants.	Ashes from 1000 parts of the Plants green.	Ditto dry.	Water from 1000 parts of the Plant green.	Constituents of 1000 parts of Ashes. Soluble Salts.	Earthy Phosphates.	Earthy Carbonates.	Silica.	Metallic Oxides.	Loss.
58	Plants of maize, in flower July 23		8 t		69	6	0·25	7·5	0·25	17
59	Ditto, seeds ripe		46							
60	Stalks of ditto		84		72·45	5	1	18	0·5	3·05
61	Spikes of ditto		16							
62	Seeds of ditto		10		62	36		1	0·12	0·88
63	Chaff of barley (*Hordeum vulgære*),		42		20	7·75	12·5	57	0·5	2·25
64	Seeds of ditto		18		29	32·5		35·5	0·25	2·8
65	Ditto				22	22		21	0·12	29·88
66	Oats		31		1	24		60	0·25	14·75
67	Leaves of *Rhododendron ferrugineum*, raised on Jura, a lime-stone mountain, June 20		30		23	14	43·25	0·75	3·25	15·63
68	Leaves of *Rhododendron ferrugineum*, raised on Breven, a granitic mountain, June 27		25		21·1	16·75	16·75	2	5·77	31·52
69	Branches of ditto, June 20		8		22·5	10	39	0·5	5·4	22·48
70	Spikes of ditto, June 27		8		24	11·5	29	1	11	24·5
71	Leaves of fir (*Pinus Abies*), raised on Jura, June 20		29		16	12·27	43·5	2·5	1·6	24·13
72	Ditto, raised on Breven, June 27				15	12	29	19	5·5	19·5
73	Branches of pine, June 20		29		15					
74	Whortleberry, (*Vaccinium Myrtillus*)		15							
	raised on Jura, August 29		26		17	18	42	0·5	3·12	19.38
75	Ditto, raised on Breven		22		24	22	22	5	9·5	17·5

To separate sugar and extract, the alcohol must be evaporated till crystals begin to fall down, which are sugar; but they will generally be coloured by some extract, and can only be purified by repeated solutions in alcohol. Extract may be separated from sugar by dissolving the solid, obtained by evaporation from alcohol, in a small quantity of water, and boiling it for a long while in contact with the air. The extract will gradually fall down in the form of an insoluble powder, and the sugar will remain in solution.

If tannin exist in the first solution made by cold water, its separation is easily effected by the process before described. The solution of isinglass must be gradually added, to prevent the existence of an excess of animal jelly in the solution, which might be mistaken for mucilage.

When the vegetable substance, the subject of experiment, will afford no more principles to cold water, it must be exposed to boiling water. This will unite to starch, if there be any, and may likewise take up more sugar, extract, and tannin, provided they be intimately combined with the other principles of the compound.

The mode of separating starch is similar to that of separating mucilage.

If after the action of hot water any thing remain, the action of boiling alcohol is then to be tried. This will dissolve resinous matter; the quantity of which may be known by evaporating the alcohol.

The last agent that may be applied is ether, which dissolves elastic gum, though the application is scarcely ever necessary; for if this principle be present, it may be easily detected by its peculiar qualities.

If any fixed oil or wax exist in the vegetable substance, it will separate during the process of boiling in water, and may be collected. Any substance not acted upon by water, alcohol, or ether, must be regarded as woody fibre.

If volatile oils exist in any vegetable substances, it is evident they may be procured, and their quantity ascertained, by distillation.

When the quantity of fixed saline, alkaline, metallic, or earthy matter in any vegetable compound is to be ascertained, the compound must be decomposed by heat, by exposing it, if a fixed substance, in a crucible, to a long continued red heat; and if a volatile substance, by passing it through an ignited porcelain tube. The nature of the matter so produced may be learned by applying the tests mentioned in Lecture IV.

The only analyses in which the agricultural chemist can often wish to occupy himself, are those of substances containing principally starch, sugar, gluten, oils, mucilage, albumen, and tannin.

The two following statements will afford an idea of the manner in which the results of experiments may be arranged.

The first is a statement of the composition of ripe peas, deduced from experiments made by Einhof; the second is of the products afforded by oak bark, deduced from experiments conducted by myself.

	Parts.
3840 parts of ripe peas afford of starch -	1265
Fibrous matter analogous to starch, with the coats of the peas -	840
A substance analogous to gluten	
Mucilage - - - -	249
Saccharine matter - - -	81
Albumen - - - -	66
Volatile matter - - -	540
Earthy phosphates - - -	11
Loss - - - -	229

1000 parts of dry oak bark, from a small tree deprived of epidermis, contain,

Of Woody Fibre - - -	876
Tannin - - - -	57
Extract - - - -	31
Mucilage - - - -	18
Matter rendered insoluble during evaporation, probably a mixture of albumen and extract -	9
Loss, partly saline matter - -	29

To ascertain the primary elements of the different vegetable principles, and the proportions in which they are combined, different methods of analysis have been adopted. The most simple are their decomposition by heat, or their formation into new products by combustion.

When any vegetable principle is acted on by a strong red heat, its elements become newly arranged. Such of them as are volatile are expelled in the gaseous form; and are either condensed as fluids, or remain permanently elastic. The fixed remainder is either carbonaceous, earthy, saline, alkaline, or metallic matter.

To make correct experiments on the decomposition of vegetable substances by heat, requires a complicated apparatus, much time and labor, and all the resources of the philosophical chemist; but such results as are useful to the agriculturist may be easily obtained. The apparatus necessary, is a green glass retort, attached by cement to a receiver, connected with a tube passing under an inverted jar of known capacity, filled with water.* A given weight of the substance is to be heated to redness, in the retort over a charcoal fire; the receiver is to be kept cool, and the process continued as long as any elastic matter is generated. The condensible fluids will collect in the receiver, and the fixed residuum will be found in the retort. The fluid products of the distillation of vegetable substances are principally water, with some acetous and mucous acids, and empyreumatic oil, or tar, and in some cases ammonia. The gases are carbonic acid gas, carbonic oxide, and carburetted hydrogen; sometimes with olefiant gas, and hydrogen; and sometimes, but more rarely, with azote. Carbonic acid is the only one of those gases rapidly absorbed by water; the rest are inflammable; olefiant gas burns with a bright white light; carburetted hydrogen with a light like wax; carbonic oxide with a feeble blue flame. The properties of hydrogen and azote have been described in the last lecture. The specific gravity of carbonic acid gas, is to that of air as 20.7, to 13.7, and it consists of one proportion of carbon 11.4, and two of oxygen 30. The specific gravity of gaseous oxide of carbon, is, taking the same standard, 13.2, and it consists of one proportion of carbon, and one of oxygen.

* See Fig. 14.

The specific gravities of carburetted hydrogen and olefiant gas, are respectively 8 and 13; both contain four proportions of hydrogen; the first contains one proportion, the second two proportions of carbon.

If the weight of the carbonaceous residuum be added to the weight of the fluids condensed in the receiver, and they be subtracted from the whole weight of the substance, the remainder will be the weight of the gaseous matter.

The acetous and mucous acids, and the ammonia formed, are usually in very small quantities; and by comparing the proportions of water and charcoal with the quantity of the gases, taking into account their qualities, a general idea may be formed of the composition of the substance. The proportions of the elements in the greater number of the vegetable substances which can be used as food, have been already ascertained by philosophical chemists, and have been stated in the preceding pages; the analysis by distillation, may, however, in some cases, be useful in estimating the powers of manures, in a manner that will be explained in a future lecture.

The statements of the composition of vegetable substances, quoted from MM. Gay Lussac and Thenard, were obtained by these philosophers by exposing the substances to the action of heated chlorate of potassa; a body that consists of potassium, chlorine, and oxygen; and which afforded oxygen to the carbon and the hydrogen. Their experiments were made in a peculiar apparatus, and required great caution, and were of a very delicate nature. It will not therefore be necessary to enter upon any details of them.

It is evident from the whole tenor of the statements which have been made, that the most essential vegetable substances consist of hydrogen, carbon, and oxygen in different proportions, generally alone, but in some few cases combined with azote. The acids, alkalies, earths, metallic oxides, and saline compounds, though necessary in the vegetable economy, must be considered as of less importance, particularly in their relation to agriculture, than the other principles; and as it appears from M. de Saussure's table, and from other experiments, they differ in the same species of vegetable when it is raised on different soils.

MM. Gay Lussac and Thenard have deduced three propositions, which they have called *laws*, from their experiments on vegetable substances. *The first* is, "That a vegetable substance is always acid whenever the oxygen it contains is to the hydrogen in a greater proportion than in water."

The third, "That a vegetable substance is neither acid nor resinous, but is either saccharine or mucilaginous, or analogous to woody fibre or starch, whenever the oxygen and hydrogen in it are in the same proportions as in water."

The second, "That a vegetable substance is always resinous, or oily or spirituous, whenever it contains oxygen in a smaller proportion to the hydrogen than exists in water."

New experiments upon other vegetable substances, besides those examined by MM. Gay Lussac and Thenard, are required before these interesting conclusions can be fully admitted. Their researches establish, however, the close analogy between several vegetable compounds differing in their sensible qualities, and combined with those of other chemists, offer simple explanations of several processes in nature and art, by which different vegetable substances are converted into each other, or changed into new compounds.

Gum and sugar, excluding the different proportions of water they may contain, afford nearly the same elements by analysis; and starch differs from them only in containing a little more carbon. The peculiar properties of gum and sugar must depend chiefly upon the different arrangement, or degree of condensation of their elements; and it would be natural to conceive, from the composition of these bodies, as well as that of starch, that all three would be easily convertible one into the other; which is actually the case.

At the time of the ripening of corn, the saccharine matter in the grain, and that carried from the sap vessels into the grain, become coagulated, probably simply by losing water, and form starch. And in the process of malting, the converse change occurs. The starch of grain is converted into sugar. As there is a little absorption of oxygen, and a formation of carbonic acid in this case, it is likely that the starch loses a little carbon, which combines with the oxygen to form carbonic acid; and probably the oxygen tends to acidify the gluten of the grain, and thus breaks down the texture of the starch; gives a new arrangement to its elements, and renders it soluble in water.

Mr. Cruikshank, by exposing syrup to a substance named phosphuret of lime, which has great tendency to decompose water, converted a part of the sugar into a matter analogous to mucilage. And M. Kirchhoff, recently, has converted starch into sugar by a very simple process, that of boiling in very diluted sulphuric acid.* The proportions are 100 parts of starch, 400 parts of water, and 1 part of the sulphuric acid by weight. This mixture is to be kept boiling for 40 hours; the loss of water by evaporation being supplied by new quantities. The acid is to be neutralized by lime; and the sugar crystallized by cooling. This experiment has been tried with success by many persons. Sir C. Tuthill, from a pound and a half of potato starch, procured a pound and a quarter of crystalline, brown sugar; which he conceives possessed properties intermediate between cane-sugar, and grape-sugar.

It is probable, from the experiments of M. Theodore de Saussure, that conversion of starch into sugar, in this experiment, is effected merely by its combination with water; for his experiments prove that the acid is not decomposed, and that no elastic matter is set free, and that the sugar weighs more than the starch from which it is formed: probably the color of the sugar, is owing to the disengagement or new combination of a little carbon, the slight excess of which, as has been just stated, constitutes the only difference (independent of the different quantities of water they may contain) perceptible by analysis between sugar and starch.

M. Bouillon la Grange, by slightly roasting starch, has rendered it soluble in cold water; and the solution evaporated afforded a substance, having the characters of mucilage. And by experiments similar to those of M. Kirchhoff, M. Braconnot has lately shown that saccharine and mucilaginous substances may be procured from various forms of woody fibre; and I have seen specimens of soft sugar made from linen rags.

Gluten and albumen differ from the other vegetable products, principally by containing azote. When gluten is kept long in water, it undergoes fermentation; ammonia (which contains its azote) is given off with acetic acid; and a fatty matter and a substance analogous to woody fibre remain.

Extract, tannin, and gallic acid, when their solutions are long exposed to air, deposite a matter similar to woody fibre; and the solid substances are rendered analogous to woody fibre, by slight roasting; and in these cases it is probable that part of their oxygen and hydrogen is separated as water.

All the other vegetable principles differ from the vegetable acids in containing more hydrogen and carbon, or less oxygen; many of them, therefore, are easily converted into vegetable acids by a mere subtraction of some proportions of hydrogen. The vegetable acids, for the most part, are convertible into each other by easy processes. The oxalic contains most oxygen; the acetic the least: and this last substance is easily formed by the distillation of other vegetable substances, or by the action of the atmosphere on such of them as are soluble in water; probably by the mere combination of oxygen with hydrogen and carbon, or in some cases by the subtraction of a portion of hydrogen.

Alcohol, or spirits of wine, has been often mentioned in the course of these lectures. This substance was not described amongst the vegetable principles, because it has never been found ready formed in the organs of plants. It is procured by a change in the principles of saccharine matter, in a process called vinous fermentation.

The expressed juice of the grape contains sugar, mucilage, gluten, and some saline matter, principally composed of tartaric acid: when this juice, or *must*, as it is commonly called, is exposed to the temperature of about 70°, the fermentation begins; it becomes thick and turbid; its temperature increases, and carbonic acid gas is disengaged in abundance. In a few days the fermentation ceases; the solid matter that rendered the juice turbid falls to the bottom, and it clears; the sweet taste of the fluid is in great measure destroyed, and it is become spirituous.

Fabroni has shown that the gluten in must is essential to fermentation; and that chemist has made saccharine matter ferment, by adding to its solution in water, common vegetable gluten and tartaric acid. Gay Lussac has demonstrated that must will not ferment when freed from air by boiling, and placed out of the contact of oxygen; but that fermentation begins as soon as it is exposed to the oxygen of air, a little of that principle being absorbed; and that it then continues independent of the presence of the atmosphere.*

* Some kinds of vinegar, especially those made from sugar, are converted into an insoluble substance resembling lignin, or the principle of the woody fibre, by exposure to the atmosphere. This I have witnessed in many instances; the new substance which is like lignin, forms on the surface of the vinegar, and leaves a dense strong crust, occasionally in appearance not unlike the buffy coat of blood.—J. D.

* Farther experiments appear to be required on this subject. I have not found the fermentation of must prevented either by immersing in it phosphorus in a close vessel, or by agitating it, in contact with a minute portion of nitrous gas.—J. D.

In the manufacture of ale and porter, the sugar formed during the germination of barley is made to ferment by dissolving it in water with a little yeast, which contains gluten in the state proper for producing fermentation, and exposing it to the requisite temperature; carbonic acid gas is given off as in the fermentation of must, and the liquor gradually becomes spirituous.

Similar phenomena occur in the fermentation of the sugar in the juice of apples and other ripe fruits. It appears that fermentation depends entirely upon a new arrangement of the elements of sugar; part of the carbon uniting to oxygen to form carbonic acid, and the remaining carbon, hydrogen, and oxygen combining as alcohol; and the use of the gluten or yeast, and the primary exposure to air, seems to be to occasion the formation of a certain quantity of carbonic acid; and this change being once produced is continued; its agency may be compared to that of a spark in producing the inflammation of gunpowder; the increase of temperature occasioned by the formation of one quantity of carbonic acid occasions the combination of the elements of another quantity.

From the experiments of M. Theodore de Saussure it appears that alcohol is composed of 100 parts of olefiant (or percarburetted hydrogen gas), and of 63.58 water, or oxygen and hydrogen in the proportions necessary to form water.

Alcohol, in its purest known form, is a highly inflammable liquid, of specific gravity 796, at the temperature of 60°; it boils at about 170° Fahrenheit. This alcohol is obtained by repeated distillation of the strongest common spirit from the salt called by chemists muriate of lime, it having been previously heated red hot.

The strongest alcohol obtained by the distillation of spirit without salts has seldom a less specific gravity than 825 at 60°; and it contains, according to Lowitz's experiments, 89 parts of the alcohol of 796, and 11 parts of water. The spirit established as *proof spirit* by act of parliament passed in 1762 ought to have the specific gravity of 916; and this contains nearly equal weights of pure alcohol and water.

The alcohol in fermented liquors is in combination with water, coloring matter, sugar, mucilage, and the vegetable acids. It has been often doubted whether it can be procured by any other process than distillation; and some persons have even supposed that it *is formed* by distillation. The experiments of Mr. Brande are conclusive against both these opinions. That gentleman has shown that the coloring and acid matter in wines may be, for the most part, separated in a solid form by the action of a solution of sugar of lead (acetate of lead,) and that the alcohol may be then obtained by abstracting the water by means of hydrate of potassa or muriate of lime, without artificial heat.

The intoxicating powers of fermented liquors depend on the alcohol that they contain; but their action on the stomach is modified by the acid, saccharine, or mucilaginous substances they hold in solution. Alcohol probably acts with most efficacy when it is most loosely combined; and its energy seems to be impaired by union with large quantities of water, or with sugar or acid, or extractive matter.

The table in the following page contains the results of Mr. Brande's experiments on the quantity of alcohol of 825 at 60°, in different fermented liquors.

The spirits distilled from different fermented liquors differ in their flavor: for peculiar odorous matter, or volatile oils, rise in most cases with the alcohol. The spirit from malt usually has an empyreumatic taste like that of the oil, formed by the distillation of vegetable substances. The best brandies seem to owe their flavor to a peculiar oily matter, formed probably by the action of the tartaric acid on alcohol; and rum derives its characteristic taste from a principle in the sugar cane. All the common spirits may, I find, be deprived of their peculiar flavour by repeatedly digesting them with a mixture of well-burnt charcoal and quicklime; they then afford pure alcohol by distillation. The cognac brandies, I find, contain vegetable prussic acid, and their flavour may be imitated by adding to a solution of alcohol in water of the same strength, a few drops of the ethereal oil of wine produced during the formation of ether,* and a similar quantity of vegetable prussic acid procured from laurel leaves or any bitter kernels.

I have mentioned *ether* in the course of this Lecture; this substance is procured from alcohol by distilling a mixture of equal parts of alcohol and sulphuric acid. It is the lightest known liquid substance, being of specific gravity 632 at 60°. It is very volatile and rises in vapor, even by the heat of the body. It is highly inflammable. In the formation of ether it is most probable, from the experiments of M. de Saussure, that the elements of water merely are separated from the alcohol by the sulphuric acid, and that ether differs from alcohol in containing a larger proportion of carbon and hydrogen. Like alcohol, it possesses intoxicating powers.

A number of the changes taking place in the vegetable principles depend upon the separation of oxygen and hydrogen as water from the compound; but there is one of very great importance, in which a new combination of the elements of water is the principal operation. This is in the manufacture of bread. When any kind of flour, which consists principally of starch, is made into a paste with water, and immediately and gradually heated to about 440°, it increases in weight, and is found entirely altered in its properties; it has lost its solubility in water, and its power of being converted into sugar. In this state it is unleavened bread.

When the flour of corn or the starch of potatoes, mixed with boiled potatoes, is made into a paste with water, kept warm, and suffered to remain 30 or 40 hours, it ferments, carbonic acid gas is disengaged from it, and it becomes filled with globules of elastic fluid. In this state it is raised dough, and affords, by baking, leavened bread; but this bread is sour and disagreeable to the taste; and leavened bread for use is made by mixing a little dough, that has fermented, with new dough, and kneading them together, or by kneading the bread with a small quantity of yeast.

In the formation of wheaten bread, more than one quarter of the elements of water combine

* In the process of the distillation of alcohol and sulphuric acid after the ether is procured; by a higher degree of heat, a yellow fluid is produced; which is the substance in question. It has a fragrant smell and an agreeable taste.

Wine.	Proportion of Alcohol, per cent. by measure.	Wine.	Proportion of Alcohol, per cent. by measure.
Port	19.00	Frontignac	12.79
Ditto	21.40	Coti Roti	12.32
Ditto	22.30	Rousillon	17.26
Ditto	33.39	Ditto	19.00
Ditto	23.71	Cape Madeira	18.11
Ditto	24.29	Ditto	20.50
Ditto	25.83	Ditto	22.94
Average	22.96	Cape Muscat	18.25
Madeira	19.24	White Constantia	19.75
Ditto (Sercial)	21.40	Red Constantia	18.92
Ditto	23.93	Tent	13.30
Ditto	24.42	Sheraaz	15.52
Average	22.27	Syracuse	15.28
Sherry	18.25	Nice	14.63
Ditto	18.79	Tokay	9.88
Ditto	19.81	Lissa	26.47
Ditto	19.83	Ditto	24.35
Average	19.17	Teneriffe	19.79
Claret	12.91	Colares	19.75
Ditto	14.08	Lachryma Christi	19.70
Ditto	16.32	Vidonia	19.25
Ditto	17.11	Alba flora	17.26
Average	15.10	Zante	17.05
Calcavella	18.10	Lunel	15.52
Ditto	19.20	Sautern	14 22
Lisbon	18.94	Barsac	13.86
Malaga	17.26	Raisin Wine	25.77
Ditto	18.94	Ditto	26.40
Bucellas	18.49	Ditto	23.20
Red Madeira	18.40	Orange Wine	11.26
Ditto	22.30	Grape Wine	18.11
Malmsey Madeira	16.40	Currant Wine	20.55
Marsala	25.05	Gooseberry Wine	11.84
Ditto	26.03	Elder Wine	8.79
Red Champagne	11.30	Mead	7.32
Ditto	12.56	Cider	9.87
White Champagne	12.80	Ditto	5.21
Still Champagne	13.80	Perry	7.26
Burgundy	14.53	Brown Stout	6.80
Ditto	11.95	Ale (Burton)	8.88
Ditto	15.22	Edinburgh	6.20
Ditto	16.80	Dorchester	5.56
White Hermitage	17.43	London Porter	4.20
Red Hermitage	12.32	Small Beer	1.28
Hock	14.37	Brandy	53.39
Ditto	13.00	Rum	53.68
Ditto	8.88	Hollands	51.60
Vin de Grave	12.80	Scotch Whiskey	54.32
Ditto	13.94	Irish Whiskey	53.90

with the flour; more water is consolidated in the formation of bread from barley, and still more in that from oats; but the gluten in wheat, being in much larger quantity than in other grain, seems to form a combination with the starch and water, which renders wheaten bread more digestible than the other species of bread.*

The arrangement of many of the vegetable principles in the different parts of plants has been incidentally mentioned in this lecture; but a more particular statement is required to afford just views of the relation between their organization and chemical constitution, which is an object of great importance. The tubes and hexagonal cells in the vascular system of plants are composed of woody fibre; and when they are not filled with fluid matter they contain some of the solid materials which formed a constituent part of the fluids belonging to them.

In the roots, trunk, and branches, the bark, alburnum, and heart-wood, the leaves and flowers, the great basis of the solid parts is woody fibre. It forms by far the greatest part of the heart-wood and bark; there is less in the alburnum, and still less in the leaves and flowers. The alburnum of the birch contains so much sugar and mucilage, that it is sometimes used in the north of Europe as a substitute for bread. The leaves of the cabbage, broccoli, and seacale, contain much mucilage, and a little saccharine matter,

* In the process of the conversion of flour into bread, it has lately been ascertained that alcohol is formed as well as carbonic acid; thus approaching the panary fermentation (as the raising of bread has been sometimes called), to the vinous. But the proportion of alcohol produced appears to be small. What the changes effected are have not yet been thoroughly investigated, especially of the gluten.—J. D.

and a little albumen. From 1000 parts of the leaves of common cabbage, I obtained 41 parts of mucilage, 24 of sugar, and 8 of albuminous matter.

In bulbous roots, and sometimes in common roots, a large quantity of starch, albumen, and mucilage are often found deposited in the vessels; and they are most abundant after the sap has ceased to flow; and afford a nourishment for the early shoots made in spring. The potato is the bulb that contains the largest quantity of soluble matter in its cells and vessels; and it is of most importance in its application as food. Potatoes in general afford from one-fifth to one-seventh their weight of dry starch. From 100 parts of the common *Kidney potato*, Dr. Pearson obtained from 32 to 28 parts of meal, which contained from 23 to 20 of starch and mucilage; and 100 parts of the *Apple potato* in various experiments, afforded me from 18 to 20 parts of pure starch. From five pounds of the variety of the potato called *Captain hart*, Mr. Skrimshire, jun. obtained 12 ounces of starch, from the same quantity of the *Rough red* potato $10\frac{1}{2}$ ounces, from the *Moulton white* $11\frac{3}{4}$, from the *Yorkshire kidney*, $10\frac{3}{4}$ ounces, from *Hundred eyes* 9 ounces, from *Purple red* $8\frac{1}{2}$, from *Ox noble* $8\frac{1}{4}$. The other soluble substances in the potato are albumen and mucilage.

From the analysis of Einhoff it appears that 7680 parts of potato afford,

Of Starch - - -	1153
— Fibrous matter analogous to starch	540
— Albumen - - -	107
— Mucilage in the state of a saturated solution - - -	312
	2122

So that a fourth part of the weight of the potato at least may be considered as nutritive matter. Mr. Knight informs me, that he has found the best potatoes, such as the Irish apple, to possess much greater specific gravity than the inferior varieties; the specific gravity varying from 1075 to 1100, and it is probable that their nutritive properties are nearly proportionate to their specific gravities.

The turnip, carrot, and parsnip, afford principally saccharine, mucilaginous, and extractive matter. I obtained from 1000 parts of common turnips, 7 parts of mucilage, 34 of saccharine matter, and nearly 1 part of albumen. 1000 parts of carrots furnished 95 parts of sugar, 3 parts of mucilage, and $\frac{1}{2}$ part of extract; 1000 parts of parsnip afforded 90 parts of saccharine matter, and 9 parts of mucilage. The *Walcheren* or *white carrot*, gave, in 1000 parts, 98 parts of sugar, 2 parts of mucilage, and 1 of extract.

Fruits, in the organization of their soft parts, approach to the nature of bulbs. They contain a certain quantity of nourishment laid up in their cells for the use of the embryon plant; mucilage, sugar, starch, are found in many of them often combined with vegetable acids. Most of the fruit trees common in Britain have been naturalized on account of the saccharine matter they contain, which, united to the vegetable acids and mucilage, renders them at once agreeable to the taste, and nutritive.

The value of fruits for the manufacture of fermented liquors, may be judged of from the specific gravity of their expressed juices; but the quantity of juice and the consistence of the pulp differ widely in different species of fruits, and therefore the specific gravity of the fruit will not always indicate the value of its fermented produce. The best cider and perry are made from those apples and pears that afford the densest juices; and a comparison between different fruits may be made with tolerable accuracy by plunging them together into a saturated solution of salt, or a strong solution of sugar; those that sink deepest will afford the richest juice.*

Starch or coagulated mucilage forms the greatest part of the seeds and grains used for food; and they are generally combined with gluten, oil, or albuminous matter. In corn, with gluten; in peas and beans, with albuminous matter; and in rape seed, hemp seed, linseed, and the kernels of most nuts, with oils.

I found 100 parts of good full-grained wheat sown in autumn, to afford

Of Starch - -	77
— Gluten - -	19

100 parts of wheat sown in spring,

Of Starch - -	70
— Gluten - -	24

100 parts of Barbary wheat,

Of Starch - -	74
— Gluten - -	23

100 parts of Sicilian wheat,

Of Starch - -	75
— Gluten - -	21

I have examined different specimens of North American wheat; all of them have contained rather more gluten than the British. In general, the wheat of warm climates abounds more in gluten, and in insoluble parts; and it is of greater specific gravity, harder, and more difficult to grind.

The wheat of the south of Europe, in consequence of the larger quantity of gluten it contains, is peculiarly fitted for making macaroni, and other preparations of flour, in which a glutinous quality is considered as an excellence.

In some experiments made on barley, I obtained from 100 parts of full and fair Norfolk barley,

Of Starch - - - - -	79
— Gluten - - - -	6
— Husk - - - -	8

The remaining 7 parts saccharine matter. The sugar in barley is probably the chief cause why it is more proper for malting than any other species of grain.

Einhoff has published a minute analysis of barley meal. He found in 3840 parts,

Of volatile matter - -	360
— Albumen - - -	44
— Saccharine matter - -	200
— Mucilage - - -	176
— Phosphate of lime, with some albumen	9
— Gluten - - -	135
— Husk, with some gluten and starch	260
— Starch not quite free from gluten	2580
— Loss - - - - -	78

* The specific gravity of the expressed juice of the water melon, the most succulent of fruits, exceeds very little that of distilled water. One specimen of water melon, which I examined in Malta, yielded 97 parts of water, and 3 of solid matter, principally saccharine and mucilaginous.—J. D.

Rye afforded to Einhoff, in 3840 parts, 2520 meal, 930 husk, and 390 moisture; and the same quantity of meal analysed gave,

Of Starch - - -	2345
— Albumen - - -	116
— Mucilage - - -	426
— Saccharine matter - -	126
— Gluten not dried - -	364

Remainder husk and loss.

I obtained from 1000 parts of rye, grown in Suffolk, 61 parts of starch, and 5 parts of gluten.

100 parts of oats, from Sussex afforded me 59 parts of starch, 6 of gluten, and 2 of saccharine matter.

1000 parts of peas, grown in Norfolk, afforded me 501 parts of starch, 22 parts of saccharine matter, 35 parts of albuminous matter, and 16 parts of extract, which became insoluble during evaporation of the saccharine fluid.

From 3840 parts of marsh beans (*Vicia faba*), Einhoff obtained,

Of Starch - - -	1312
—Albumen - - - -	31
— Other matters which may be conceived nutritive; such as gummy, starchy, fibrous matter analogous to animal matter - - -	1204

The same quantity of kidney beans (*Phaseolus vulgaris*), afforded,

Of matter analogous to starch -	1805
— Albumen and matter approaching to animal matter in its nature	851
—Mucilage - - -	799

From 3840 parts of lentiles, he obtained 1260 parts of starch, and 1433 of a matter analogous to animal matter.

The matter analogous to animal matter is described by Einhoff, as a glutinous substance insoluble in water; soluble in alcohol; when dry, having the appearance of glue; probably a peculiar modification of gluten.

From 16 parts of hemp seed, Bucholz obtained 3 parts of oil, $3\frac{1}{2}$ parts of albumen, about $1\frac{3}{4}$ of saccharine and gummy matter. The insoluble husks and coats of the seed weighed $6\frac{1}{8}$ parts.

The different parts of flowers contain different substances: the pollen, or impregnating dust of the date, has been found by Fourcroy and Vauquelin to contain a matter analogous to gluten, and a soluble extract abounding in malic acid. Link found in the pollen of the hazel-tree, much tannin and gluten.

Saccharine matter is found in the nectarium of flowers, or the receptacles within the corolla, and by tempting the larger insects into the flowers, it renders the work of impregnation more secure; for the pollen is often by their means applied to the stigma; and this is particularly the case when the male and female organs are in different flowers or different plants.

It has been stated, that the fragrance of flowers depends upon the volatile oils they contain; and these oils, by their constant evaporation, surround the flower with a kind of odorous atmosphere; which at the same time that it entices larger insects, may probably preserve the parts of fructification from the ravages of smaller ones. Volatile oils, or odorous substances, seem particularly destructive to these minute insects and animalcules which feed on the substance of vegetables; thousands of aphides may be usually seen in the stalk and leaves of the rose; but none of them are ever observed on the flower. Camphor is used to preserve the collections of naturalists. The woods that contain aromatic oils are remarked for their indestructibility; and for their exemption from the attacks of insects: this is particularly the case with the cedar, rose-wood, and cypress. The gates of Constantinople, which were made of this last wood, stood entire from the time of Constantine, their founder, to that of Pope Eugene IV., a period of 1100 years.

The petals of many flowers afford saccharine and mucilaginous matter. The white lily yields mucilage abundantly; and the orange lily a mixture of mucilage and sugar; the petals of the convolvulus afford sugar, mucilage, and albuminous matter.

The chemical nature of the coloring matters of flowers has not as yet been subject to any very accurate observation. These coloring matters, in general, are very transient, particularly the blues and reds; alkalies change the colors of most flowers to green, and acids to red. An imitation of the coloring matter may be made by digesting solutions of gall-nuts with chalk: a green fluid is obtained, which becomes red by the action of an acid; and has its green color restored by means of alkalies.

The yellow coloring matters of flowers are the most permanent; the carthamus contains a red and a yellow coloring matter; the yellow coloring matter is easily dissolved by water, and from the red, rouge is prepared by a process which is kept secret.

The same substances as exist in the solid parts of plants are found in their fluids, with the exception of woody fibre. Fixed and volatile oils, containing resin or camphor, or analogous substances in solution, exist in the cylindrical tubes belonging to a number of plants. Different species of euphorbia emit a milky juice, which when exposed to air deposites a substance analogous to starch, and another similar to gluten.

Opium, gum elastic, gamboge, the poisons of the *Upas antiar* and *Tieute*, and other substances that exude from plants, may be considered as peculiar juices belonging to appropriate vessels.

The sap of plants, in general, is very compound in its nature; and contains more saccharine, mucilaginous, and albuminous matter in the alburnum; and most tannin and extract in the bark. The cambium, which is the mucilaginous fluid found in trees between the wood and the bark, and which is essential to the formation of new parts, seems to be derived from these two kinds of sap; and probably is a combination of the mucilaginous and albuminous matter of one, with the astringent matter of the other, in a state fitted to become organized by the separation of its watery parts.

The alburnous saps of some trees have been chemically examined by Vauquelin. He found in those of the elm, beech, yoke elm, hornbeam, and birch, extractive and mucilaginous matter, and acetic acid combined with potassa or lime. The solid matter afforded by their evaporation yielded an ammoniacal smell, probably owing to albumen: the sap of the birch afforded saccharine matter.

Deyeux in the sap of the vine and the yoke elm has detected a matter analogous to the curd of milk. I found a substance similar to albumen in the sap of the walnut tree.

I found the juice which exudes from the vessels of the marshmallow when cut, to be a solution of mucilage.

The fluids contained in the sap vessels of wheat and barley, afforded in some experiments which I made on them, mucilage, sugar, and a matter which coagulated by heat; which last was most abundant in wheat.

The following table contains a statement of the quantity of soluble or nutritive matters existing in varieties of the different substances that have been mentioned, and of some others which are used as articles of food, either for man or cattle. The analyses are my own; and were conducted with a view to a knowledge of the general nature and quantity of the products, and not of their intimate chemical composition. The soluble matters afforded by the grasses, except that from the fiorin in winter, were obtained by Mr. Sinclair, gardener to the Duke of Bedford, from given weights of the grasses cut when the seeds were ripe; they were sent to me by his Grace's desire for chemical examination, and form part of the results of an important and extensive series of experiments on grasses made by direction of the Duke, at Woburn Abbey, when pursuing those plans for the improvement of agriculture, the origin of which have thrown so much glory on the memory of his illustrious brother.

Table of the Quantities of soluble or nutritive Matters afforded by 1000 *Parts of different vegetable Substances.*

Vegetables or vegetable Substance.	Whole Quantity of soluble or nutritive matter.	Mucilage or Starch.	Saccharine matter or Sugar.	Gluten or Albumen.	Extract or matter rendered insoluble during evaporation.
Middlesex wheat, average crop	955	765	—	190	
Spring wheat	940	700	—	240	
Mildewed wheat of 1806	210	178	—	32	
Blighted wheat of 1804	650	520	—	130	
Thick-skinned Sicilian wheat of 1810	955	725	—	230	
Thin-skinned Sicilian wheat of 1810	961	722	—	239	
Wheat from Poland	950	750	—	200	
North American wheat	955	730	—	225	
Norfolk barley	920	790	70	60	
Oats from Scotland	743	641	15	87	
Rye from Yorkshire	792	645	38	109	
Common bean	570	426	—	103	41
Dry peas	574	501	22	35	16
Potatoes	from 260 to 200	from 200 to 155	from 20 to 15	from 40 to 30	
Linseed cake	151	123	11	17	
Red beet	148	14	121	13	
White beet	136	13	119	4	
Parsnip	99	9	90		
Carrots	98	3	95		
Common turnips	42	7	34	1	
Swedish turnips	64	9	51	2	2
Cabbage	73	41	24	8	
Broad-leaved clover	39	31	3	2	3
Long-rooted clover	39	30	4	3	2
White clover	32	29	1	3	5
Sainfoin	39	28	2	3	6
Lucerne	23	18	1	—	4
Meadow fox-tail grass	33	24	3	—	6
Perennial rye grass	39	26	4	—	5
Fertile meadow grass	78	65	6	—	7
Roughish meadow grass	39	29	5	—	6
Crested dog's-tail grass	35	28	3	—	4
Spiked fescue grass	19	15	2	—	2
Sweet-scented soft grass	82	72	4	—	6
Sweet-scented vernal grass	50	43	4	—	3
Fiorin	54	46	5	1	2
Fiorin cut in winter	76	64	8	1	3

All these substances were submitted to experiment green, and in their natural states. It is probable that the excellence of the different articles, as food, will be found to be in a great measure proportional to the quantities of soluble or nutritive matters they afford; but still these quantities cannot be regarded as *absolutely* denoting their value. Albuminous or glutinous matters have the characters of animal substances; sugar is more nourishing, and extractive matter less nourishing, than any other principles composed of carbon, hydrogen, and oxygen. Certain combinations likewise of these substances may be more nutritive than others.

I have been informed by Sir Joseph Banks, that the Derbyshire miners, in winter, prefer oat-cakes to wheaten bread; finding that this kind of nourishment enables them to support their strength and perform their labour better. In summer, they say oat-cake heats them, and they then consume the finest wheaten bread they can procure. Even the skin of the kernel of oats probably has a nourishing power, and is rendered partly soluble in the stomach with the starch and gluten. In most countries of Europe, except Britain, and in Arabia, horses are fed with corn of different kinds, mixed with chopped straw; and the chopped straw seems to act the same part as the husk of the oat. In the mill 14 lbs. of good wheat yield on an average 13 lbs. of flour; the same quantity of barley 12 lbs., and of oats only 8 lbs.

In the south of Europe, hard or thin-skinned wheat is in higher estimation, than soft or thick-skinned wheat; the reason of which is obvious, from the larger quantity of gluten and nutritive matter it contains. I have made an analysis of only one specimen of thin-skinned wheat, so that other specimens may possibly contain more nutritive matter than that in the table; the Barbary and Sicilian wheats. before referred to, were thick-skinned wheats. In England, the difficulty of grinding thin-skinned wheat is an objection; but this difficulty is easily overcome by moistening the corn.*

LECTURE IV.

ON SOILS: THEIR CONSTITUENT PARTS. ON THE ANALYSIS OF SOILS. OF THE USES OF THE SOIL. OF THE ROCKS AND STRATA FOUND BENEATH SOILS. OF THE IMPROVEMENT OF SOIL.

No subjects are of more importance to the farmer than the nature and improvement of soils; and no parts of the doctrines of agriculture are more capable of being illustrated by chemical inquiries.

Soils are extremely diversified in appearance and quality; yet, as it was stated in the introductory lecture, they consist of different proportions of the same elements; which are in various states of chemical combination, or mechanical mixture.

The substances which constitute soils have been already mentioned. They are certain compounds of the earths, silica, lime, alumina, magnesia, and of the oxides of iron and manganesum; animal and vegetable matters in a decomposing state, and saline, acid, or alkaline combinations.

In all chemical experiments on the composition of soils connected with agriculture, the constituent parts obtained are compounds; and they act as compounds in nature; it is in this state, therefore, that I shall describe their characteristic properties.

1. *Silica*, or the earth of *flints*, in its pure and crystallized form, is the substance known by the name of rock crystal, or Cornish diamond. As it is procured by chemists, it appears in the form of a white impalpable powder. It is not soluble in the common acids, but dissolves by heat in fixed alkaline lixivia. It is an incombustible substance, for it is saturated with oxygen. I have proved it to be a compound of oxygen and the peculiar combustible body which I have named silicum; and from the experiments of Berzelius, it is probable that it contains nearly equal weights of these two elements.*

2. The sensible properties of *lime* are well known. It exists in soils usually united to carbonic acid, which is easily disengaged from it by the attraction of the common acids. It is sometimes found combined with the phosphoric and sulphuric acids. Its chemical properties and agencies in its pure state will be described in the lecture on manures, obtained from the mineral kingdom. It is soluble in nitric and muriatic acids, and forms a substance with sulphuric acid difficult of solution, called gypsum. It is not soluble in alkaline solutions. It consists of one proportion. 40 of the peculiar metallic substance, which I have named calcium; and one proportion 15 of oxygen.

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* For the following note on this subject I am indebted to the kindness of the Right Hon. Sir Joseph Banks, Bart. K. B.:—

Information received from John Jeffrey, Esq., his Majesty's Consul-General at Lisbon, in answer to Queries transmitted to him, from the Comm. of P. C. for Trade, dated Jan. 12, 1812.

To grind hard corn with the mill-stones used in England, the wheat must be well screened, then sprinkled with water at the miller's discretion, and laid in heaps and frequently turned and thoroughly mixed, which will soften the husk, so as to make it separate from the flour in grinding, and of course give the flour a brighter colour; otherwise the flinty quality of the wheat, and the thinness of the skin, will prevent its separation, and will render the flour unfit for making into bread.

I am informed by a miller of considerable experience, and who works his mills entirely with the stones from England or Ireland, that he frequently prepares the hard Barbary corn by immersing it in water in close wicker baskets, and spreading it thinly on a floor to dry; much depends on the judgment and skill of the miller in preparing the corn for the mill according to its relative quality. I beg to observe, that it is not from this previous process of wetting the corn that the weight in the flour of hard corn is increased; but from its natural quality it imbibes considerably more water in making it into bread. The mill-stones must not be cut too deep, but the furrows very fine, and picked in the usual way. The mills should work with less velocity in grinding hard corn than with soft, and set to work at first with soft corn, till the mill ceases to work well; then put on the hard corn. Hard wheat always sells at a higher price in the market than soft wheat, on an average of ten to fifteen per cent.; as it produces more flour in proportion, and less bran than the soft corn.

Flour made from hard wheat is more esteemed than what is made from soft corn; and both sorts are applied to every purpose.

The flour of hard wheat is in general superior to that made from soft; and there is no difference in the process of making them into bread; but the flour from hard wheat will imbibe and retain more water in making into bread, and will consequently produce more weight of bread: it is the practice here, and which I am persuaded it would be advisable to adopt in England, to make bread with flour of hard and soft wheat, which by being mixed, will make the bread much better.

(Signed) JOHN JEFFREY.

* According to the later experiments of Berzelius, silica consists of 48·4 inflammable basis, and of 51·6 oxygen.—J. D.

3. *Alumina* exists in a pure and crystallized state in the white sapphire, and united to a little oxide of iron and silica in the other oriental gems.

In the state in which it is procured by chemists, it appears as a white powder, soluble in acids and fixed alkaline liquors. From my experiments, it appears that alumina consists of one proportion 33 of aluminum, and one 15 of oxygen.

4. *Magnesia* exists in a pure crystallized state, constituting a mineral like talc found in North America. In its common form it is the *magnesia usta*, or calcined magnesia of druggists. It generally exists in soils combined with carbonic acid. It is soluble in all the mineral acids; but not in alkaline lixivia. It is distinguished from the other earths found in soils by its ready solubility in solutions of alkaline carbonates, saturated with carbonic acid. It appears to consist of 38 magnesium and 15 oxygen.

5. There are two well-known *oxides of iron*, the black and the brown. The black is the substance that flies off when red-hot iron is hammered. The brown oxide may be formed by keeping the black oxide red-hot for a long time in contact with air. The first seems to consist of one proportion of iron 103, and two of oxygen 30: and the second of one proportion of iron 103, and three proportions of oxygen 45. The oxides of iron sometimes exist in soils combined with carbonic acid. They are easily distinguished from other substances by their giving, when dissolved in acids, a black color to solution of galls, and a bright blue precipitate to solution of prussiate of potassa and iron.

6. *The oxide of manganesum* is the substance commonly called manganese, and used in bleaching. It appears to be composed of one proportion of manganesum 113, and three of oxygen 45. It is distinguished from the other substances found in soils, by its property of decomposing muriatic acid, and converting it into chlorine.

7. *Vegetable and animal matters* are known by their sensible qualities, and by their property of being decomposed by heat. Their characters may be learned from the details in the last lecture.

8. The *saline compounds* found in soils, are common salt, sulphate of magnesia, sometimes sulphate of iron, nitrates of lime and of magnesia, sulphate of potassa, and carbonates of potassa and soda.* To describe their characters minutely will be unnecessary: the tests for most of them have been already noticed.

The silica in soils is usually combined with alumina and oxide of iron, or with alumina, lime, magnesia, and oxide of iron, forming gravel and sand of different degrees of fineness. The carbonate of lime is usually in an impalpable form; but sometimes in the state of calcareous sand. The magnesia, if not combined in the gravel and sand of soil, is in a fine powder united to carbonic acid. The impalpable part of the soil, which is usually called clay or loam, consists of silica, alumina, lime, and magnesia; and is, in fact, usually of the same composition as the hard sand, but more finely divided. The vegetable or animal matters (and the first is by far the most common in soils), exist in different states of decomposition. They are sometimes fibrous, sometimes entirely broken down and mixed with the soil.

To form a just idea of soils, it is necessary to conceive different rocks decomposed, or ground into parts and powder of different degrees of fineness, some of their soluble parts dissolved by water, and that water adhering to the mass, and the whole mixed with larger or smaller quantities of the remains of vegetables and animals in different stages of decay.

It will be necessary to describe the processes by which all the varieties of soils may be analyzed. I shall be minute in these particulars, and, I fear, tedious; but the philosophical farmer will, I trust, feel the propriety of full details on this subject.

The instruments required for the analysis of soils are few, and but little expensive. They are, a balance capable of containing a quarter of a pound of common soil, and capable of turning when loaded with a grain; a set of weights from a quarter of a pound troy to a grain; a wire sieve, sufficiently coarse to admit a mustard seed through its apertures; an Argand lamp and stand; some glass bottles; Hessian crucibles; procelain, or queen's ware evaporating basins; a Wedgewood pestle and mortar; some filters made of half a sheet of blotting paper, folded so as to contain a pint of liquid, and greased at the edges; a bone knife, and an apparatus for collecting and measuring aëriform fluids.

The chemical substances or re-agents required for separating the constituent parts of the soil, have, for the most part, been mentioned before; they are muriatic acid *(spirit of salt,)* sulphuric acid, pure volatile alkali dissolved in water, solution of prussiate of potash and iron, succinate of ammonia, soap lie, or solution of potassa, solutions of carbonate of ammonia, or muriate of ammonia, of neutral carbonate of potash, and nitrate of ammoniac.

In cases when the general nature of the soil of a field is to be ascertained, specimens of it shonld be taken from different places, two or three inches below the surface, and examined as to the similarity of their properties. It sometimes happens, that upon plains the whole of the upper stratum of the land is of the same kind, and in this case one analysis will be sufficient; but in valleys, and near the beds of rivers, there are very great differences, and it now and then occurs that one part of a field is calcareous, and another part siliceous; and in this case, and in analogous cases, the portions different from each other should be separately submitted to experiment.

Soils, when collected, if they cannot be immediately examined, should be preserved in phials quite filled with them, and closed with ground-glass stoppers.

The quantity of soil most convenient for a perfect analysis, is from two to four hundred grains. It should be collected in dry weather, and exposed to the atmosphere till it becomes dry to the touch.

The specific gravity of a soil, or the relation of its weight to that of water, may be ascertained by introducing into a phial, which will contain a known quantity of water, equal volumes of water and of soil; and this may be easily done by pouring in water till it is half full, and then adding the soil till the fluid rises to the mouth; the difference

* In some soils, especially in Spain and in Bengal, nitre is an ingredient formed by the intervention of carbonate of lime, by the union of alkali in the soil, and of nitric acid, the elements of which are derived from the atmosphere.—J. D.

between the weight of the soil and that of the water will give the result.* Thus, if the bottle contains four hundred grains of water, and gains two hundred grains when half filled with water and half with soil, the specific gravity of the soil will be 2; that is, it will be twice as heavy as water; and if it gained 165 grains, its specific gravity would be 1825, water being 1000.

It is of importance that the specific gravity of a soil should be known, as it affords an indication of the quantity of animal and vegetable matter it contains; these substances being always most abundant in the lighter soils.

The other physical properties of soils should likewise be examined before the analysis is made, as they denote, to a certain extent, their composition, and serve as guides in directing the experiments. Thus, siliceous soils are generally rough to the touch, and scratch glass when rubbed upon it; ferruginous soils are of a red or yellow colour; and calcareous soils are soft.†

1. Soils, though as dry as they can be made by continued exposure to air, in all cases still contain a considerable quantity of water, which adheres with great obstinacy to the earths and animal and vegetable matter, and can only be driven off from them by a considerable degree of heat. The first process of analysis is, to free the given weight of soil from as much of this water as possible, without in other respects affecting its composition; and this may be done by heating it for ten or twelve minutes over an Argand's lamp, in a basin of porcelain, to a temperature equal to 300 Fahrenheit; and if a thermometer is not used, the proper degree may be easily ascertained, by keeping a piece of wood in contact with the bottom of the dish; as long as the color of the wood remains unaltered, the heat is not too high; but when the wood begins to be charred, the process must be stopped. A small quantity of water will, perhaps, remain in the soil even after this operation, but it always affords useful comparative results; and if a higher temperature were employed, the vegetable or animal matter would undergo decomposition, and in consequence the experiment be wholly unsatisfactory.

The loss of weight in the process should be carefully noted, and when in 400 grains of soil it reaches as high as 50, the soil may be considered as in the greatest degree absorbent, and retentive of water, and will generally be found to contain much vegetable or animal matter, or a large proportion of aluminous earth. When the loss is only from 20 to 10, the land may be considered as only slightly absorbent and retentive, and siliceous earth probably forms the greatest part of it.

2. None of the loose stones, gravel, or large vegetable fibres, should be divided from the pure soil till after the water is drawn off; for these bodies are themselves often highly absorbent and retentive, and, in consequence, influence the fertility of the land. The next process, however, after that of heating, should be their separation, which may be easily accomplished by the sieve, after the soil has been gently bruised in a mortar. The weights of the vegetable fibres or wood, and of gravel and stones, should be separately noted down, and the nature of the last ascertained; if calcareous, they will effervesce with acids; if siliceous, they will be sufficiently hard to scratch glass; and if of the common aluminous class of stones, they will be soft, easily cut with a knife, and incapable of effervescing with acids.

3. The greater number of soils, besides gravel and stones, contain larger or smaller proportions of sand of different degrees of fineness; and it is a necessary operation, the next in the process of analysis, to detach them from the parts in a state of more minute division, such as clay, loam, marl, vegetable and animal matter, and the matter soluble in water. This may be effected in a way sufficiently accurate, by boiling the soil in three or four times its weight of water; and when the texture of the soil is broken down, and the water cool, by agitating the parts together, and then suffering them to rest. In this case, the coarse sand will generally separate in a minute, and the finer in two or three minutes, whilst the highly-divided earthy, animal, or vegetable matter, will remain in a state of mechanical suspension for a much longer time; so that by pouring the water from the bottom of the vessel, after one, two, or three minutes, the sand will be principally separated from the other substances, which, with the water containing them, must be poured into a filter, and after the water has passed through, collected, dried, and weighed. The sand must likewise be weighed, and the respective quantities noted down. The water of lixiviation must be preserved, as it will be found to contain the saline and soluble animal or vegetable matters, if any exist in the soil.

4. By the process of washing and filtration, the soil is separated into two portions, the most important of which is generally the finely-divided matter. A minute analysis of the sand is seldom or never necessary, and its nature may be detected in the same manner as that of the stones or gravel. It is always either siliceous sand, or calcareous sand, or a mixture of both. If it consist wholly of carbonate of lime, it will be rapidly soluble in muriatic acid with effervescence; but if it consist partly of this substance, and party of siliceous matter, the respective quantities may be ascertained by weighing the residuum after the action of the acid, which must be applied till the mixture has acquired a sour taste, and has ceased to effervesce. This residuum is the siliceous part; it must be washed, dried, and heated strongly in a crucible; the difference between the weight of it and the weight of the whole indicates the proportion of calcareous sand.

5. The finely-divided matter of the soil is usually very compound in its nature; it sometimes contains all the four primitive earths of soils, as well as animal and vegetable matter; and to ascertain the proportions of these with tolerable accuracy is the most difficult part of the subject.

The first process to be performed in this part of the analysis is the exposure of the fine matter of the soil to the action of muriatic acid. This substance should be poured upon the earthy matter in an evaporating basin, in a quantity equal to twice the weight of the earthy matter; but diluted with double its volume of water. The mixture should

* It may be more accurately and easily accomplished by weighing it in air and in water in a light phial carefully counterpoised.—J. D.

† Clay soils, breathed on, emit a peculiar odor, called the earthy.—J. D.

be often stirred, and suffered to remain for an hour, or an hour and a half, before it is examined.

If any carbonate of lime or of magnesia exist in the soil, they will have been dissolved in this time by the acid, which sometimes takes up likewise a little oxide of iron; but very seldom any alumina.

The fluid should be passed through a filter; the solid matter collected, washed with rain water, dried at a moderate heat, and weighed. Its loss will denote the quantity of solid matter taken up. The washings must be added to the solution, which, if not sour to the taste, must be made so by the addition of fresh acid, when a little solution of prussiate of potassa and iron must be mixed with the whole. If a blue precipitate occurs, it denotes the presence of oxide of iron, and the solution of the prussiate must be dropped in till no farther effect is produced. To ascertain its quantity, it must be collected in the same manner as other solid precipitates, and heated red; the result is oxide of iron, which may be mixed with a little oxide of manganesum.

Into the fluid freed from oxide of iron, a solution of neutralized carbonate of potash must be poured, till all effervescence ceases in it, and till its taste and smell indicate a considerable excess of alkaline salt.

The precipitate that falls down is carbonate of lime; it must be collected on the filter, and dried at a heat below that of redness.

The remaining fluid must be boiled for a quarter of an hour, when the magnesia, if any exist, will be precipitated from it, combined with carbonic acid, and its quantity is to be ascertained in the same manner as that of the carbonate of lime.

If any minute proportion of alumina should, from peculiar circumstances, be dissolved by the acid, it will be found in the precipitate with the carbonate of lime, and it may be separated from it by boiling it for a few minutes with soap lie, sufficient to cover the solid matter: this substance dissolves alumina, without acting upon carbonate of lime.

Should the finely-divided soil be sufficiently calcareous to effervesce very strongly with acids, a very simple method may be adopted for ascertaining the quantity of carbonate of lime, and one sufficiently accurate in all common cases.

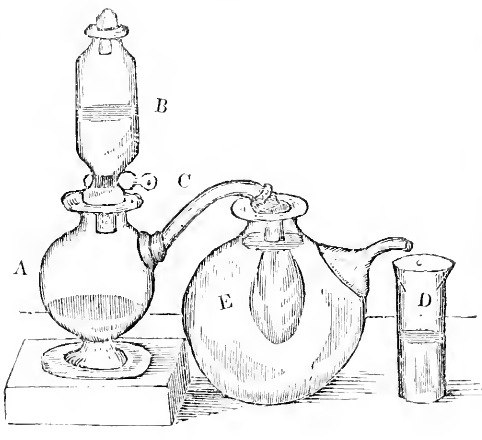
Carbonate of lime, in all its states, contains a determinate proportion of carbonic acid, *i. e.* nearly 43 per cent., so that when the quantity of this elastic fluid given out by any soil during the solution of its calcareous matter in an acid is known, either in weight or measure, the quantity of carbonate of lime may be easily discovered.

When the process by diminution of weight is employed, two parts of the acid and one part of the matter of the soil must be weighed in two separate bottles, and very slowly mixed together till the effervescence ceases: the difference between their weight before and after the experiment denotes the quantity of carbonic acid lost; for every four grains and a quarter of which, ten grains of carbonate of lime must be estimated.

The best method of collecting the carbonic acid, so as to discover its volume, is by a peculiar pneumatic apparatus,* in which its bulk may be measured by the quantity of water it displaces.

6. After the calcareous parts of the soil have been acted upon by muriatic acid, the next process is to ascertain the quantity of finely-divided insoluble animal and vegetable matter that it contains.

Fig. 15.



This may be done with sufficient precision, by strongly igniting it in a crucible over a common fire till no blackness remains in the mass. It should be often stirred with a metallic rod, so as to expose new surfaces continually to the air; the loss of weight that it undergoes denotes the quantity of the substance that it contains destructible by fire and air.*

It is not possible, without very refined and difficult experiments, to ascertain whether this substance is wholly animal or vegetable matter, or a mixture of both. When the smell emitted during the incineration is similar to that of burnt feathers, it is a certain indication of some substance either animal or analogous to animal matter; and a copious blue flame at the time of ignition almost

* Fig. 15. A, B, C, D, represent the different parts of this apparatus. A represents the bottle for receiving the soil. B the bottle containing the acid, furnished with a stop-cock. C the tube connected with a flaccid bladder. D the graduated measure. E the bottle for containing the bladder. When this instrument is used, a given quantity of soil is introduced into A. B is filled with muriatic acid diluted with an equal quantity of water; and the stop-cock being closed, is connected with the upper orifice of A, which is ground to receive it. The tube D is introduced into the lower orifice of A, and the bladder connected with it placed in its flaccid state into E, which is filled with water. The graduated measure is placed under the tube of E. When the stop-cock of B is turned, the acid flows into A, and acts upon the soil; the elastic fluid generated passes through C into the bladder, and displaces a quantity of water in E equal to it in bulk, and this water flows through the tube into the graduated measure; and gives by its volume the indication of the proportion of carbonic acid disengaged from the soil; for every ounce measure of which two grains of carbonate of lime may be estimated.

* When the soil is aluminous, part of the loss in the above process will be owing to water driven off. Pure hydrate of alumina contains about 58 per cent. water; the whole of which can only be expelled by a white heat. On this account the ascertaining with any accuracy the proportion of animal and vegetable matter in a soil is difficult, and requires much chemical skill.—J. D.

always denotes a considerable proportion of vegetable matter. In cases when it is necessary that the experiments should be very quickly performed, the destruction of the decomposable substances may be assisted by the agency of nitrate of ammoniac, which at the time of ignition may be thrown gradually upon the heated mass, in the quantity of twenty grains for every hundred of residual soil. It accelerates the dissipation of the animal and vegetable matter, which it causes to be converted into elastic fluids; and it is itself at the same time decomposed and lost.

7. The substances remaining after the destruction of the vegetable and animal matter are generally minute particles of earthy matter, containing usually alumina and silica, with combined oxide of iron, or of manganesum.

To separate these from each other, the solid matter should be boiled for two or three hours with sulphuric acid, diluted with four times its weight of water: the quantity of the acid should be regulated by the quantity of solid residuum to be acted on, allowing for every 100 grains 2 drachms or 120 grains of acid.

The substance remaining after the action of the acid may be considered as siliceous; and it must be separated, and its weight ascertained, after washing and drying in the usual manner.

The alumina and the oxide of iron and manganesum, if any exist, are all dissolved by the sulphuric acid: they may be separated by succinate of ammonia, added to excess, which throws down the oxide of iron; and by soap lie, which will dissolve the alumina, but not the oxide of manganesum; the weights of the oxides ascertained after they have been heated to redness will denote their quantities.

Should any magnesia and lime have escaped solution in the muriatic acid, they will be found in the sulphuric acid; this, however, is rarely the case; but the process for detecting them and acertaining their quantities, is the same in both instances.

The method of analysis by sulphuric acid is sufficiently precise for all usual experiments; but if very great accuracy be an object, dry carbonate of potassa must be employed as the agent, and the residuum of the incineration (6) must be heated red for half an hour, with four times its weight of this substance, in a crucible of silver, or of well-baked porcelain. The mass obtained must be dissolved in muriatic acid, and the solution evaporated till it is nearly solid; distilled water must then be added, by which the oxide of iron and all the earths, except silica, will be dissolved in combination as muriates. The silica, after the usual process of lixiviation, must be heated red: the other substances may be separated in the same manner as from the muriatic and sulphuric solutions.

This process is the one usually employed by chemical philosophers for the analysis of stones.

8. If any saline matter, or soluble vegetable or animal matter is suspected in the soil, it will be found in the water of lixiviation used for separating the sand.

This water must be evaporated to dryness in a proper dish, at a heat below its boiling point.

If the solid matter obtained is of a brown color and inflammable, it may be considered as partly vegetable extract. If its smell, when exposed to heat, be like that of burnt feathers, it contains animal or albuminous matter; if it be white, crystalline, and not destructible by heat, it may be considered as principally saline matter; the nature of which may be known by the tests already described.

9. Should sulphate or phosphate of lime be suspected in the entire soil, the detection of them requires a particular process upon it. A given weight of it, for instance, 400 grains, must be heated red for half an hour in a crucible, mixed with one-third of powdered charcoal. The mixture must be boiled for a quarter of an hour, in a-half pint of water, and the fluid collected through the filter, and exposed for some days to the atmosphere in an open vessel. If any notable quantity of sulphate of lime *(gypsum)* existed in the soil, a white precipitate will gradually form in the fluid, and the weight of it will indicate the proportion.

Phosphate of lime, if any exist, may be separated from the soil after the process for gypsum. Muriatic acid must be digested upon the soil, in quantity more than sufficient to saturate the soluble earths; the solution must be evaporated, and water poured upon the solid matter. This fluid will dissolve the compounds of earths with the muriatic acid, and leave the phosphate of lime untouched. It would not fall within the limits assigned to this lecture to detail any processes for the detection of substances which may be accidentally mixed with the matters of soils. Other earths and metallic oxides are now and then found in them, but in quantities too minute to bear any relation to fertility or barrenness, and the search for them would make the analysis much more complicated, without rendering it more useful.

10. When the examination of a soil is completed, the products should be numerically arranged, and their quantities added together; and if they nearly equal the original quantity of soil, the analysis may be considered as accurate. It must, however, be noticed, that when phosphate or sulphate of lime is discovered by the independent process just described (9), a correction must be made for the general process, by subtracting a sum equal to their weight from the quantity of carbonate of lime obtained by precipitation from the muriatic acid.

In arranging the products, the form should be in the order of the experiments by which they were procured.

Thus, I obtained from 400 grains of a good siliceous sandy soil from a hop-garden near Tunbridge, Kent,

		Grains.
Of water of absorption - -		19
Of loose stones and gravel, principally siliceous - - - - -		53
Of undecompounded vegetable fibres		14
Of fine siliceous sand - - -		212
Of minutely divided matter separated by agitation and filtration, and consisting of		
Carbonate of lime - -	19	
Carbonate of magnesia -	3	
Matter destructible by heat, principally vegetable - - -	15	
Silica - - - - -	21	
Alumina - - - -	13	
Oxide of iron - - -	5	

Soluble matter, principally common salt and vegetable extract	3	
Gypsum	2	
	—	81
Amount of all the products		379
Loss		21

The loss in this analysis is not more than usually occurs, and it depends upon the impossibility of collecting the whole quantities of the different precipitates, and upon the presence of more moisture than is accounted for in the water of absorption, and which is lost in the different processes.

When the experimenter is become acquainted with the use of the different instruments, the properties of the re-agents, and the relations between the external and chemical qualities of soils, he will seldom find it necessary to perform, in any one case, all the processes that have been described. When his soil, for instance, contains no notable proportion of calcareous matter, the action of the muriatic acid (7) may be omitted. In examining peat soils, he will principally have to attend to the operation by fire and air (8): in the analysis of chalks and loams, he will often be able to omit the experiment by sulphuric acid (9); and when a soil is extremely dense and heavy, and after being heated to redness, strongly attracted by the magnet, he must particularly attend to the quantity of iron it contains; and, in this case, the muriatic acid will be the principal agent.

In the first trials that are made by persons unacquainted with chemistry, they must not expect much precision of result. Many difficulties will be met with; but in overcoming them, the most useful kind of practical knowledge will be obtained; and nothing is so instructive in experimental science as the detection of mistakes. The correct analyst ought to be well grounded in general chemical information; but, perhaps, there is no better mode of gaining it, than that of attempting original investigations. In pursuing his experiments, he will be continually obliged to learn the properties of the substances he is employing or acting upon; and his theoretical ideas will be more valuable in being connected with practical operations, and acquired for the purpose of discovery.

Plants, being possessed of no locomotive powers, can grow only in places where they are supplied with food; and the soil is necessary to their existence, both as affording them nourishment and enabling them to fix themselves in such a manner as to obey those mechanical laws by which their radicles are kept below the surface, and their leaves exposed to the free atmosphere. As the systems of roots, branches, and leaves are very different in different vegetables, so they flourish most in different soils; the plants that have bulbous roots, require a looser and a lighter soil than such as have fibrous roots; and the plants possessing only short fibrous radicles demand a firmer soil than such as have tap roots, or extensive lateral roots.

A good turnip soil from Holkham, Norfolk, afforded me 8 parts out of 9 siliceous sand; and the finely divided matter consisted

Of carbonate of lime	63
— silica	15
— alumina	11
— oxide of iron	3
Of vegetable and saline matter	5
— moisture	3

I found the soil taken from a field at Sheffield Place, in Sussex, remarkable for producing flourishing oaks, to consist of six parts of sand, and one part of clay and finely divided matter. And 100 parts of the entire soil submitted to analysis produced,

Silica	54
Alumina	28
Carbonate of lime	3
Oxide of iron	5
Decomposing vegetable matter	4
Moisture and loss	6

An excellent wheat soil from the neighborhood of West Drayton, Middlesex, gave 3 parts in 5 of siliceous sand; and the finely divided matter consisted of

Carbonate of lime	28
Silica	32
Alumina	29
Animal or vegetable matter and moisture	11

Of these soils the last was by far the most, and the first the least, coherent in texture. In all cases the constituent parts of the soil which give tenacity and coherence are the finely divided matters; and they possess the power of giving those qualities the highest degree when they contain much alumina. A small quantity of finely divided matter is sufficient to fit a soil for the production of turnips and barley; and I have seen a tolerable crop of turnips on a soil containing 11 parts out of 12 sand. A much greater proportion of sand, however, always produces absolute sterility. The soil of Bagshot heath, which is entirely devoid of vegetable covering, contains less than one-twentieth of finely divided matter. 400 parts of it, which had been heated red, afforded me 380 parts of coarse siliceous sand, 9 parts of fine siliceous sand, and 11 parts of impalpable matter, which was a mixture of ferruginous clay with carbonate of lime.* Vegetable or animal matters, when finely divided, not only give coherence, but likewise softness and penetrability; but neither they nor any other part of the soil must be in too great proportion; and a soil is unproductive if it consist entirely of impalpable matter.

Pure alumina or silica, pure carbonate of lime,

* When the climate is favorable and there is sufficient moisture, shrubs occasionally grow and flourish in soils nearly purely siliceous. As a striking example, I may mention the soil of the cinnamon garden in the neighborhood of Colombo, in the island of Ceylon. In many spots where this valuable plant flourishes most, the surface of the ground is white as snow, being pure quartz-sand; below the surface a few inches, where the roots penetrate, the sand is of a gray color. A specimen of this, dried thoroughly, was found to consist of

98·5	Siliceous sand
1·0	Vegetable matter
0·5	Water.

In my work, entitled "An Account of the Interior of Ceylon," other instances are given of soils, composed chiefly of siliceous earths, admitting of cultivation in that climate. Reflecting on this, I am disposed to think that in estimating the power of a soil, in relation to fertility, great attention should be paid to situation, in connexion with water. Probably a nearly pure siliceous soil may be fertile which admits of being well watered, care being taken to give it manure. *Vide* p. 622.—J. D.

or carbonate of magnesia, are incapable of supporting healthy vegetation.

No soil is fertile that contains as much as 19 parts out of 20 of any of the constituents that have been mentioned.

It will be asked, are the pure earths in the soil merely active as mechanical or indirect chemical agents, or do they actually afford food to the plant? This is an important question; and not difficult of solution.

The earths consist, as I have before stated, of metals, united to oxygen; and these metals have not been decomposed; there is consequently no reason to suppose that the earths are convertible into the elements of organized compounds, into carbon, hydrogen, and azote.

Plants have been made to grow in given quantities of earth. They consume very small portions only, and what is lost may be accounted for by the quantities found in their ashes; that is to say, it has not been converted into any new products.

The carbonic acid united to lime or magnesia, if any stronger acid happens to be formed in the soil during the fermentation of vegetable matter, which will disengage it from the earths, may be decomposed: but the earths themselves cannot be supposed convertible into other substances by any process taking place in the soil.

In all cases, the ashes of plants contain some of the earths of the soil in which they grow; but these earths, as may be seen from the table of the ashes afforded by different plants given in the last Lecture, never equal more than $\frac{1}{50}$ of the weight of the plant consumed.

If they be considered as necessary to the vegetable, it is as giving hardness and firmness to its organization. Thus, it has been mentioned that wheat, oats, and many of the hollow grasses, have an epidermis principally of siliceous earth; the use of which seems to be to strengthen them, and defend them from the attacks of insects and parasitical plants.

Many soils are popularly distinguished as *cold;* and the distinction, though at first view it may appear to be founded on prejudice, is really just.

Some soils are much more heated by the rays of the sun, all other circumstances being equal, than others; and soils brought to the same degree of heat cool in different times, *i. e.* some cool much faster than others.

This property has been very little attended to in a philosophical point of view; yet it is of the highest importance in agriculture. In general, soils that consist principally of a stiff white clay are difficultly heated; and being usually very moist, they retain their heat only for a short time. *Chalks* are similar in one respect, that they are difficultly heated; but being drier they retain their heat longer, less being consumed in causing the evaporation of their moisture.

A black soil, containing much soft vegetable matter, is most heated by the sun and air; and the colored soils, and the soils containing much carbonaceous matter, or ferruginous matter, exposed under equal circumstances to the sun, acquire a much higher temperature than pale-colored soils.

When soils are perfectly dry, those that most readily become heated by the solar rays likewise cool most rapidly, their power of losing heat by radiation being greatest; but I have ascertained, by experiment, that the darkest colored dry soil, (that which contains abundance of animal or vegetable matter, substances which most facilitate the diminution of temperature,) when heated to the same degree, provided it be within the common limits of the effect of solar heat, will cool more slowly than a wet pale soil, entirely composed of earthy matter.

I found that a rich black mould, which contained nearly $\frac{1}{4}$ of the vegetable matter, had its temperature increased in an hour from 65° to 88° by exposure to sunshine; whilst a chalk soil was heated only to 69° under the same circumstances. But the mould removed into the shade, where the temperature was 62°, lost, in half an hour, 15°; whereas the chalk, under the same circumstances, had lost only 4°.

A brown fertile soil and a cold barren clay were each artificially heated to 88°, having been previously dried: they were then exposed in a temperature of 57°; in half an hour the dark soil was found to have lost 9° of heat; the clay had lost only 6°. An equal portion of the clay containing moisture, after being heated to 88°, was exposed in a temperature of 55°; in less than a quarter of an hour, it was found to have gained the temperature of the room. The soils in all these experiments were placed in small tin plate trays two inches square, and half an inch in depth, and the temperature ascertained by a delicate thermometer.

Nothing can be more evident than that the genial heat of the soil, particularly in spring, must be of the highest importance to the rising plant. And when the leaves are fully developed, the ground is shaded, and any injurious influence, which in the summer might be expected from too great a heat, entirely prevented; so that the temperature of the surface, when bare and exposed to the rays of the sun, affords at least one indication of the degrees of its fertility; and the thermometer may be sometimes a useful instrument to the purchaser or improver of lands.

There is a very simple test of the cooling or radiating powers of soils, the formation of dew upon them, or their relative increase of weight by exposure to the air after being dried, in the day or the night, in sunshine or in shade. The soil that radiates most heat acquires the greatest increase of weight; and of course the radiating powers of the soil are not only connected with its temperature, but likewise with its relations to moisture.

The moisture in the soil influences its temperature; and the manner in which it is distributed through, or combined with, the earthy materials, is of great importance in relation to the nutriment of the plant. If water is too strongly attracted by the earths, it will not be absorbed by the roots of the plants; if it is in too great quantity, or too loosely united to them, it tends to injure or destroy the fibrous parts of the roots.

There are two states in which water seems to exist in the earths, and in animal and vegetable substances: in the first state it is united by chemical, in the other by cohesive, attraction.

If pure solution of ammonia or potassa be poured into a solution of alum, alumina falls down combined with water; and the powder dried by exposure to air will afford more than half its weight of water by distillation; in this instance the water is united by chemical attraction. The moisture which wood, or muscular fibre, or gum, that have been heated to 212°, afford by distillation at a red heat, is likewise water, the elements of which were united in the substance by chemical combination.

When pipe-clay dried at the temperature of the atmosphere is brought in contact with water, the fluid is rapidly absorbed: this is owing to cohesive attraction. Soils in general, vegetable and animal substances, that have been dried at a heat below that of boiling water, increase in weight by exposure to air, owing to their absorbing water existing in the state of vapor in the air, in consequence of cohesive attraction.

The water *chemically combined* amongst the elements of soils, unless in the case of the decomposition of animal or vegetable substances, cannot be absorbed by the roots of plants; but that *adhering* to the parts of the soil is in constant use in vegetation. Indeed, there are few mixtures of the earths found in soils that contain any chemically combined water; water is expelled from the earths by most substances that combine with them. Thus, if a combination of lime and water be exposed to carbonic acid; the carbonic acid takes the place of water; and compounds of alumina and silica, or other compounds of the earths, do not chemically unite with water; and soils, as it has been stated, are formed either by earthy carbonates, or compounds of the pure earths and metallic oxides.

When saline substances exist in soils, they may be united to water both chemically and mechanically; but they are always in too small a quantity to influence materially the relations of the soil to water.

The power of the soil to absorb water by cohesive attraction depends in great measure upon the state of division of its parts; the more divided they are, the greater is their absorbent power. The different constituent parts of soils likewise appear to act, even by cohesive attraction, with different degrees of energy. Thus vegetable substances seem to be more absorbent than animal substances; animal substances more so than compounds of alumina and silica; and compounds of alumina and silica more absorbent than carbonates of lime and magnesia: these differences may, however, possibly depend upon the differences in their state of division, and upon the surface exposed.

The power of soils to absorb water from air is much connected with fertility. When this power is great, the plant is supplied with moisture in dry seasons; and the effect of evaporation in the day is counteracted by the absorption of aqueous vapor from the atmosphere, by the interior parts of the soil during the day, and by both the exterior and interior during the night.

The stiff clays approaching to pipe clays in their nature, which take up the greatest quantity of water when it is poured upon them in a fluid form, are not the soils which absorb most moisture from the atmosphere in dry weather. They cake, and present only a small surface to the air; and the vegetation on them is generally burnt up almost as readily as on sands.

The soils that are most efficient in supplying the plant with water by atmospheric absorption are those in which there is a due mixture of sand, finely divided clay, and carbonate of lime, with some animal or vegetable matter; and which are so loose and light as to be freely permeable to the atmosphere. With respect to this quality, carbonate of lime and animal and vegetable matter are of great use in soils, they give absorbent power to the soil without giving it likewise tenacity: sand, which also destroys tenacity, on the contrary, gives little absorbent power.

I have compared the absorbent powers of many soils with respect to atmospheric moisture, and I have always found it greatest in the most fertile soils; so that it affords one method of judging of the productiveness of land.

1000 parts of a celebrated soil from Ormistown, in East Lothian, which contained more than half its weight of finely divided matter, of which 11 parts were carbonate of lime and 9 parts vegetable matter, when dried at 212°, gained in an hour by exposure to air saturated with moisture, at temperature 62°, 18 grains.

1000 parts of a very fertile soil from the banks of the river Parret, in Somersetshire, under the same circumstances, gained 16 grains.

1000 parts of a soil from Mersea, in Essex, worth 45 shillings an acre, gained 13 grains.

1000 grains of a fine sand from Essex, worth 28 shillings an acre, gained 11 grains.

1000 of a coarse sand, worth 15 shillings an acre, gained only 8 grains.

1000 of the soil of Bagshot heath gained only 3 grains.

Water, and the decomposing animal and vegetable matter existing in the soil, constitute the true nourishment of plants: and as the earthy parts of the soil are useful in retaining water, so as to supply it in the proper proportions to the roots of the vegetables, so they are likewise efficacious in producing the proper distribution of the animal or vegetable matter: when equally mixed with it, they prevent it from decomposing too rapidly; and by their means the soluble parts are supplied in proper proportions.

Besides this agency, which may be considered as mechanical, there is another agency between soils and organizable matters, which may be regarded as chemical in its nature. The earths, and even the earthy carbonates, have a certain degree of chemical attraction for many of the principles of vegetable and animal substances. This is easily exemplified in the instance of alumina and oil; if an acid solution of alumina be mixed with a solution of soap, which consists of oily matter and potassa, the oil and the alumina will unite and form a white powder, which will sink to the bottom of the fluid.

The extract from decomposing vegetable matter, when boiled with pipe-clay or chalk, forms a combination by which the vegetable matter is rendered more difficult of decomposition and of solution. Pure silica and siliceous sands have little action of this kind; and the soils which contain the most alumina and carbonate of lime are those which act with the greatest chemical energy in preserving manures. Such soils merit the appellation which is commonly given to them of rich soils; for the vegetable nourishment is long preserved in them, unless taken up by the organs of plants. Siliceous sands, on the contrary, deserve the term hungry, which is commonly applied to them; for the vegetable and animal matters they contain not being attracted by the earthy constituent parts of the soil, are more liable to be decomposed by the action of the atmosphere, or carried off from them by water.

In most of the black and brown rich vegetable moulds, the earths seem to be in combination with a peculiar extractive matter, afforded during the decomposition of vegetables: this is slowly taken up, or attracted from the earths by water, and appears to constitute a prime cause of the fertility of the soil.

The standard of fertility of soils for different plants must vary with the climate; and must be particularly influenced by the quantity of rain.

The power of soils to absorb moisture ought to be much greater in warm or dry countries than in cold and moist ones; and the quantity of clay, or vegetable or animal matter they contain, greater. Soils also on declivities ought to be more absorbent than in plains or in the bottom of valleys. Their productiveness likewise is influenced by the nature of the sub-soil, or the stratum on which they rest.

When soils are immediately situated upon a bed of rock or stone, they are much sooner rendered dry by evaporation, than where the sub-soil is of clay or marl: and one cause of the great fertility of some lands in the moist climate of Ireland is the proximity of the rocky strata to the soil.

A clayey sub-soil will sometimes be of material advantage to a sandy soil; and in this case it will retain moisture in such a manner as to be capable of supplying that lost by the earth above, in consequence of evaporation, or the consumption of it by plants.

A sandy, or gravelly sub-soil, often corrects the imperfections of too great a degree of absorbent power in the true soil.

In calcareous countries, where the surface is a species of marl, the soil is often found only a few inches above the limestone; and its fertility is not impaired by the proximity of the rock: though in a less absorbent soil, this situation would occasion barrenness; and the sandstone and limestone hills in Derbyshire and North Wales may be easily distinguished at a distance in summer by the different tints of the vegetation. The grass on the sandstone hills usually appears brown and burnt up; that on the limestone hills, flourishing and green.

In devoting the different parts of an estate to the necessary crops, it is perfectly evident from what has been said, that no general principle can be laid down, except when all the circumstances of the nature, composition, and situation of the soil and sub-soil are known.

The methods of cultivation, likewise, must be different for different soils. The same practice, which will be excellent in one case, may be destructive in another.

Deep ploughing may be a very profitable practice in a rich thick soil; and in a fertile shallow soil, situated upon cold clay or sandy sub-soil, it may be extremely prejudicial.

In a moist climate, where the quantity of rain that falls annually, equals from 40 to 60 inches, as in Lancashire, Cornwall, and some parts of Ireland, a siliceous sandy soil is much more productive than in dry districts; and in such situations, wheat and beans will require a less coherent and absorbent soil than in drier situations; and plants having bulbous roots will flourish in a soil containing as much as 14 parts out of 15 of sand.

Even the exhausting powers of crops will be influenced by like circumstances. In cases where plants cannot absorb sufficient moisture, they must take up more manure. And in Ireland, Cornwall, and the Western Highlands of Scotland, corn will exhaust less than in dry inland situations. Oats, particularly in dry climates, are impoverishing in a much higher degree than in moist ones.

Soils appear to have been originally produced in consequence of the decomposition of rocks and strata. It often happens, that soils are found in an unaltered state upon the rocks from which they were derived. It is easy to form an idea of the manner in which rocks are converted into soils, by referring to the instance of *soft granite*, or *porcelain granite*. This substance consists of three ingredients, quartz, feldspar, and mica. The quartz is almost pure siliceous earth, in a crystalline form. The feldspar and mica are very compounded substances; both contain silica, alumina, and oxide of iron: in the feldspar there is usually lime and potassa; in the mica, lime and magnesia.

When a granitic rock of this kind has been long exposed to the influence of air and water, the lime and the potassa contained in its constituent parts are acted upon by water or carbonic acid; and the oxide of iron, which is almost always in its least oxided state, tends to combine with more oxygen; the consequence is, that the felspar decomposes, and likewise the mica, but the first the most rapidly. The feldspar, which is as it were the cement of the stone, forms a fine clay: the mica partially decomposed, mixes with it as sand; and the undecomposed quartz appears as gravel, or sand of different degrees of fineness.

As soon as the smallest layer of earth is formed on the surface of a rock, the seeds of lichens, mosses, and other imperfect vegetables which are constantly floating in the atmosphere, and which have made it their resting-place, begin to vegetate; their death, decomposition, and decay, afford a certain quantity of organizable matter, which mixes with the earthy materials of the rock: in this improved soil more perfect plants are capable of subsisting; these in their turn, absorb nourishment from water and the atmosphere; and after perishing, afford new materials to those already provided: the decomposition of the rock still continues; and at length by such slow and gradual processes, a soil is formed in which even forest trees can fix their roots, and which is fitted to reward the labors of the cultivator.

In instances where successive generations of vegetables have grown upon a soil, unless part of their produce has been carried off by man, or consumed by animals, the vegetable matter increases in such a proportion that the soil approaches to a peat in its nature; and if in a situation where it can receive water from a higher district, it becomes spongy, and permeated with that fluid, and is gradually rendered incapable of supporting the nobler classes of vegetables.

Many peat-mosses seem to have been formed by the destruction of forests, in consequence of the imprudent use of the hatchet by the early cultivators of the country in which they exist: when the trees are felled in the outskirts of a wood, those in the interior exposed to the influence of the winds, and having been accustomed to shelter, become unhealthy, and die in their new situation; and their leaves and branches gradually decomposing, produce a stratum of vegetable matter. In many of the great bogs in Ireland and Scotland, the larger trees that are found in the out-skirts of them bear the marks of having been felled. In the interior few entire trees are found; and the cause is, probably, that they fell by gradual decay; and that the fermentation and decomposition of the vegetable matter was most rapid where it was in the greatest quantity.

Lakes and pools of water are sometimes filled up by the accumulation of the remains of aquatic plants; and in this case a sort of spurious peat is formed. The fermentation in these cases, however, seems to be of a different kind. Much more gaseous matter is evolved; and the neighborhood of morasses in which aquatic vegetables decompose is usually aguish and unhealthy; whilst that of the true peat, or peat formed on soils originally dry, is always salubrious.*

The earthy matter of peats is uniformly analogous to that of the stratum on which they repose; the plants which have formed them must have derived the earths that they contained from this stratum. Thus in Wiltshire and Berkshire, where the stratum below the peat is chalk, calcareous earth abounds in the ashes, and very little alumina and silica. They likewise contain much oxide of iron and gypsum, both of which may be derived from the decomposition of the pyrites, so abundant in chalk.

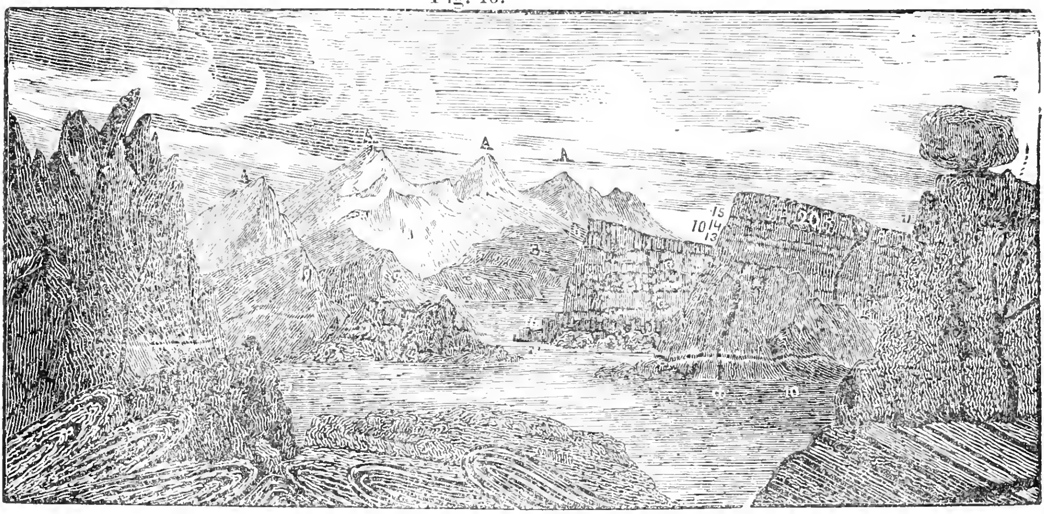
Different specimens of peat that I have burnt, from the granitic and schistose soils of different parts of these islands, have always given ashes, principally siliceous and aluminous; and a specimen of peat from the county of Antrim, gave ashes which afforded very nearly the same constituents as the great basaltic stratum of the county.

Poor and hungry soils, such as are produced from the decomposition of granitic and sandstone rocks, remain very often for ages with only a thin covering of vegetation. Soils from the decomposition of limestone, chalks, and basalts, are often clothed by nature with the perennial grasses; and afford, when ploughed up, a rich bed of vegetation for every species of cultivated plant.

Rocks and strata from which soils have been derived, and those which compose the more interior solid parts of the globe, are arranged in a certain order; and as it often happens that strata very different in their nature are associated together, and that the strata immediately beneath the soil contain materials which may be of use for improving it, a general view of the nature and position of rocks and strata in nature will not, I trust, be unacceptable to the scientific farmer.

Rocks are generally divided by geologists into

Fig. 16.



two grand divisions, distinguished by the names of *primary and secondary*.

The primary rocks are composed of pure crystalline matter, and contain no fragments of other rocks.

The secondary rocks, or strata, consist only partly of crystalline matter, contain fragments of other rocks or strata; often abound in remains of vegetables and marine animals; and sometimes contain the remains of land animals.

The primary rocks are generally arranged in large masses, or in layers, vertical or more or less inclined to the horizon.

The secondary rocks are usually disposed in strata or layers, parallel, or nearly parallel, to the horizon.

The number of primary rocks which are commonly observed in nature are eight.

First, *granite*, which, as has been mentioned, is composed of quartz, feldspar, and mica; when these bodies are arranged in regular layers in the rock, it is called *gneiss*.

Second, *micaceous schistus*, which is composed of quartz and mica, arranged in layers, which are usually curvilineal.

Third, *sienite*, which consists of the substance called hornblende and feldspar.

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* In tropical climates no peat is formed; the temperature is too high. The dead vegetable matter rapidly decomposes, and is converted into gases; and this probably is one of the causes of these climates being so much more unhealthy and productive of malaria-fevers than temperate and cold climates.—J. D.

Fourth, *serpentine*, which is constituted by feldspar and a body named resplendent hornblende; and their separate crystals are often so small as to give the stone a uniform appearance: this rock abounds in veins of a substance called *steatite*, or *soap rock*.

Fifth, *porphyry*, which consists of crystals of feldspar, embedded in the same material; but usually of a different color.

Sixth, *granular marble*, which consists entirely of crystals of carbonate of lime; and which, when its color is white, and texture fine, is the substance used by statuaries.

Seventh, *chlorite schist*, which consists of chlorite, a green or gray substance, somewhat analogous to mica and feldspar.

Eighth, *quartzose rock*, which is composed of quartz in a granular form, sometimes united to small quantities of the crystalline elements, which have been mentioned as belonging to the other rocks.

The secondary rocks are more numerous than the primary; but twelve varieties include all that are usually found in these islands.

First, *grauwacke*, which consists of fragments of quartz, or chlorite schist, embedded in a cement, principally composed of feldspar.

Second, *siliceous sandstone*, which is composed of fine quartz or sand, united by a siliceous cement.

Third, *limestone*, consisting of carbonate of lime, more compact in its texture than in the granular marble; and often abounding in marine exuviæ.

Fourth, *aluminous schist* or *shale*, consisting of the decomposed materials of different rocks cemented by a small quantity of ferruginous or siliceous matter; and often containing the impressions of vegetables.

Fifth, *calcareous sandstone*, which is calcareous sand, cemented by calcareous matter.

Sixth, *ironstone*, formed of nearly the same materials as aluminous schist or shale; but containing a much larger quantity of oxide of iron.

Seventh, *basalt* or *whinstone*, which consists of feldspar and hornblende, with materials derived from the decomposition of the primary rocks; the crystals are generally so small as to give the rock a homogeneous appearance; and it is often disposed in very regular columns, having usually five or six sides.

Eighth, *bituminous* or *common coal*.

Ninth, *gypsum*, the substance so well known by that name, which consists of sulphate of lime; and often contains sand.

Tenth, *rock salt*.

Eleventh, *chalk*, which usually abounds in remains of marine animals, and contains horizontal layers of flints.

Twelfth, *plumb pudding stone*, consisting of pebbles cemented by a ferruginous or siliceous cement.

To describe more particularly the constituent parts of the different rocks and strata will be unnecessary; at any time, indeed, details on this subject are useless, unless the specimens are examined by the eye; and a close inspection and comparison of the different species will in a short time enable the most common observer to distinguish them.

The highest mountains in these islands, and indeed in the whole of the old continent, are constituted by granite; and this rock has likewise been found at the greatest depths to which the industry of man has yet been able to penetrate; micaceous schist is often found immediately upon granite; serpentine or marble upon micaceous schist; but the order in which the primary rocks are grouped together is various. Marble and serpentine are usually found uppermost; but granite, though it seems to form the foundation of the rocky strata of the globe, is yet sometimes discovered above micaceous schist.

The secondary rocks are always incumbent on the primary; the lowest of them is usually grauwacke; upon this limestone or sandstone is often found; coal generally occurs between sandstone or shale; basalt often exists above sandstone and limestone; rock salt almost always occurs associated with red sandstone and gypsum. Coal, basalt, sandstone, and limestone, are often arranged in different alternate layers, of no considerable thickness, so as to form a great extent of country. In a depth of less than 500 yards, 80 of these different alternate strata have been counted.

The veins which afford metallic substances, are fissures vertical or more or less inclined, filled with a material different from the rock in which they exist. This material is almost always crystalline; and usually consists of calcareous fluor spar, quartz, or heavy spar, either separate or together. The metallic substances are generally dispersed through, or confusedly mixed with these crystalline bodies. The veins in hard granite seldom afford much useful metal; but in the veins in soft granite and in gneiss tin, copper, and lead are found. Copper and iron are the only metals usually found in the veins in serpentine. Micaceous schist, sienite, and granular marble are seldom metalliferous rocks. Lead, tin, copper, iron, and many other metals, are found in the veins in chlorite schist. Grauwacke, when it contains few fragments, and exists in large masses, is often a metalliferous rock. The precious metals, likewise iron, lead, and antimony, are found in it: and sometimes it contains veins, or masses of *stone coal*, or coal free from bitumen. Limestone is the great metalliferous rock of the secondary family; and lead and copper are the metals most usually found in it. No metallic veins have ever been found in shale, chalk, or calcareous sandstone; and they are very rare in basalt and siliceous sandstone.*

In cases where veins in rocks are exposed to the atmosphere, indications of the metals they contain may be often gained from their superficial appearance. Whenever fluor spar is found in a vein, there is always strong reason to suspect that it is associated with metallic substances. A brown powder at the surface of a vein always indicates iron, and often tin; a pale yellow powder lead;

* Fig. 16. will give a general idea of the appearance and arrangement of rocks and veins.

Explanation of Figure 16.

1 Granite.—2 Gneiss.—3 Micaceous Schistus.—4 Sienite.—5 Serpentine.—6 Porphyry.—7 Granular Marble.—8 Chlorite Schist.—9 Quartzose Rock.—10 Grauwacke.—11 Siliceous Sandstone.—12 Limestone.—13 Shale.—14 Calcareous Sandstone.—15 Iron Stone.—16 Basalt.—17 Coal.—18 Gypsum.—19 Rock Salt.—20 Chalk.—21 Plum Pudding Stone.—AA Primary Mountains.—BB Secondary Mountains.—*aaa* Veins.

and a green colour in a vein denotes the presence of copper.

It may not be improper to give a general description of the geological constitution of Great Britain and Ireland. Granite forms the great ridge of hills extending from Land's End through Dartmore into Devonshire. The highest rocky strata in Somersetshire are grauwacke and limestone. The Malvern hills are composed of granite, sienite, and porphyry. The highest mountains in Wales are chlorite schist, or grauwacke. Granite occurs at Mount Sorrel, in Leicestershire. The great range of the mountains in Cumberland and Westmoreland are prophyry, chlorite schist, and grauwacke; but granite is found as their western boundary. Throughout Scotland the most elevated rocks are granite, sienite, and micaceous schistus. No true secondary formations are found in South Britain, west of Dartmore; and no basalt south of the Severn. The chalk district extends from the western part of Dorsetshire to the eastern coast of Norfolk. The coal formations abound in the district between Glamorganshire and Derbyshire: and likewise in the secondary strata of Yorkshire, Durham, Westmorland, and Northumberland. Serpentine is found only in three places in Great Britain; near Cape Lizard in Cornwall, Portsoy in Aberdeenshire, and in Ayrshire. Black and gray granular marble is found near Padstow in Cornwall; and other colored primary marbles exist in the neighborhood of Plymouth. Colored primary marbles are abundant in Scotland: and white granular marble is found in the Isle of Sky, in Assynt, and on the banks of Loch Shin in Sutherland: the principal coal formations in Scotland are in Dumbartonshire, Ayrshire, Fifeshire, and on the banks of the Brora, in Sutherland. Secondary limestone and sandstone are found in most of the low countries north of the Mendip hills.

In Ireland there are five great associations of primary mountains; the mountains of Morne, in the county of Down; the mountains of Donegal; those of Mayo and Galway; those of Wicklow; and those of Kerry. The rocks composing the four first of these mountain chains are principally granite, gneiss, sienite, micaceous schist, and porphyry. The mountains of Kerry are chiefly constituted by granular quartz, and chlorite schist. Colored marble is found near Killarney; and white marble on the western coast of Donegal.

Limestone and sandstone are the common secondary rocks found south of Dublin. In Sligo, Roscommon, and Leitrim, limestone, sandstone, shale, ironstone, and bituminous coal are found. The secondary hills in these counties are of considerable elevation; and many of them have basaltic summits. The north coast of Ireland is principally basalt; this rock commonly reposes upon a white limestone, containing layers of flint, and the same fossils as chalk; but it is considerably harder than that rock. There are some instances, in this district, in which columnar basalt is found above sandstone and shale, alternating with coal. The stone-coal of Ireland is principally found in Kilkenny, associated with limestone and grauwacke.

It is evident from what has been said concerning the production of soils from rocks, that there must be at least as many varieties of soils as there are species of rocks exposed at the surface of the earth; in fact there are many more. Independent of the changes produced by cultivation and the exertions of human labor, the materials of strata have been mixed together and transported from place to place by various great alterations that have taken place in the system of our globe, and by the constant operation of water.

To attempt to class soils with scientific accuracy would be a vain labor; the distinctions adopted by farmers are sufficient for the purposes of agriculture; particularly if some degree of precision be adopted in the application of terms. The term sandy, for instance, should never be applied to any soil that does not contain at least $\frac{7}{8}$ of sand; sandy soils that effervesce with acids should be distinguished by the name of calcareous sandy soil, to distinguish them from those that are siliceous. The term clayey soil should not be applied to any land which contains less than $\frac{1}{6}$ of impalpable earthy matter, not considerably effervescing with acids: the word loam should be limited to soils containing at least one-third of impalpable earthy matter, copiously effervescing with acids. A soil, to be considered as peaty, ought to contain at least one-half of vegetable matter.

In cases where the earthy part of a soil evidently consists of a decomposed matter of one particular rock, a name derived from the rock may with propriety be applied to it. Thus, if a fine red earth be found immediately decomposing basalt, it may be denominated basaltic soil. If fragments of quartz and mica be found abundant in the materials of the soil, which is often the case, it may be denominated granitic soil; and the same principles may be applied to other like instances.

In general, the soils, the materials of which are the most various and heterogeneous, are those called alluvial, or which have been formed from the depositions of rivers; many of them are extremely fertile. I have examined some productive alluvial soils, which have been very different in their composition. The soil which has been mentioned before, as very productive, from the banks of the river Parret in Somersetshire, afforded me eight parts of finely divided earthy matter, and one part of siliceous sand; and an analysis of the finely divided matter gave the following results:—

360 parts of carbonate of lime.
25 — alumina.
20 — silica.
8 — oxide of iron.
19 — vegetable, animal, and saline matter.

A rich soil from the neighborhood of the Avon, in the valley of Evesham in Worcestershire, afforded me three-fifths of fine sand, and two-fifths of impalpable matter; the impalpable matter consisted of

35 Alumina.
41 Silica.
14 Carbonate of lime.
3 Oxide of iron.
7 Vegetable, animal, and saline matter.

A specimen of good soil from Tiviotdale, afforded five-sixths of fine siliceous sand, and one-sixth of impalpable matter; which consisted of

41 Alumina.
42 Silica.
4 Carbonate of lime.
5 Oxide of iron.
8 Vegetable, animal, and saline matter.

A soil yielding excellent pasture from the valley of the Avon, near Salisbury, afforded one-eleventh of coarse silicеous sand; and the finely divided matter consisted of

7 Alumina.
14 Silica.
63 Carbonate of lime.
2 Oxide of iron.
14 Vegetable, animal, and saline matter.

In all these instances the fertility seems to depend upon the state of division, and mixture of the earthy materials and the vegetable and animal matter; and may be easily explained on the principles which I have endeavored to elucidate in the preceding part of this Lecture.

In ascertaining the composition of steril soils with a view to their improvement, any particular ingredient which is the cause of their unproductiveness, should be particularly attended to; if possible. they should be compared with fertile soils in the same neighborhood, and in similar situations, as the difference of the composition may, in many cases, indicate the most proper methods of improvement. If on washing a steril soil it is found to contain the salt of iron, or any acid matter, it may be ameliorated by the application of quick-lime. A soil of good apparent texture from Lincolnshire, was put into my hands by Sir Joseph Banks as remarkable for sterility. On examining it, I found that it contained sulphate of iron: and I offered the obvious remedy of top-dressing with lime, which converts the sulphate into a manure If there be an excess of calcareous matter in the soil, it may be improved by the application of sand, or clay. Soils too abundant in sand are benefited by the use of clay or marl, or vegetable matter. A field belonging to Sir Robert Vaughan at Nannau, Merionethshire, the soil of which was a light sand, was much burnt up in the summer of 1805; I recommended to that gentleman the application of peat as a top-dressing. The experiment was attended with immediate good effects; and Sir Robert has informed me, that the benefit was permanent. A deficiency of vegetable or animal matter must be supplied by manure. An excess of vegetable matter is to be removed by burning, or to be remedied by the application of earthy materials. The improvement of peats, or bogs, or marsh lands, must be preceded by draining; stagnant water being injurious to all the nutritive classes of plants. Soft black peats, when drained, are often made productive by the mere application of sand or clay as a top-dressing. When peats are acid, or contain ferruginous salts, calcareous matter is absolutely necessary in bringing them into cultivation. When they abound in the branches and roots of trees, or when their surface entirely consists of living vegetables, the wood or the vegetables must either be carried off, or be destroyed by burning. In the last case their ashes afford earthy ingredients, fitted to improve the texture of the peat.

The best natural soils are those of which the materials have been derived from different strata; which have been minutely divided by air and water, and are intimately blended together: and in improving soils artificially, the farmer cannot do better than imitate the processes of nature.

The materials necessary for the purpose are seldom far distant: coarse sand is often found immediately on chalk; and beds of sand and gravel are common below clay. The labor of improving the texture or constitution of the soil is repaid by a great permanent advantage; less manure is required, and its fertility insured. And capital laid out in this way secures for ever the productiveness, and consequently the value, of the land.

LECTURE V.

ON THE NATURE AND CONSTITUTION OF THE ATMOSPHERE, AND ITS INFLUENCE ON VEGETABLES. OF THE GERMINATION OF SEEDS. OF THE FUNCTIONS OF PLANTS IN THEIR DIFFERENT STAGES OF GROWTH; WITH A GENERAL VIEW OF THE PROGRESS OF VEGETATION.

The constitution of the atmosphere has been already generally referred to in the preceding Lectures. Water, carbonic acid gas, oxygen, and azote, have been mentioned as the principal substances composing it; but more minute inquiries respecting their nature and agencies are necessary to afford correct views of the uses of the atmosphere in vegetation.

On these inquiries I now propose to enter; the pursuit of them, I hope, will offer some objects of practical use in farming; and present some philosophical illustrations of the manner in which plants are nourished, their organs unfolded, and their functions developed.

If some of the salt called muriate of lime that has been just heated red be exposed to the air, even in the driest and coldest weather, it will increase in weight and become moist; and in a certain time will be converted into a fluid. If put into a retort and heated, it will yield pure water; will gradually recover its pristine state; and, if heated red, its former weight: so that it is evident that the water united to it was derived from the air. And that it existed in the air in an invisible and elastic form, is proved by the circumstance, that if a given quantity of air be exposed to the salt, its volume and weight will diminish, provided the experiment be correctly made.

The quantity of water which exists in air, as vapor, varies with the temperature. In proportion as the weather is hotter, the quantity is greater. At 50° of Fahrenheit air contains about $\frac{1}{50}$ of its volume of vapor; and as the specific gravity of vapor is to that of air nearly as 10 to 15, this is about $\frac{1}{75}$ of its weight.

At 100°, supposing that there is a free communication with water, it contains about $\frac{1}{14}$ parts in volume, or $\frac{1}{21}$ in weight. It is the condensation of vapor by diminution of the temperature of the atmosphere, which is probably the principal cause of the formation of clouds, and of the deposition of dew, mist, snow, or hail.

The power of different substances to absorb aqueous vapor from the atmosphere by cohesive attraction was discussed in the last Lecture. The leaves of living plants appear to act upon the vapor likewise in its elastic form, and to absorb it. Some vegetables increase in weight from this cause, when suspended in the atmosphere and unconnected with the soil; such are the houseleek, and different species of the aloe. In very intense heats, and when the soil is dry, the life of plants seems to be preserved by the absorbent power of their leaves: and it is a beautiful circumstances in the economy of nature, that aqueous vapor is most abundant in the atmosphere when it is most needed for the purposes of life: and that when other sources of its supply are cut off, this is most copious.

The compound nature of water has been referred to. It may be proper to mention the experimental proofs of its decomposition into, and composition from, oxygen and hydrogen.

If the metal called potassium be exposed in a glass tube to a small quantity of water, it will act upon it with great violence; elastic fluid will be disengaged, which will be found to be hydrogen; and the same effects will be produced upon the potassium, as if it had absorbed a small quantity of oxygen; and the hydrogen disengaged, and the oxygen added to the potassium, are in weight as 2 to 15; and if two in volume of hydrogen, and one in volume of oxygen, which have the weights of 2 and 15, be introduced into a close vessel, and an electrical spark passed through them, they will inflame and condense into 17 parts of pure water.

It is evident from the statements given in the third lecture, that water forms by far the greatest part of the sap of plants; and that this substance, or its elements, enters largely into the constitution of their organs and solid productions.

Water is absolutely necessary to the economy of vegetation in its elastic and fluid state; and it is not devoid of use even in its solid form. Snow and ice are bad conductors of heat; and when the ground is covered with snow, or the surface of the soil or of water is frozen, the roots or bulbs of the plants beneath are protected by the congealed water from the influence of the atmosphere, the temperature of which in northern winters is usually very much below the freezing point; and this water becomes the first nourishment of the plant in early spring. The expansion of water during its congelation, at which time its volume increases one-twelfth, and its contraction of bulk during a thaw, tend to pulverise the soil; to separate its parts from each other, and to make it more permeable to the influence of the air.

If a solution of lime in water be exposed to the air, a pellicle will speedily form upon it, and a solid matter will gradually fall to the bottom of the water, and in a certain time the water will become tasteless; this is owing to the combination of the lime, which was dissolved in the water, with carbonic acid gas which existed in the atmosphere, as may be proved by collecting the film and the solid matter, and igniting them strongly in a little tube of platina or iron; they will give off carbonic acid gas, and will become quick-lime, which, added to the same water, will again bring it to the state of lime-water.

The quantity of carbonic acid gas in the atmosphere is very small. It is not easy to determine it with precision, and it must differ in different situations; but where there is a free circulation of air, it is probably never more than one-five hundredth, nor less than one-eight hundredth of the volume of air. Carbonic acid gas is nearly one-third heavier than the other elastic parts of the atmosphere in their mixed state: hence, at first view, it might be supposed that it would be most abundant in the lower regions of the atmosphere; but unless it has been immediately produced at the surface of the earth in some chemical process, this does not seem to be the case: elastic fluids of different specific gravities have a tendency to equable mixture by a species of attraction, and the different parts of the atmosphere are constantly agitated and blended together by winds or other causes. De Saussure found lime-water precipitated on Mount Blanc, the highest point of land in Europe; and carbonic acid gas has been always found, apparently in due proportion, in the air brought down from great heights in the atmosphere by aërostatic adventurers.

The experimental proofs of the composition of carbonic acid gas are very simple. If 13 grains of well burnt charcoal be inflamed by a burning-glass in 100 cubical inches of oxygen gas, the charcoal will entirely disappear; and, provided the experiment be correctly made, all the oxygen, except a few cubical inches, will be found converted into carbonic acid; and, what is very remarkable, the volume of the gas is not changed. On this last circumstance it is easy to found a correct estimation of the quantity of pure charcoal and oxygen in carbonic acid gas: the weight of 100 cubical inches of carbonic acid gas is to that of 100 cubical inches of oxygen gas, as 47 to 34: so that 47 parts in weight of carbonic acid gas must be composed of 34 parts of oxygen and 13 of charcoal, which correspond with the numbers given in the second lecture.

Carbonic acid is easily decomposed by heating potassium in it; the metal combines with the oxygen, and the charcoal is deposited in the form of a black powder.

The principal consumption of the carbonic acid in the atmosphere, seems to be in affording nourishment to plants; and some of them appear to be supplied with carbon chiefly from this source.

Carbonic acid gas is formed during fermentation, combustion, putrefaction, respiration, and a number of operations taking place upon the surface of the earth; and there is no other process known in nature by which it can be destroyed but by vegetation.

After a given portion of air has been deprived of aqueous vapor and carbonic acid gas, it appears little altered in its properties; it supports combustion and animal life. There are many modes of separating its principal constituents, oxygen, and azote, from each other. A simple one is by burning phosphorus in a confined volume of air: this absorbs the oxygen and leaves the azote; and 100 parts in volume of air, in which phosphorus has been burnt, yield 79 parts of azote; and by mixing this azote with 21 parts of fresh oxygen gas, artificially procured, a substance having the original characters of air is produced. To procure pure oxygen from air, quicksilver may be kept heated in it, at about 600°, till it becomes a red powder: this powder, when ignited, will be restored to the state of quicksilver by giving off oxygen.

Oxygen is necessary to some functions of vegetables, but its great importance in nature is in its relation to the economy of animals. It is absolutely necessary to their life. Atmospheric air taken into the lungs of animals, or passed in solution in water through the gills of fishes, loses oxygen; and for the oxygen lost, about an equal volume of carbonic acid appears.

The effects of azote in vegetation are not distinctly known. As it is found in some of the products of vegetation, it may be absorbed by certain plants from the atmosphere. It prevents the action of oxygen from being too energetic, and serves as a medium in which the more essential parts of the air act: nor is this circumstance unconformable to the analogy of nature; for the elements most abundant on the solid surface of the globe, are not those which are the most essential to the existence of the living beings belonging to it.

The action of the atmosphere on plants differs at different periods of their growth, and varies with the various stages of the developement and decay of their organs. Some general idea of its influence may have been gained from circumstances already mentioned: I shall now refer to it more particularly, and endeavor to connect it with a general view of the progress of vegetation.

If a healthy seed be moistened and exposed to air at a temperature not below 45°, it soon germinates; it shoots forth a plume which rises upwards, and a radicle which descends.

If the air be confined, it is found that in the process of germination the oxygen, or a part of it, is absorbed. The azote remains unaltered; no carbonic acid is taken away from the air; on the contrary, some is added.

Seeds are incapable of germinating, except when oxygen is present. In the exhausted receiver of the air-pump, in pure azote, in pure carbonic acid, when moistened they swell, but do not vegetate; and if kept in these gases, lose their living powers, and undergo putrefaction.

If a seed be examined before germination, it will be found more or less insipid, at least not sweet; but after germination it is always sweet. Its coagulated mucilage, or starch, is converted into sugar in the process; a substance difficult of solution is changed into one easily soluble; and the sugar carried through the cells or vessels of the cotyledons, is the nourishment of the infant plant. It is easy to understand the nature of the change, by referring to the facts mentioned in the third lecture; and the production of carbonic acid renders probable the idea, that the principal chemical difference between sugar and mucilage depends upon the sugar containing a larger proportion of the elements of water, and upon a slight difference in the proportions of their carbon.

The absorption of oxygen by the seed in germination, has been compared to its absorption in producing the evolution of fœtal life in the egg; but this analogy is only remote. All animals, from the most to the least perfect classes, require a supply of oxygen.* From the moment the heart begins to pulsate till it ceases to beat, the aëration of the blood is constant, and the function of respiration invariable; carbonic acid is given off in the process, but the chemical change produced in the blood is unknown; nor is there any reason to suppose the formation of any substance similar to sugar. In the production of a plant from a seed, some reservoir of nourishment is needed before the root can supply sap; and this reservoir is the cotyledon, in which it is stored up in an insoluble form, and protected, if necessary, during the winter, and rendered soluble by agents which are constantly present on the surface. The change of starch into sugar, connected with the absorption of oxygen, may be rather compared to a process of fermentation than to that of respiration; it is a change effected upon unorganized matter, and can be artificially imitated; and in most of the chemical changes that occur when vegetable compounds are exposed to air, oxygen is absorbed, and carbonic acid formed or evolved.

It is evident, that in all cases of tillage the seeds should be sown so as to be fully exposed to the influence of the air. And one cause of the unproductiveness of cold clayey adhesive soils is, that the seed is coated with matter impermeable to air.

In sandy soils the earth is always sufficiently penetrable by the atmosphere; but in clayey soils there can scarcely be too great a mechanical division of parts in the process of tillage. Any seed not fully supplied with air, always produces a weak and diseased plant.

The process of malting, which has been already referred to, is merely a process in which germination is artificially produced; and in which the starch of the cotyledon is changed into sugar; which sugar is afterwards, by fermentation, converted into spirit.

It is very evident from the chemical principles of germination, that the process of malting should be carried on no further than to produce the sprouting of the radicle, and should be checked as soon as this has made its distinct appearance. If it is pushed to such a degree as to occasion the perfect developement of the radicle and the plume, a considerable quantity of saccharine matter will have been consumed in producing their expansion, and there will be less spirit formed in fermentation, or produced in distillation.

As this circumstance is of some importance, I made in October, 1806, an experiment relating to it. I ascertained by the action of alcohol, the relative proportions of saccharine matter in two equal quantities of the same barley; in one of which the germination had proceeded so far as to occasion a protrusion of the radicle to nearly a-quarter of an inch beyond the grain in most of the specimens, and in the other of which it had been checked before the radicle was a line in length; the quantity of sugar afforded by the last was to that in the first nearly as six to five.

The saccharine matter in the cotyledons at the time of their change into seed-leaves, renders them exceedingly liable to the attacks of insects:

* The impregnated eggs of insects, and even of fishes, do not produce young ones, unless they are supplied with air, that is, unless the fœtus can respire. I have found that the eggs of moths did not produce larvæ when confined in pure carbonic acid; and when they were exposed in common air, the oxygen partly disappeared, and carbonic acid was formed. The fish in the egg or spawn gains its oxygen from the air dissolved in water; and those fishes that spawn in spring and summer in still water, such as the pike, carp, perch, and bream, deposit their eggs upon subaquatic vegetables, the leaves of which, in performing their healthy functions, supply oxygen to the water. The fish that spawn in winter, such as the salmon and trout, seek spots where there is a constant supply of fresh water, as near the sources of streams as possible, and in the most rapid currents, where all stagnation is prevented, and where the water is saturated with air, to which it has been exposed during its deposition from clouds. It is the instinct leading these fish to seek a supply of air for their eggs which carries them from seas or lakes into the mountain country, which induces them to move against the stream, and to endeavor to overleap weirs, mill-dams, and cataracts.

this principle is at once a nourishment of plants and animals, and the greatest ravages are committed upon crops in this first stage of their growth.

The turnip fly, an insect of the colyoptera genus, fixes itself upon the seed-leaves of the turnip at the time that they are beginning to perform their functions; and when the rough leaves of the plume are thrown forth, it is incapable of injuring the plant to any extent.

Several methods have been proposed for destroying the turnip fly, or for preventing it from injuring the crop. It has been proposed to sow radish-seed with the turnip seed, on the idea that the insect is fonder of the seed-leaves of the radish than those of the turnip: it is said that this plan has not been successful, and that the fly feeds indiscriminately on both.

There are several chemical menstrua which render the process of germination much more rapid, when the seeds have been steeped in them. As in these cases the seed-leaves are quickly produced, and more speedily perform their functions, I proposed it as a subject of experiment to examine whether such menstrua might not be useful in raising the turnip more speedily to that state in which it would be secure from the fly; but the result proved that the practice was inadmissible; for seeds so treated, though they germinated much quicker, did not produce healthy plants, and often died soon after sprouting.

I steeped radish-seeds in September, 1807, for 12 hours, in a solution of chlorine, and similar seeds in very diluted nitric acid, in very diluted sulphuric acid, in weak solution of oxysulphate of iron, and some in common water. The seeds in solutions of chlorine and oxysulphate of iron threw out the germ in two days, those in nitric acid in three days, in sulphuric acid in five, and those in water in seven days. But in the cases of premature germination, though the plume was very vigorous for a short time, yet it became at the end of a fortnight weak and sickly; and at that period less vigorous in its growth than the sprouts which had been naturally developed, so that there can be scarcely any useful application of these experiments. Too rapid growth and premature decay seem invariably connected in organized structures: and it is only by following the slow operations of natural causes, that we are capable of making improvements.

There is a number of chemical substances which are very offensive and even deadly to insects, which do not injure, and some of which even assist vegetation. Several of these mixtures have been tried with various success, a mixture of sulphur and lime, which is very destructive to slugs, does not prevent the ravages of the fly on the young turnip crop. His Grace the Duke of Bedford, at my suggestion, was so good as to order the experiment to be tried on a considerable scale at Woburn farm: the mixture of lime and sulphur was strewed over one part of a field sown with turnips; nothing was applied to the other part, but both were attacked nearly in the same manner by the fly.

Mixtures of soot and quick-lime, and urine and quick-lime, will probably be more efficacious. The volatile alkali given off by these mixtures is offensive to insects; and they afford nourishment to the plant. Mr. T. A. Knight* informs me, that he has tried the method by ammoniacal fumes with success; but more extensive trials are necessary to establish its general efficacy. It may, however, be safely adopted; for if it should fail in destroying the fly, it will at least be a useful manure to the land.

After the roots and leaves of the infant plant are formed, the cells and tubes throughout its structure become filled with fluid, which is usually supplied from the soil, and the function of nourishment is performed by the action of its organs upon the external elements. The constituent parts of the air are subservient to this process; but, as it might be expected, they act differently under different circumstances.

When a growing plant, the roots of which are supplied with proper nourishment, is exposed in the presence of solar light to a given quantity of atmospherical air, containing its due proportion of carbonic acid, the carbonic acid after a certain time is destroyed, and a certain quantity of oxygen is found in its place. If new quantities of carbonic acid gas be supplied, the same result occurs; so that carbon is added to plants from the air by the process of vegetation in sunshine; and oxygen is added to the atmosphere.

This circumstance is proved by a number of experiments made by Drs. Priestley, Ingenhousz, and Woodhouse, and M. T. de Saussure; many

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* Mr. Knight has been so good as to furnish me with the following note on this subject.

"The experiment which I tried the year before last, and last year, to preserve turnips from the fly, has not been sufficiently often repeated to enable me to speak with any degree of decision; and last year all my turnips succeeded perfectly well. In consequence of your suggestion, when I had the pleasure to meet you some years ago at Holkham, that lime slaked with urine might possibly be found to kill, or drive off, the insects from a turnip crop, I tried that preparation in mixture with three parts of soot, which was put into a small barrel, with gimlet holes round it, to permit a certain quantity of the composition, about four bushels to an acre, to pass out, and to fall into the drills with the turnip seeds. Whether it was by affording highly stimulating food to the plant, or giving some flavor which the flies did not like, I cannot tell; but in the year 1811, the adjoining rows were eaten away, and those to which the composition was applied, as above described, were scarcely at all touched. It is my intention in future to drill my crop in, first, with the composition on the top of the ridge; and then to sow at least a pound of seed, broad-cast, over the whole ground. The expense of this will be very trifling, not more than 2s. per acre; and the horse-hoe will instantly sweep away all the supernumeraries between the rows, should those escape the flies, to which, however, they will be chiefly attracted; because it will always be found that those insects prefer turnips growing in poor to those in rich ground. One advantage seems to be the acceleration given to the growth of the plants, by the highly stimulative effects of the food they instantly receive, as soon as their growth commences, and long before their radicals have reached the dung. The directions above given apply only to turnips sowed upon ridges, with the manure immediately under them; and I am quite certain, that in all soils turnips should be thus cultivated. The close vicinity of the manure, and the consequent short time required to carry the food into the leaf, and return the organizable matter to the roots, are, in my hypothesis, points of vast importance; and the results in practice are correspondent."

of which I have repeated with similar results. The absorption of carbonic acid gas and the production of oxygen are performed by the leaf; and leaves recently separated from the tree effect the change, when confined in portions of air containing carbonic acid; and absorb carbonic acid and produce oxygen, even when immersed in water holding carbonic acid in solution.

The carbonic acid is probably absorbed by the fluids in the cells of the green or parenchymatous part of the leaf; and it is from this part that oxygen gas is produced during the presence of light. M. Sennebier found that the leaf, from which the epidermis was stripped off, continued to produce oxygen when placed in water containing carbonic acid gas, and the globules of air rose from the denuded parenchyma; and it is shown both from the experiments of Sennebier and Woodhouse, that the leaves most abundant in parenchymatous parts produce most oxygen in water impregnated with carbonic acid.

Some few plants* will vegetate in an artificial atmosphere, consisting principally of carbonic acid, and many will grow for some time in air containing from one-half to one-third; but they are not so healthy as when supplied with smaller quantities of this elastic substance.

Plants exposed to light have been found to produce oxygen gas in an elastic medium and in water containing no carbonic acid gas; but in quantities much smaller than when carbonic acid gas was present.

In the dark, no oxygen gas is produced by plants, whatever be the elastic medium to which they are exposed; and no carbonic acid absorbed. In most cases, on the contrary, oxygen gas, if it be present, is absorbed, and carbonic acid gas is produced.

In the changes that take place in the composition of the organized parts it is probable that saccharine compounds are principally formed during the absence of light: gum, woody fibre, oils, and resins, during its presence; and the evolution of carbonic acid gas, or its formation during the night, may be necessary to give greater solubility to certain compounds in the plant. I once suspected that all the carbonic acid gas, produced by plants in the night, or in shade, might be owing to the decay of some part of the leaf, or epidermis; but the recent experiments of Mr. D. Ellis are opposed to this idea; and I found that a perfectly healthy plant of celery, placed in a given portion of air for a few hours only, occasioned a production of carbonic acid gas, and an absorption of oxygen.

Some persons have supposed that plants exposed in the free atmosphere to the vicissitudes of sunshine and shade, light and darkness, consume more oxygen than they produce, and that their permanent agency upon air is similar to that of animals; and this opinion is espoused by the writer on the subject I have just quoted, in his ingenious researches on vegetation. But all experiments brought forwards in favor of this idea, and particularly his experiments, have been made under circumstances unfavorable to accuracy of result. The plants have been confined and supplied with food in an unnatural manner; and the influence of light upon them has been very much diminished by the nature of the media through which it passed. Plants confined in limited portions of atmospheric air soon become diseased; their leaves decay, and by their decomposition they rapidly destroy the oxygen of the air. In some of the early experiments of Dr. Priestley, before he was acquainted with the agency of light upon leaves, air that had supported combustion and respiration, was found purified by the growth of plants when they were exposed in it for successive days and nights; and his experiments are the more unexceptionable, as the plants, in many of them, grew in their natural states; and shoots, or branches from them, only were introduced through water into the confined atmosphere.

I have made some few researches on this subject, and I shall describe their results. On the 12th of July, 1800, I placed a turf four inches square, clothed with grass, principally meadow fox-tail, and white clover, in a porcelain dish, standing in a shallow tray filled with water; I then covered it with a jar of flint glass, containing 380 cubical inches of common air in its natural state. It was exposed in a garden, so as to be liable to the same changes with respect to light as in the common air. On the 20th of July the results were examined. There was an increase of the volume of the gas, amounting to fifteen cubical inches; but the temperature had changed from 64° to 71°; and the pressure of the atmosphere, which on the 12th had been equal to the support of 30.1 inches of mercury, was now equal to that of 30.2. Some of the leaves of the white clover, and of the fox-tail were yellow, and the whole appearance of the grass less healthy than when it was first introduced. A cubical inch of the gas, agitated in lime-water, gave a slight turbidness to the water; and the absorption was not quite $\frac{1}{150}$ of its volume: 100 parts of the residual gas exposed to a solution of green sulphate of iron, impregnated with nitrous gas, a substance which rapidly absorbs oxygen from air, occasioned a diminution to 80 parts; 100 parts of the air of the garden occasioned a diminution to 79 parts.

If the results of this experiment be calculated upon, it will appear that the air had been slightly deteriorated by the action of the grasses. But the weather was unusually cloudy during the progress of the experiment; the plants had not been supplied in a natural manner with carbonic acid gas; and the quantity formed during the night, and by the action of the faded leaves, must have been partly dissolved by the water; and that this was actually the case, I proved by pouring lime-water into the water, when an immediate precipitation was occasioned. The increase of azote I am inclined to attribute to common air disengaged from the water.

The following experiment I consider as conducted under circumstances more analogous to those existing in nature. A turf four inches square, from an irrigated meadow, clothed with common meadow grass, meadow fox-tail grass, and vernal meadow grass, was placed in a porcelain dish, which swam on the surface of water impregnated with carbonic acid gas. A vessel of thin flint glass, of the capacity of 230 cubical inches, having a funnel furnished with a stop-cock inserted in the top, was made to cover the grass; and the apparatus was exposed in an open place;

* I found the Arenaria tenuifolia to produce oxygen in carbonic acid, which was nearly pure.

a small quantity of water was daily supplied to the grass by means of the stop-cock.* Every day likewise a certain quantity of water was removed by a syphon, and water saturated with carbonic acid gas was supplied in its place; so that it may be presumed that a small quantity of carbonic acid gas was constantly present in the receiver. On the 7th of July, 1807, the first day of the experiment, the weather was cloudy in the morning, but fine in the afternoon; the thermometer at 67, the barometer 30.2: towards the evening of this day a slight increase of the gas was perceived: the next three days were bright; but in the morning of the 11th the sky was clouded; a considerable increase of the volume of the gas was now observed: the 12th was cloudy, with gleams of sunshine; there was still an increase, but less than in the bright days: the 13th was bright. About nine o'clock A. M. on the 14th, the receiver was quite full; and considering the original quantity in the jar, it must have been increased by at least 30 cubical inches of elastic fluid: at times during this day globules of gas escaped. At ten on the morning of the 15th, I examined a portion of the gas; it contained less than $\frac{1}{50}$ of carbonic acid gas; 100 parts of it exposed to the impregnated solution left only 75 parts; so that the air was four per cent. purer than the air of the atmosphere.

I shall detail another similar experiment made with equally decisive results. A shoot from a vine, having three healthy leaves belonging to it, attached to its parent tree, was bent so as to be placed under the receiver which had been used in the last experiment; the water confining the common air was kept in the same manner impregnated with carbonic acid gas: the experiment was carried on from August 6th, till August 14th, 1807; during this time, though the weather had been generally clouded, and there had been some rain, the volume of elastic fluid continued to increase. Its quality was examined on the morning of the 15th; it contained $\frac{1}{17}$ of carbonic acid gas, and 100 parts of it afforded 23.5 of oxygen gas.

These facts confirm the popular opinion, that when the leaves of vegetables perform their healthy functions, they tend to purify the atmosphere in the common variations of weather, and changes from light to darkness.

In germination, and at the time of the decay of the leaf, oxygen must be absorbed; but when it is considered how large a part of the surface of the earth is clothed with perennial grasses, and that half of the globe is always exposed to the solar light it appears by far the most probable opinion, that more oxygen is produced than consumed during the process of vegetation; and that it is this circumstance which is the principal cause of the uniformity of the constitution of the atmosphere.

Animals produce no oxygen gas during the exercise of any of their functions, and they are constantly consuming it; but the extent of the animal, compared to that of the vegetable kingdom, is very small; and the quantity of carbonic acid gas produced in respiration, and in various processes of combustion and fermentation, bears a proportion extremely minute to the whole volume of the atmosphere: if every plant during the progress of its life makes a very small addition of oxygen to the air, and occasions a very small consumption of carbonic acid, the effect may be conceived adequate to the wants of nature.

It may occur as an objection to these views, that if the leaves of plants purify the atmosphere, towards the end of autumn, and through the winter, and early spring, the air in our climates must become impure, the oxygen in it diminish, and the carbonic acid gas increase, which is not the case; but there is a very satisfactory answer to this objection. The different parts of the atmosphere are constantly mixed together by winds, which, when they are strong, move at the rate of from 60 to 100 miles in an hour. In our winter, the southwest gales convey air which has been purified by the vast forests and savannahs of South America, and which passing over the ocean, arrives in an uncontaminated state. The storms and tempests which often occur at the beginning, and towards the middle of our winter, and which generally blow from the same quarter of the globe, have a salutary influence. By constant agitation and motion, the equilibrium of the constituent parts of the atmosphere is preserved; it is fitted for the purposes of life; and those events which the superstitious formerly referred to the wrath of Heaven, or the agency of evil spirits, and in which they saw only disorder and confusion, are demonstrated, by science, to be ministrations of Divine Intelligence, and connected with the order and harmony of our system.

I have reasoned, in a former part of this lecture, against the close analogy which some persons have assumed between the absorption of oxygen and the formation of carbonic acid gas in germination, and in the respiration of the fœtus. Similar arguments will apply against the pursuit of this analogy, between the functions of the leaves of the adult plant, and those of the lungs of the adult animal. Plants grow vigorously only when supplied with light; and most species die if deprived of it. It cannot be supposed that the production of oxygen from the leaf, which is known to be connected with its natural color, is the exertion of a diseased function, or that it can acquire carbon in the day-time, when it is in most vigorous growth, when the sap is rising, when all its powers of obtaining nourishment are exerted, merely for the purpose of giving it off again in the night, when its leaves are closed, when the motion of the sap is imperfect, and when it is in a state approaching to that of quiescence. Many plants that grow upon rocks, or soils, containing no carbonic matter, can only be supposed to acquire their charcoal from the carbonic acid gas in the atmosphere; and the leaf may be considered at the same time as an organ of absorption, and an organ in which the sap may undergo different chemical changes.

When pure water only is absorbed by the roots of plants, the fluid, in passing into the leaves, will probably have greater power to absorb carbonic acid from the atmosphere. When the water is saturated with carbonic acid gas, some of this substance, even in the sunshine, may be given off by the leaves; but a part of it likewise will be always decomposed, which has been proved by the experiments of M. Sennebier.

When the fluid taken up by the roots of plants contains much carbonaceous matter, it is probable that plants may give off carbonic acid from their leaves even in the sunshine. In short, the func-

* See Fig. 17.

Fig. 17.

tion of the leaf must vary according to the composition of the sap passing through it, and according to the nature of the products which are formed from it. When sugar is to be produced, as in early spring at the time of the developement of buds and flowers, it is probable that less oxygen will be given off than at the time of the ripening of the seed, when starch, or gums, or oils, are formed; and the process of ripening the seed usually takes place when the agency of the solar light is most intense. When the acid juices of fruits become saccharine in the natural process of vegetation, more oxygen, there is every reason to believe, must be given off, or newly combined, than at other times; for, as it was shown in the third lecture, all the vegetable acids contain more oxygen than sugar. It appears probable, that in some cases in which oily and resinous bodies are formed in vegetation, water may be decomposed; its oxygen set free, and its hydrogen absorbed.

Mr. Berard, of Montpellier, has shown that fruits in ripening convert the oxygen of the air into carbonic acid; and that the process of ripening may be suspended by the exclusion of the fruit from oxygen gas, and that it will go on again after a certain interval of time. Unripe peaches, plums, and apricots, may be preserved in close bottles, filled with air deprived of oxygen, for from twenty days to a month; and pears and apples about three months, when they will afterward ripen perfectly by exposure to air.

I have already mentioned, that some plants produce oxygen in pure water. Dr. Ingenhousz found this to be the case with species of the confervæ. I have tried the leaves of many plants, particularly those that produce volatile oils. When such leaves are exposed in water saturated with oxygen gas, oxygen is given off in the solar light; but the quantity is very small, and always limited; nor have I been able to ascertain with certainty whether the vegetative powers of the leaf were concerned in the operation, though it seems probable. I obtained a considerable quantity of oxygen in an experiment made fifteen years ago, in which vine leaves were exposed to pure water; but on repeating the trials often since, the quantities have always been very much smaller. I am ignorant whether this difference is owing to the peculiar state of the leaves, or to some confervæ which might have adhered to the vessel, or to other sources of fallacy.

The most important and most common products of vegetables, mucilage, starch, sugar, and woody fibre, are composed of water, or the elements of water in their due proportion, and charcoal; and these, or some of them, exist in all plants: and the decomposition of carbonic acid, and the combination of water in vegetable structures, are processes which must occur almost universally.

When glutinous and albuminous substances exist in plants, the azote they contain may be suspected to be derived from the atmosphere: but no experiments have been made which prove this; they might easily be instituted upon mushrooms and funguses.

In cases in which buds are formed, or shoots thrown forth from roots, oxygen appears to be uniformly absorbed, as in the germination of seeds. I exposed a small potato, moistened with common water, to 24 cubical inches of atmospherical air, at a temperature of 59°. It began to throw forth a shoot on the third day; when it was half an inch long I examined the air; nearly a cubical inch of oxygen was absorbed, and about three-fourths of a cubical inch of carbonic acid formed. The juices in a shoot separated from the potato had a sweet taste; and the absorption of oxygen, and the production of carbonic acid, were probably connected with the conversion of a portion of starch into sugar. When potatoes that have been frozen are thawed, they become sweet; probably oxygen is absorbed in this process; if so, the change may be prevented by thawing them out of the contact of air; under water, for instance, that has been recently boiled.

In the tillering of corn, that is, the production of new stalks round the original plume, there is every reason to believe that oxygen must be absorbed; for the stalk at which the tillering takes place always contains sugar, and the shoots arise from a part deprived of light. The drill husbandry favors this process; for loose earth is thrown by hoing round the stalks: they are preserved from light, and yet supplied with oxygen. I have counted from 40 to 120 stalks produced from a grain of wheat, in a moderately good crop of drilled wheat. And we are informed by Sir Kenelm Digby, in 1660, that there was in the possession of the Fathers of the Christian Doctrine at Paris, a plant of barley, which they, at that time, kept by them as a curiosity, and which consisted of 249 stalks springing from one root, or grain; and in which they counted above 18,000 grains or seeds of barley.

The great increase which takes place in the transplantation of wheat depends upon the circumstance, that each layer thrown out in tillering may be removed, and treated as a distinct plant. In the Philosophical Transactions, vol. lviii. page 203, the following statement may be found: Mr. C. Miller, of Cambridge, sowed some wheat on the 2d of June, 1766; and on the 8th of August, a plant was taken and separated into 18 parts, and replanted; these plants were again taken up, and divided in the months of September and October, and planted separately to stand the winter, which division produced 67 plants. They were again taken up in March and April, and produced 500 plants: the number of ears thus formed from one grain of wheat was 21,109, which gave three pecks and three quarters of corn that weighed 47 lbs. 7 oz., and that were estimated at 576,840 grains.

It is evident from the statements just given, that the change which takes place in the juices of the leaf by the action of the solar light, must tend to increase the proportion of inflammable matter to their other constituent parts. And the leaves of the plants that grow in darkness or in shady places are uniformly pale; their juices are watery and saccharine, and they do not afford oils or resinous substances. I shall detail an experiment on this subject.

I took an equal weight, 400 grains, of the leaves of two plants of endive; one bright green, which had grown fully exposed to light, and the other almost white, which had been secluded from light by being covered with a box; after being both acted upon for some time by boiling water, in the state of pulp, the undissolved matter was dried, and exposed to the action of warm alcohol. The matter from the green leaves gave it a tinge of olive; that from the pale leaves did not alter its color. Scarcely any solid matter was produced by evaporation of the alcohol that had been digested on the pale leaves: whereas, by the evaporation of that from the green leaves a considerable residuum was obtained; five grains of which were separated from the vessel in which the evaporation was carried on; they burnt with flame, and appeared partly matter analogous to resin: 53 grains of woody fibre were obtained from the green leaves, and only 31 from the pale leaves.

It has been mentioned in the third lecture, that the sap probably, in common cases, descends from the leaves into the bark; the bark is usually so loose in its texture, that the atmosphere may possibly act upon it in the cortical layers; but the changes taking place in the leaves appear sufficient to explain the difference between the products obtained from the bark and from the alburnum; the first of which contains more carbonaceous matter than the last.

When the similarity of the elements of different vegetable products is considered according to the views given in the third lecture, it is easy to conceive how the different organized parts may be formed from the same sap, according to the manner in which it is acted on by heat, light, and air. By the abstraction of oxygen, the different inflammable products, fixed and volatile oils, resins, camphor, woody fibre, &c., may be produced from saccharine or mucilaginous fluids; and by the abstraction of carbon and hydrogen, starch, sugar, the different vegetable acids and substances soluble in water, may be formed with highly combustible and insoluble substances. Even the limpid volatile oils which convey the fragrance of the flower, consist of different proportions of the same essential elements as the dense woody fibre; and both are formed by different changes in the same organs, from the same materials, and at the same time.

M. Vauquelin has lately attempted to estimate the chemical changes taking place in vegetation, by analyzing some of the organized parts of the horse-chestnut in their different stages of growth. He found in the buds collected, March 7, 1812, tanning principle, and albuminous matter capable of being obtained separately, but, when obtained, combining with each other. In the scales surrounding the buds, he found the tanning principle, a little saccharine matter, resin, and a fixed oil. In the leaves fully developed, he discovered the same principles as in the buds; and in addition, a peculiar green resinous matter. The petals of the flower yielded a yellowish resin, saccharine matter, albuminous matter, and a little wax: the stamina afforded sugar, resin, and tannin.

The young chestnuts examined immediately after their formation, afforded a large quantity of a matter which appeared to be a combination of albuminous matter and tannin. All the parts of the plant afforded saline combinations of the acetic and phosphoric acids.

M. Vauquelin could not obtain a sufficient quantity of the sap of the horse-chestnut for examination, a circumstance much to be regretted; and he has not stated the relative quantities of the different substances in the buds, leaves, flowers, and seeds. It is probable, however, from his unfinished details, that the quantity of resinous matter is increased in the leaf, and that the white fibrous pulp of the chestnut is formed by the mutual action of albuminous and astringent matter, which probably are supplied by different cells or vessels. I have already mentioned that the cambium, from which the new parts in the trunk and branches appear to be formed, probably owes its power of consolidation to the mixture of two different kinds of sap, one of which flows upwards from the roots, and the other of which probably descends from the leaves. I attempted, in May, 1804, at the time the cambium was forming in the oak, to ascertain the nature of the action of the sap of the alburnum upon the juices of the bark. By perforating the alburnum in a young oak, and applying an exhausting syringe to the aperture, I easily drew out a small quantity of sap. I could not, however, in the same way obtain sap from the bark. I was obliged to recur to the solution of its principles in water, by infusing a small quantity of fresh bark in warm water; the liquid obtained in this way was highly colored and astringent; and produced an immediate precipitate in the alburnous sap, the taste of which was sweetish, and slightly astringent, and which was colorless.

The increase of trees and plants must depend upon the quantity of sap which passes into their organs; upon the quality of this sap; and on its modification by the principles of the atmosphere. Water, as it is the vehicle of the nourishment of the plant, is the substance principally given off by the leaves. Dr. Hales found that a sunflower, in one day of twelve hours, transpired by its leaves one pound fourteen ounces of water, all of which must have been imbibed by its roots.

The powers which cause the ascent of the sap have been slightly touched upon in the second and third lectures. The roots imbibe fluids from the soil by capillary attraction; but this power alone is insufficient to account for the rapid elevation of the sap into the leaves. This is fully proved by the following fact, detailed by Dr.

Hales, vol. i. of the Vegetable Statics, page 114: A vine branch, four or five years old, was cut through, and a glass tube carefully attached to it; this tube was bent as a syphon, and filled with quicksilver; so that the force of the ascending sap could be measured by its effect in elevating the quicksilver. In a few days it was found that the sap had been propelled forwards with so much force as to raise the quicksilver to 38 inches, which is a force considerably superior to that of the usual pressure of the atmosphere. Capillary attraction can only be exerted by the surfaces of small vessels, and can never raise a fluid into tubes above the vessels themselves.

I referred, in the beginning of the third lecture, to Mr. Knight's opinion, that the contractions and expansions of the silver grain in the alburnum are the most efficient cause of the ascent of the fluids contained in its pores and vessels. The views of this excellent physiologist are rendered extremely probable by the facts he has brought forward in support of them. Mr. Knight found that a very small increase of temperature was sufficient to cause the fibres of the silver grain to separate from each other, and that a very slight diminution of heat produced their contraction. The sap rises most vigorously in spring and autumn, at the time the temperature is variable; and if it be supposed that, in expanding and contracting, the elastic fibres of the silver grain exercise a pressure upon the cells and tubes containing the fluid absorbed by the capillary attraction of the roots, this fluid must constantly move upwards towards the points where a supply is needed.

The experiments of Montgolfier, the celebrated inventor of the balloon, have shown that water may be raised almost to an indefinite height by a very small force, provided its pressure be taken off by continued divisions in the column of fluid. This principle, there is great reason to suppose, must operate in assisting the ascent of the sap in the cells and vessels of plants which have no rectilineal communication, and which every where oppose obstacles to the perpendicular pressure of the sap.

The changes taking place in the leaves and buds, and the degree of their power of transpiration, must be intimately connected likewise with the motion of the sap upwards. This is shown by several experiments of Dr. Hales.

A branch from an apple-tree was separated and introduced into water, and connected with a mercurial gauge. When the leaves were upon it, it raised the mercury by the force of the ascending juices to four inches; but a similar branch, from which the leaves were removed, scarcely raised it a quarter of an inch.

Those trees, likewise, whose leaves are soft and of a spongy texture, and porous at their upper surfaces, displayed by far the greatest powers with regard to the elevation of the sap.

The same accurate philosopher whom I have just quoted found that the pear, quince, cherry, walnut, peach, gooseberry, water-elder, and sycamore, which have all soft and unvarnished leaves, raised the mercury under favorable circumstances from three to six inches. Whereas the elm, oak, chestnut, hazel, sallow, and ash, which have firmer and more glossy leaves, raised the mercury only from one to two inches. And the evergreens, and trees bearing varnished leaves, scarcely at all affected it; particularly the laurel and the laurustinus.

It will be proper to mention the facts which show that in many cases fluids descend through the bark. Mr. Knight has shown, in the Philosophical Transactions, that long strips of bark, every where detached from the alburnum of the tree, except at their upper ends, deposited as much alburnum as they could have done, if they had retained their natural position. In these cases, the sap must have descended through the bark wholly.

M. Baisse placed branches of different trees in an infusion of madder, and kept them there for a long time. He found, in all cases, that the wood became red before the bark; and that the bark began to receive no tinge till the whole of the wood was colored, and till the leaves were affected; and that the coloring matter first appeared above, in the bark immediately in contact with the leaves.

Similar experiments were made by M. Bonnet, and with analogous results, though not so perfectly distinct as those of M. Baisse.

Du Hamel found, that in different species of the pine and other trees, when strips of bark were removed, the upper part of the wound only emitted fluid, whilst the lower part remained dry.

This may likewise be observed in the summer in fruit trees, when the bark is wounded, the alburnum remaining untouched.

The motion of the sap through the bark seems principally to depend upon gravitation. When the watery particles have been considerably dissipated by the transpiring functions of the leaves, and the mucilaginous, inflammable, and astringent constituents, increased by the agency of heat, light, and air, the continued impulse upwards from the alburnum forces the remaining inspissated fluid into the cortical vessels, which receive no other supply. In these, from its weight, its natural tendency must be to descend; and the rapidity of the descent must depend upon the general consumption of the fluids of the bark in the living processes of vegetation; for there is every reason to believe that no fluid passes into the soil through the roots; and it is impossible to conceive a free lateral communication between the absorbent vessels of the alburnum in the roots, and the transporting or carrying vessels of the bark; for if such a communication existed, there is no reason why the sap should not rise through the bark as well as through the alburnum; for the same physical powers would then operate upon both.

Some authors have supposed that the sap rises in the alburnum, and descends through the bark, in consequence of a power similar to that which produces the circulation of the blood in animals; a force analogous to the muscular force in the sides of the vessels.

This analogy has, however, in general, been too much insisted upon and too loosely stated; there are undoubtedly resemblances more or less remote in every part of created nature; but the irritability of the muscular fibre in animals and the contractibility of the vascular system in plants appear to depend upon entirely different causes.

In crystallization, or the regular arrangement of inorganic substances, there is a constant increase of matter from the attraction and juxta-position of like parts or molecules. In vegetation a germ expands by the assimilation of a variety of new aliments, and by powers entirely different from those of common inorganic matter; but there seems to be no system of nerves, as in animals, which is essential to irritability. We know so little of the refined powers and properties of matter, that we can give little more than vague hypotheses as to the cause of the movement of the fluids in the vegetable cells or tubes; yet it is impossible not to allow common material agents a much greater share in producing this phenomenon, than they exercise in animal life.

Whoever will peruse any considerable part of the Vegetable Statics of Hales, must receive a deep impression of the dependence of the motion of the sap upon physical causes. In the same tree, this sagacious person observed that in a cold cloudy morning, when no sap ascended, a sudden change was produced by a gleam of sunshine of half an hour, and a vigorous motion of the fluid. The alteration of the wind from south to the north immediately checked the effect. On the coming on of a cold afternoon after a hot day, the sap that had been rising began to fall. A warm shower and a sleet storm produced opposite effects.

Many of his observations likewise show that the different powers which act on the adult tree, produce different effects at different seasons.

Thus, in the early spring, before the buds expand, the variations of the temperature, and changes of the state of the atmosphere with regard to moisture and dryness, exert their great effects upon the expansions and contractions of the vessels; and then the tree is in what is called by gardeners its bleeding season.

When the leaves are fully expanded, the great determination of the sap is to these new organs. And hence a tree which emits sap copiously from a wound whilst the buds are opening, will no longer emit it in summer when the leaves are perfect; but in the variable weather, towards the end of autumn, when the leaves are falling, it will again possess the power of bleeding in a very slight degree in the warmest days: but at no other times.

In all these circumstances there is nothing truly analogous to the irritable action of animal systems.

In animal systems the heart and arteries are in constant pulsation. Their functions are unceasingly performed in all climates, and in all seasons; in winter, as well as in spring; upon the arctic snows, and under the tropical suns. They neither cease in the periodical nocturnal sleep, common to most animals; nor in the long sleep of winter, peculiar to a few species. The power is connected with animation, is limited to beings possessing the means of voluntary locomotion; it co-exists with the first appearance of vitality; it disappears only with the last spark of life.

As the operation of the different physical agents upon the sap vessels of plants ceases, and the fluid becomes quiescent, the materials dissolved in it by heat are deposited in the cells of the alburnum; and in consequence of this deposition, a nutritive matter is provided for the first wants of the plant in early spring, to assist the opening of the buds, and their expansion, when the motion from the want of leaves is as yet feeble.

This beautiful principle in the vegetable economy was first pointed out by Dr. Darwin; and Mr. Knight has given a number of experimental elucidations of it.

Mr. Knight made numerous incisions into the alburnum of the sycamore and the birch at different heights; and in examining the sap that flowed from them, he found it more sweet and mucilaginous in proportion as the aperture from which it flowed was elevated; which he could ascribe to no other cause than to its having dissolved sugar and mucilage, which had been stored up through the winter.

He examined the alburnum in different poles of oak in the same forest; of which some had been felled in winter, and others in summer; and he always found most soluble matter in the wood felled in winter, and its specific gravity was likewise greater.

In all perennial trees this circumstance takes place; and likewise in grasses and shrubs. The joints of the perennial grasses contain more saccharine and mucilaginous matter in winter than at any other season; and this is the reason why the fiorin or agrostis alba, which abounds in these joints, affords so useful a winter food.

The roots of shrubs contain the largest quantity of nourishing matter in the depth of winter; and the bulb in all plants possessing it is the receptacle in which nourishment is hoarded up during winter.

In annual plants the sap seems to be fully exhausted of all its nutritive matter by the production of flowers and seeds; but if parts of annual plants, having leaves and buds, be detached and kept so that they do not expend themselves by affording blossoms or seeds, the same individual life may be preserved through many years. It appears, therefore, as Mr. Knight observes, to be habit only, not life, that is annual in such plants.

When perennial grasses are cropped very close by feeding cattle late in autumn, it has been often observed by farmers that they never rise vigorously in the spring; and this is owing to the removal of that part of the stalk which would have afforded them concrete sap, their first nourishment.

Ship-builders prefer for their purposes that kind of oak timber afforded by trees that have had their bark stripped off in spring, and which have been cut in the autumn or winter following. The reason of the superiority of this timber is, that the concrete sap is expended in the spring in the sprouting of the leaf; and the circulation being destroyed, it is not formed anew; and the wood having its pores free from saccharine matter, is less liable to undergo fermentation from the action of moisture and air.

In perennial trees a new alburnum, and consequently a new system of vessels is annually produced, and the nutriment for the next year deposited in them; so that the new buds, like the plume of the seed, are supplied with a reservoir of matter essential to their first developement.

The old alburnum gradually loses its vascular structure, and, being constantly pressed upon by the expansive force of the new fibres, becomes harder, denser, and at length becomes heart-wood; and in a certain time obeys the common laws of dead matter, decays, decomposes, and it is converted into aëriform and carbonic elements; into those principles from which it was originally formed.

The decay of the heart-wood seems to constitute the great limit to the age and size of trees.—And in young branches from old trees, it is much more liable to decompose than in similar branches from seedlings. This is likewise the case with grafts. The graft is only nourished by the sap of the tree to which it is transferred; its properties are not changed by it: the leaves, blossoms, and fruits are of the same kind as if it had vegetated upon its parent stock. The only advantage to be gained in this way, is the affording to a graft from an old tree a more plentiful and healthy food than it could have procured in its natural state; it is rendered for a time more vigorous, and produces fairer blossoms and richer fruits. But it partakes not merely of the obvious properties, but likewise of the infirmities and disposition to old age and decay of the tree whence it sprung.

This seems to be distinctly shown by the observations and experiments of Mr. Knight. He has, in a number of instances, transferred the young scions and healthy shoots from old esteemed fruit-bearing trees to young seedlings. They flourished for two or three years; but they soon became diseased and sickly, like their parent trees.

It is from this cause that so many of the apples formerly celebrated for their taste and their uses in the manufacture of cider are gradually deteriorating, and many will soon disappear. The red streak, and the moil, so excellent in the beginning of the last century, are now in the extremest stage of their decay; and however carefully they are ingrafted, they merely tend to multiply a sickly and exhausted variety.*

The tress possessing the firmest and the least porous heart-wood are the longest in duration.

In general, the quantity of charcoal afforded by woods offers a tolerably accurate indication of their durability: those most abundant in charcoal and earthy matter are most permanent; and those that contain the largest proportion of gaseous elements are the most destructible.

Amongst our own trees, the chestnut and the oak are pre-eminent as to durability; and the chestnut affords rather more carbonaceous matter than the oak.

In old Gothic buildings these woods have been sometimes mistaken one for the other; but they may be easily known by this circumstance, that the pores in the alburnum of the oak are much larger and more thickly set, and are easily distinguished; whilst the pores in the chestnut require glasses to be seen distinctly.

In consequence of the slow decay of the heart-wood of the oak and chestnut, these trees, under favorable circumstances, attain an age which cannot be much short of 1000 years.

The beech, the ash, and the sycamore, most likely never live half as long. The duration of the apple-tree is not, probably, much more than 200 years; but the pear-tree, according to Mr. Knight, lives through double this period. Most of our best apples are supposed to have been introduced into Britain by a fruiterer of Henry the Eighth, and they are now in a state of old age.

The oak and chestnut decay much sooner in a moist situation than in a dry and sandy soil; and their timber is less firm. The sap vessels in such cases are more expanded, though less nourishing matter is carried into them; and the general texture of the formations of wood necessarily less firm. Such wood splits more easily, and is more liable to be affected by variations in the state of the atmosphere.

The same trees, in general, are much longer-lived in the northern than in the southern climates. The reason seems to be, that all fermentation and decomposition are checked by cold; and at very low temperatures both animal and vegetable matters altogether resist putrefaction: and in the northern winter, not only vegetable life, but likewise vegetable decay, must be at a stand.

The anti-putrescent quality of cold climates is fully illustrated in the instances of the rhinoceros and mammoth, lately found in Siberia, entire beneath the frozen soil, in which they must probably have existed from the time of the deluge. I examined a part of the skin of the mammoth sent to this country, on which there was some coarse hair; it had all the chemical characters of recently dried skin.

Trees that grow in situations much exposed to winds, have harder and firmer wood than such as are considerably sheltered. The dense sap is determined by the agitation of the smaller branches to the trunk and larger branches, where the new alburnum formed is consequently thick and firm. Such trees abound in the crooked limbs fitted for forming knee-timber, which is necessary for joining the decks and the sides of ships. The gales in elevated situations gradually act so as to give the tree the form best calculated to resist their effects. And the mountain oak rises robust and sturdy; fixed firmly in the soil, and able to oppose the full force of the tempest.

The decay of the best varieties of fruit-bearing trees which have been distributed through the country by grafts, is a circumstance of great importance. There is no mode of preserving them; and no resource, except that of raising new varieties by seeds.

Where a species has been ameliorated by culture, the seeds it affords, other circumstances being similar, produce more vigorous and perfect plants; and in this way the great improvements in the production of our fields and gardens seem to have been occasioned.

Wheat, in its indigenous state, as a natural production of the soil, appears to have been a very small grass; and the case is still more remarkable with the apple and the plum. The crab seems to have been the parent of all our apples. And two fruits can scarcely be conceived more different, in color, size, and appearance, than the wild plum and the rich magnum bonum.

The seeds of plants exalted by cultivation always furnish large and improved varieties; but the flavor, and even the color of the fruit, seems to be a matter of accident. Thus a hundred seeds

* This opinion relative to the loss of varieties of fruit-bearing trees is not in accordance with the views of M. De Candolle on the subject of the length of life of trees; viz. that, excluding accidents and disease, it is unlimited. Much deference is due to so high an authority; and, assuredly, the doctrine of Mr. Knight, referred to above, should not be received and acted on by practical men, unless clearly demonstrated to be true, because, if taken for granted, it will necessarily lead to the neglect of old varieties of fruit-trees, on the idea that they are in the decline and decrepitude of age, and about to die. *Vide* Physiologie Végétale, liv. 4, chap. xi., where the subject is most ingeniously discussed.—J. D.

of the golden pippin will 'all produce fine large-leaved apple trees, bearing fruit of a considerable size; but the tastes and colors of the apples from each will be different, and none will be the same in kind as those of the pippin itself. Some will be sweet, some sour, some bitter, some mawkish, some aromatic; some yellow, some green, some red, and some streaked. All the apples will, however, be much more perfect than those from the seeds of a crab, which produce trees all of the same kind, and all bearing sour and diminutive fruit.

The power of the horticulturist extends only to the multiplying excellent varieties by grafting. They cannot be rendered permanent; and the good fruits at present in our gardens are the produce of a few seedlings, selected probably from hundreds of thousands; the results of great labor and industry, and multiplied experiments.

The larger and thicker the leaves of a seedling, and the more expanded its blossoms, the more it is likely to produce a good variety of fruit. Short-leaved trees should never be selected; for these approach nearer to the original standard: whereas the other qualities indicate the influence of cultivation.

In the general selection of seeds, it would appear that those arising from the most highly cultivated varieties of plants, are such as give the most vigorous produce; but it is necessary from time to time to change, and, as it were, to cross the breed.

By applying the pollen, or dust of the stamina, from one variety to the pistil of another of the same species, a new variety may be easily produced; and Mr. Knight's experiments seem to warrant the idea that great advantages may be derived from this method of propagation.

Mr. Knight's large peas, produced by crossing two varieties, are celebrated amongst horticulturists, and will, I hope, soon be cultivated by farmers.

I have seen several of his crossed apples, which promise to rival the best of those which are gradually dying away in the cider countries.

And his experiments on the crossing of wheat, which is very easily effected, merely by sowing the different kinds together, lead to a result which is of considerable importance. He says, in the Philosophical Transactions for 1799, "In the years 1795 and 1796, when almost the whole crop of corn in the island was blighted, the varieties obtained by crossing *alone* escaped, though sown in several soils, and in very different situations."

The processes of gardening for increasing the number of fruit-bearing branches, and for improving the fruit upon particular branches, will all admit of elucidation from the principles that have been advanced in this lecture.

By making trees espaliers, the force of gravity is particularly directed towards the lateral parts of the branches, and more sap determined towards the fruit buds: and hence they are more likely to bear when in a horizontal than when in a vertical position.

The twisting of a wire, or tying a thread round a branch, has been often recommended as a means of making it produce fruit. In this case the descent of the sap in the bark must be impeded above the ligature; and more nutritive matter consequently retained and applied to the expanding parts.

In engrafting, the vessels of the bark of the stock and the graft cannot so perfectly come in contact as the alburnous vessels, which are much more numerous, and equally distributed; hence the circulation downwards is probably impeded, and the tendency of the graft to evolve its fruit-bearing buds increased.

In transplanting trees, if their size is at all considerable, they should be stripped of a portion of their branches and leaves by cutting; for they must in the process of removal from the soil lose a great part of their roots and fine radical fibres; and supposing all their leaves remaining, they would die from exhaustion of their moisture by the great evaporating surface.

By lopping trees more nourishment is supplied to the remaining parts; for the sap flows laterally as well as perpendicularly. The same reasons will apply to explain the increase of the size of fruits by diminishing the number upon a tree.

As plants are capable of amelioration by peculiar methods of cultivation, and of having the natural term of their duration extended; so, in conformity to the general law of change, they are rendered unhealthy by being exposed to peculiarly unfavorable circumstances, and liable to permature old age and decay.

The plants of warm climates transported into cold ones, or of cold ones transported into warm ones, if not absolutely destroyed by the change of situation, are uniformly rendered unhealthy.

Few of the tropical plants, as is well known, can be raised in this country, except in hot houses. The vine during the whole of our summer may be said to be in a feeble state with regard to health; and its fruit, except in very extraordinary cases, always contains a superabundance of acid. The gigantic pine of the north, when transported into the equatorial climates, becomes a degenerated dwarf; and a great number of instances of the same kind might be brought forward.

Much has been written, and many very ingenious remarks have been made by different philosophers, upon what have been called the habits of plants. Thus in transplanting a tree, it dies or becomes unhealthy, unless its position with respect to the sun is the same as before. The seeds brought from warm climates germinate here much more early in the season than the same species brought from cold climates. The apple-tree from Siberia, where the short summer of three months immediately succeeds the long winter, in England, usually puts forth is blossoms in the first year of its transplantation, on the appearance of mild weather; and is often destroyed by the late frosts of the spring.

It is not difficult to explain this principle so intimately connected with the healthy or diseased state of plants. The organization of the germ, whether in seeds or buds, must be different, according as more or less heat or alternations of heat and cold have affected it during its formation; and the nature of its expansion must depend wholly on this organization. In a changeable climate the formations will have been interrupted, and in different successive layers. In an equal temperature they will have been uniform; and the operation of new and sudden causes will of course be severely felt.

The disposition of trees may, however, be changed gradually in many instances; and the operation of a new climate in this way be made supportable. The myrtle, a native of the south of Europe, inevitably dies if exposed in the early state of its growth to the frosts of our winter; but if kept in a green-house during the cold season for successive years, and gradually exposed to low temperatures, it will, in an advanced stage of growth, resist even a very severe cold. And in the south and west of England the myrtle flourishes, produces blossoms and seeds, in consequence of this process, as an unprotected standard tree; and the layers from such trees are much more hardy than the layers from myrtles reared within doors.

The arbutus, probably originally from similar cultivation, has become the principal ornament of the lakes of the south of Ireland. It thrives even in bleak mountain situations; and there can be little doubt but that the offspring of this tree, inured to a temperate climate, might be easily spread in Britain.

The same principles that apply to the effects of heat and cold will likewise apply to the influence of moisture and dryness. The layers of a tree habituated to a moist soil will die in a dry one; even though such a soil is more favorable to the general growth of the species. And, as was already stated, trees that have been raised in the centre of woods are sooner or later destroyed, if exposed in their adult state to blasts, in consequence of the felling of the surrounding timber.

Trees, in all cases in which they are exposed in high and open situations to the sun, the winds, and the rain, as I just now noticed, become low and robust, exhibiting curved limbs, but never straight and graceful trunks. Shrubs and trees, on the contrary, which are too much sheltered, too much secluded from the sun and wind, extend exceedingly in height, but present at the same time slender and feeble branches; their leaves are pale and sickly, and in extreme cases they do not bear fruit. The exclusion of light alone is sufficient to produce this species of disease, as would appear from the experiments of Bonnet. This ingenious physiologist sowed three seeds of the pea in the same kind of soil: one he suffered to remain exposed to the free air; the other he inclosed in a tube of glass; and the third in a tube of wood. The pea in the tube of glass sprouted, and grew in a manner scarcely at all different from that under usual circumstances; but the plant in the tube of wood, deprived of light, became white and slender, and grew to a much greater height.

The plants growing in a soil incapable of supplying them with sufficient manure, or dead organized matter, are very generally low, having brown or dark green leaves; and their woody fibre abounds in earth.* Those vegetating in peaty soils, or in lands too copiously supplied with animal or vegetable matter, rapidly expand, produce large bright green leaves, abound in sap, and generally blossom prematurely.

Where a land is too rich for corn, it is not an uncommon practice to cut down the first stalks, as by these means its exuberance is corrected, and it is less likely to fall before the grain is ripe; excess of poverty, or of richness, is almost equally fatal to the hopes of the farmer; and the true constitution of the soil for the best crop is that in which the earthy materials, the moisture and manure, are properly associated; and in which the decomposable vegetable or animal matter does not exceed one-fourth of the weight of the earthy constituents.

The canker, or erosion of the bark and wood, is a disease produced often in trees by a poverty of soil; and it is invariably connected with old age. The cause seems to be an excess of alkaline and earthy matter in the descending sap. I have often found carbonate of lime on the edges of the canker in apple trees; and ulmin, which contains fixed alkali, is abundant in the canker of the elm. The old age of a tree, in this respect, is faintly analogous to the old age of animals, in which the secretions of solid bony matter are always in excess, and the tendency to ossification great.

The common modes of attempting to cure the canker are by cutting the edges of the bark, binding new bark upon it, or laying on a plaster of earth; but these methods, though they have been much extolled, probably do very little in producing a regeneration of the part. Perhaps the application of a weak acid to the canker might be of use; or where the tree is of great value, it may be watered occasionally with a very diluted acid. The alkaline and earthy nature of the morbid secretion warrants the trial; but circumstances that cannot be foreseen may occur to interfere with the success of the experiment.

Besides the diseases having their source in the constitution of the plant, or in the unfavorable operation of external elements, there are many others perhaps more injurious, depending upon the operations and powers of other living beings; and such are the most difficult to cure, and the most destructive to the labors of the husbandman.

Parasitical plants of different species, which attach themselves to trees and shrubs, feed on their juices, destroy their health, and finally their life, abound in all climates; and are, perhaps, the most formidable of the enemies of the superior and cultivated vegetable species.

The mildew, which has often occasioned great havoc in our wheat crops, and which was particularly destructive in 1804, is a species of fungus, so small as to require glasses to render its form distinct, and rapidly propagated by its seeds.

This has been shown by various botanists; and the subject has received a full illustration from the researches of the late ever to be lamented Sir Joseph Banks.

The fungus rapidly spreads from stalk to stalk, fixes itself in the cells connected with the common tubes, and carries away and consumes that nourishment which should have been appropriated to the grain.

Various remedies have been proposed for this disease. The Rev. Dr. Cartwright states that he

* This is very strikingly illustrated in many of the plants which grow out of the soft free-stone rock of Malta: their growth is stunted; their roots large, branches and leaves small; and their leaves as well as branches abound in lime. From what I have witnessed in that island, I am disposed to believe that plants are instrumental in effecting cavities in calcareous rocks, and that many perforations which have been referred to the operation of boring salt-water mollusca are owing to vegetable growth and decay.—J. D.

has successfully treated it, by the application of a solution of salt, by a common gardening pot, to the stalks of the corn. This is a subject worthy of the most minute investigation; and all methods should be tried which promise to eradicate so great an evil. As the fungus increases by the diffusion of its seeds, great care should be taken that no mildewed straw is carried in the manure used for corn; and in the early crop, if mildew is observed upon any of the stalks of corn, they should be carefully removed, and treated as weeds.

The popular notion amongst farmers, that a barberry-tree in the neighborhood of a field of wheat often produces the mildew, deserves examination. This tree is frequently covered with a fungus, which, if it should be shown to be capable of degenerating into the wheat fungus, would offer an easy explanation of the effect.

There is some reason to believe, from the researches of Sir Joseph Banks, that the smut in wheat likewise is produced by a very small fungus which fixes on the grain; the products that it affords by analysis are similar to those afforded by the puff-ball; and it is difficult to conceive, that without the agency of some organized structure, so complete a change should be effected in the constitution of the grain.

The misletoe and the ivy, the moss and the lichen, in fixing upon trees, uniformly injure their vegetative processes, though in very different degrees. They are supported from the lateral sap-vessels, and deprive the branches above of a part of their nourishment.

The insect tribes are scarcely less injurious than the parasitical plants.

To enumerate all the animal destroyers and tyrants of the vegetable kingdom, would be to give a catalogue of the greater number of the classes in zoology. Every species of plant almost is the peculiar resting-place or dominion of some insect tribe; and from the locust, the caterpillar, and snail, to the minute aphis, a wonderful variety of the inferior insects are nourished, and live by their ravages upon the vegetable world.

I have already referred to the insect which feeds on the seed-leaf of the turnip.

The Hessian fly, still more destructive to wheat, has, in some seasons, threatened the United States with a famine. And the French government, in 1813, issued decrees with a view to occasion the destruction of the larvæ of the grasshopper.

In general, wet weather is most favorable to the propagation of mildew, funguses, rust, and the small parasitical vegetables; dry weather to the increase of the insect tribes. Nature, amidst all her changes, is continually directing her resources towards the production and multiplication of life; and in the wise and grand economy of the whole system, even the agents that appear injurious to the hopes, and destructive to the comforts of man, are, in fact, ultimately connected with a more exalted state of his powers and his condition. His industry is awakened, his activity kept alive, even by the defects of climates and season. By the accidents which interfere with his efforts, he is made to exert his talents, to look farther into futurity, and to consider the vegetable kingdom not as a secure and unalterable inheritance, spontaneously providing for his wants; but as a doubtful and insecure possession, to be preserved only by labor, and extended and perfected by ingenuity.

LECTURE VI.

ON MANURES OF VEGETABLE AND ANIMAL ORIGIN. OF THE MANNER IN WHICH THEY BECOME THE NOURISHMENT OF THE PLANT. OF FERMENTATION AND PUTREFACTION. OF THE DIFFERENT SPECIES OF MANURES OF VEGETABLE ORIGIN; OF THE DIFFERENT SPECIES OF ANIMAL ORIGIN. OF MIXED MANURES. GENERAL PRINCIPLES WITH RESPECT TO THE USE AND APPLICATION OF SUCH MANURES.

That certain vegetable and animal substances introduced into the soil accelerate vegetation and increase the product of crops, is a fact known since the earliest period of agriculture; but the manner in which manures act, the best modes of applying them, their relative value and durability, are still subjects of discussion. In this lecture, I shall endeavor to lay down some settled principles on these objects; they are capable of being materially elucidated by the recent discoveries in chemistry; and I need not dwell on their great importance to farmers.

The pores in the fibres of the roots of plants are so small, that it is with difficulty they can be discovered by the microscope; it is not, therefore, probable that solid substances can pass into them from the soil. I tried an experiment on this subject: some impalpable powdered charcoal, procured by washing gunpowder, and dissipating the sulphur by heat, was placed in a phial containing pure water in which a plant of peppermint was growing; the roots of the plant were pretty generally in contact with the charcoal. The experiment was made in the beginning of May, 1805; the growth of the plant was very vigorous during a fortnight, when it was taken out of the phial: the roots were cut through in different parts; but no carbonaceous matter could be discovered in them, nor were the smallest fibrils blackened by charcoal, though this must have been the case had the charcoal been absorbed in a solid form.

No substance is more necessary to plants than carbonaceous matter; and if this cannot be introduced into the organs of plants except in a state of solution, there is every reason to suppose that other substances less essential will be in the same case.

I found by some experiments made in 1804, that plants introduced into strong fresh solutions of sugar, mucilage, tanning principle, jelly, and other substances, died: but that plants lived in the same solutions after they had fermented. At that time, I supposed that fermentation was necessary to prepare the food of plants; but I have since found that the deleterious effect of the recent vegetable solutions was owing to their being too concentrated; in consequence of which the vegetable organs were probably clogged with solid matter, and the transpiration by the leaves prevented. In the beginning of June, in the next year, I used solutions of the same substances; but so much diluted, that there was only about one-two hundredth part of solid vegetable or animal matter in the solutions. Plants of mint grow luxuriantly in all these solutions; but least so in that of the astringent matter. I watered some spots of grass in a garden with the different solutions separately, and a spot with common water: the grass watered with solutions of jelly, sugar, and mucilage, grew most vigorously; and that watered with the solution of the tanning principle grew better than that watered with common water.

I endeavored to ascertain whether soluble vegetable substances passed in an unchanged state into the roots of plants, by comparing the products of the analysis of the roots of some plants of mint which had grown, some in common water, some in a solution of sugar: 120 grains of the roots of the mint which grew in the solution of sugar afforded five grains of pale green extract, which had a sweetish taste, but which slightly coagulated by the action of alcohol: 120 grains of the roots of the mint which had grown in common water yielded three grains and a half of extract, which was of a deep olive color; its taste was sweetish, but more astringent than that of the other extract, and it coagulated more copiously with alcohol.

These results, though not quite decisive, favor the opinion that soluble matters pass unaltered into the roots of plants; and the idea is confirmed by the circumstances that the radical fibres of plants made to grow in infusions of madder are tinged red; and it may be considered as almost proved by the fact, that substances which are even poisonous to vegetables are absorbed by them. I introduced the roots of a primrose into a weak solution of oxide of iron in vinegar, and suffered it to remain in it till the leaves became yellow; the roots were then carefully washed in distilled water, bruised, and boiled in a small quantity of the same fluid: the decoction of them passed through a filter was examined by the test of infusion of nutgalls; the decoction gained a strong tint of purple, which proves that solution of iron had been taken up by the vessels or pores in the roots.

Vegetable and animal substances deposited in the soil, as is shown by universal experience, are consumed during the process of vegetation; and they can only nourish the plant by affording solid matters capable of being dissolved by water, or gaseous substances capable of being absorbed by the fluids in the leaves of vegetables; but such parts of them as are rendered gaseous, and that pass into the atmosphere, must produce a comparatively small effect; for gases soon become diffused through the mass of the surrounding air. The great object in the application of manure should be to make it afford as much soluble matter as possible to the roots of the plant: and that in a slow and gradual manner, so that it may be entirely consumed in forming its sap and organized parts.

Mucilaginous, gelatinous, saccharine, oily and extractive fluids, and solution of carbonic acid and water are substances that in their unchanged states contain almost all the principles necessary for the life of plants; but there are few cases in which they can be applied as manures, in their pure forms; and vegetable manures, in general, contain a great excess of fibrous and insoluble matter, which must undergo chemical changes before they can become the food of plants.

It will be proper to take a scientific view of the nature of these changes; of the causes which occasion them, and which accelerate or retard them; and of the products they afford.

If any fresh vegetable matter which contains sugar, mucilage, starch, or other of the vegetable compounds soluble in water, be moistened and exposed to air, at a temperature from 55° to 80°, oxygen will soon be absorbed, and carbonic acid formed; heat will be produced, and elastic fluids, principally carbonic acid, gaseous oxide of carbon, and hydro-carbonate will be evolved; a dark-colored liquid, of a slightly sour or bitter taste, will likewise be formed; and if the process be suffered to continue for a time sufficiently long, nothing solid will remain, except earthy and saline matter, colored black by charcoal.

The dark-colored fluid formed in the fermentation always contains acetic acid; and when albumen or gluten exists in the vegetable substance, it likewise contains volatile alkali.

In proportion as there is more gluten, albumen, or matters soluble in water, in the vegetable substances exposed to fermentation, so in proportion, all other circumstances being equal, will the process be more rapid. Pure woody fibre alone undergoes a change very slowly; but its texture is broken down, and it is easily resolved into new elements when mixed with substances more liable to change, containing more oxygen and hydrogen. Volatile and fixed oils, resins and wax, are more susceptible of change than woody fibre when exposed to air and water, but much less liable than the other vegetable compounds; and even the most inflammable substances, by the absorption of oxygen, become gradually soluble in water.

Animal matters in general are more liable to decompose than vegetable substances; oxygen is absorbed, and carbonic acid and ammonia formed in the process of their putrefaction. They produce fœtid compound elastic fluids, and likewise azote: they afford dark-colored acid, and oily fluids and leave a residuum of salts and earths mixed with carbonaceous matter.

The principal substances which constitute the different parts of animals, or which are found in their blood, their secretions, or their excrements, are gelatine, fibrine, mucus, fatty or oily matter, albumen, urea, uric acid, and different acid, saline, and earthy matters.

Of these *gelatine* is the substance which when combined with water forms jelly. It in very liable to putrefaction. According to MM. Gay Lussac and Thenard, it is composed of

47·88 of carbon.
27·207—oxygen.
7·914—hydrogen.
16·998—azote.

These proportions cannot be considered as definite, for they do not bear to each other the ratios of any simple multiples of the number representing the elements; the case seems to be the same with other animal compounds: and even in vegetable substances in general, as appears from the statements given in the third lecture, the proportions are far from having the same simple relations as in the binary compounds capable of being made artificially; such as acids, alkalies, oxides, and in salts.

Fibrine constitutes the basis of the muscular fibre of animals, and a similar substance may be obtained from recent fluid blood; by stirring it with a stick the fibrine will adhere to the stick. It is not soluble in water; but by the action of acids, as Mr. Hatchett has shown, it becomes soluble, and analogous to gelatine. It is less disposed to putrefy than gelatine.* According to MM. Gay Lussac and Thenard, 100 parts of fibrine contain

Of carbon	- -	53·360
— oxygen	- -	19·685
— hydrogen	- -	7 021
— azote	- -	19·934

Mucus is very analogous to vegetable *gum* in its characters; and as Dr. Bostock has stated, it may be obtained by evaporating saliva. No experiments have been made upon its analysis; but it is probably similar to gum in composition. It is capable of undergoing putrefaction, but less rapidly than fibrine.

Animal fat and *oils* have not been accurately analyzed; but there is great reason to suppose that their composition is analogous to that of similar substances from the vegetable kingdom.

Albumen has been already referred to, and its analysis stated in the third lecture.

Urea may be obtained by the evaporation of human urine till it is of the consistence of a syrup, and the action of alcohol on the crystalline substance which forms when the evaporated matter cools. In this way a solution of urea in alcohol is procured, and the alcohol may be separated from the urea by heat.† Urea is very soluble in water, and is precipitated from water by diluted nitric acid in the form of bright pearl-colored crystals; this property distinguishes it from all other animal substances.

According to Fourcroy and Vauquelin, 100 parts of urea, when distilled, yield

92·027 parts of carbonate of ammonia.
4·608 carburetted hydrogen gas.
3·225 of charcoal.‡

Urea, particularly when mixed with albumen or gelatine, readily undergoes putrefaction.

Uric acid, as has been shown by Dr. Egan, may be obtained from human urine by pouring an acid into it; and it often falls down from urine in the form of brick-colored crystals. It consists of carbon, hydrogen, oxygen, and azote; but their proportions have not yet been determined. Uric acid is one of the animal substances least liable to undergo the process of putrefaction.§

According to the different proportions of these principles in animal compounds, so are the changes they undergo different. When there is much saline or earthy matter mixed or combined with them, the progress of their decomposition is less rapid than when they are principally composed of fibrine, albumen, gelatine, or urea.

The ammonia given off from animal compounds in putrefaction may be conceived to be formed at the time of their decomposition by the combination of hydrogen and azote; except this matter, the other products of putrefaction are analogous to those afforded by the fermentation of vegetable substances; and the soluble substances formed abound in the elements, which are the constituent parts of vegetables, in carbon, hydrogen, and oxygen.

Whenever manures consist principally of matter soluble in water, it is evident that their fermentation or putrefaction should be prevented as much as possible; and the only cases in which these processes can be useful are when the manure consists principally of vegetable or animal fibre. The circumstances necessary for the putrefaction of animal substances are similar to those required for the fermentation of vegetable substances: a temperature above the freezing point; the presence of water, and the presence of oxygen, at least in the first stage of the process.

To prevent manures from decomposing, they should be preserved dry, defended from the contact of air, and kept as cool as possible.

Salt and alcohol appear to owe their powers of preserving animal and vegetable substances to their attraction for water, by which they prevent its decomposing action, and likewise to their excluding air. The use of ice in preserving animal substances is owing to its keeping their temperature low. The efficacy of M. Appert's method of preserving animal and vegetable substances, an account of which has been lately published, entirely depends upon the exclusion of air. This method is by filling a vessel of tin plate or glass with the meat or vegetables; soldering or cementing the top so as to render the vessel air tight; and then keeping it half immersed in a vessel of boiling water for a sufficient time to render the meat or vegetables proper for food. In this last process it is probable that the small quantity of oxygen remaining in the vessel is absorbed; for on opening a tinned iron cannister which had been filled with raw beef, and exposed to hot water the day before, I found that the minute quantity of elastic fluid which could be procured from it, was a mixture of carbonic acid gas and azote.

Where meat or vegetable food is to be preserved on a large scale, for the use of the navy or army, for instance, I am inclined to believe, that by forcibly throwing a quantity of carbonic acid, hydrogen, or azote, into the vessel, by means of a compressing pump, similar to that used for making artificial Seltzer water, any change in the substance would be more effectually prevented. No elastic fluid in this case would have room to form by the decomposition of the meat; and the tightness and strength of the vessel would be proved by the process. No putrefaction or fermentation can go on without the generation of elastic fluid; and pressure would probably act with as much efficacy as cold in the preservation of animal or vegetable food.

* Fibrine, especially of the blood, according to my experience, putrefies more readily than any other animal substance. In a few hours, at the temperature of 80° Fahrenheit, exposed to the air, by putrefacion it is reduced from a solid to a liquid: the change is accompanied by a considerable disengagement of heat, and formation of ammonia and carbonic acid.—J. D.

† It is best obtained from the nitrate of urea, by means of carbonate of potash and alcohol, according to Dr. Prout's method. Pure urea is colorless, crystallizes in four-sided prisms, and its solution in water resists change for many weeks or even months. It is the only animal compound (or proximate principle) which hitherto has been formed artificially.—J. D.

‡ According to the analysis of Dr. Prout, it consists of

Carbon	- - -	12·24
Nitrogen	- - -	22·3
Hydrogen	- - -	4
Oxygen	- - -	16—J. D.

§ It has lately been analysed by Liebig, and found to consist of

Carbon	- - -	36·11
Hydrogen	- - -	2 34
Nitrogen	- - -	33·36
Oxygen	- - -	28·10

When pure, it is colorless, tasteless, and without odor.—J. D.

As different manures contain different proportions of the elements necessary to vegetation, so they require a different treatment to enable them to produce their full effects in agriculture. I shall therefore describe in detail the properties and nature of the manures in common use, and give some general views respecting the best modes of preserving and applying them.

All *green succulent plants* contain saccharine or mucilaginous matter, with woody fibre, and readily ferment. They cannot, therefore, if intended for manure, be used too soon after their death.

When *green crops* are to be employed for enriching a soil, they should be ploughed in, if it be possible, when in flower, or at the time the flower is beginning to appear; for it is at this period that they contain the largest quantity of easily soluble matter, and that their leaves are most active in forming nutritive matter. Green crops, pond weeds, the paring of hedges or ditches, or any kind of fresh vegetable matter, require no preparation to fit them for manure. The decomposition slowly proceeds beneath the soil; the soluble matters are gradually dissolved, and the slight fermentation that goes on, checked by the want of a free communication of air, tends to render the woody fibre soluble without occasioning the rapid dissipation of elastic matter.

When old pastures are broken up and made arable, not only has the soil been enriched by the death and slow decay of the plants which have left soluble matters in the soil; but the leaves and roots of the grasses living at the time and occupying so large a part of the surface, afford saccharine, mucilaginous, and extractive matters, which become immediately the food of the crop, and the gradual decomposition affords a supply for successive years.

Rape cake, which is used with great success as a manure, contains a large quantity of mucilage, some albuminous matter, and a small quantity of oil. This manure should be used recent, and kept as dry as possible before it is applied. It forms an excellent dressing for turnip crops; and is most economically applied by being thrown into the soil at the same time with the seed. Whoever wishes to see this practice in its highest degree of perfection, should attend Mr. Coke's annual sheep-shearing at Holkham.

Malt dust consists chiefly of the infant radicle separated from the grain. I have never made any experiment upon this manure; but there is great reason to suppose it must contain saccharine matter; and this will account for it powerful effects. Like rape cake, it should be used as dry as possible, and its fermentation prevented.

Linseed cake is too valuble as a food for cattle to be much employed as a manure; the analysis of linseed was referred to in the third lecture. The *water* in which *flax* and *hemp* are steeped for the purpose of obtaining the pure vegetable fibre, has considerable fertilizing powers. It appears to contain a substance analogous to albumen, and likewise much vegetable extractive matter. It putrefies very readily. A certain degree of fermentation is absolutely necessary to obtain the flax and hemp in a proper state; the water to which they have been exposed should therefore be used as a manure as soon as the vegetable fibre is removed from it.

Sea weeds, consisting of different species of fuci, algæ, and confervæ, are much used as a manure on the sea-coasts of Britain and Ireland. By digesting the common fucus, which is the sea-weed usually most abundant on the coast, in boiling water, I obtained from it one-eighth of a gelatinous substance which had characters similar to mucilage. A quantity distilled gave nearly four-fifths of its weight of water, but no ammonia; the water had an empyreumatic and slightly sour taste; the ashes contained sea salt, carbonate of soda, and carbonaceous matter. The gaseous matter afforded was small in quantity, principally carbonic acid and gaseous oxide of carbon, with a little hydro-carbonate. This manure is transient in this effects, and does not last for more than a single crop, which is easily accounted for from the large quantity of water, or the elements of water, it contains. It decays without producing heat when exposed to the atmosphere, and seems as it were to melt down and dissolve away. I have seen a large heap entirely destroyed in less than two years, nothing remaining but a little black fibrous matter.

I suffered some of the firmest part of a fucus to remain in a close jar containing atmospheric air for a fortnight: in this time it had become very much shrivelled; the sides of the jar were lined with dew. The air examined was found to have lost oxygen, and contained carbonic acid gas.

Sea-weed is sometimes suffered to ferment before it is used; but this process seems wholly unnecessary, for there is no fibrous matter rendered soluble in the process, and a part of the manure is lost.

The best farmers in the west of England use it as fresh as it can be procured; and the practical results of this mode of applying it are exactly conformable to the theory of its operation. The carbonic acid formed by its incipient fermentation must be partly dissolved by the water set free in the same process; and thus become capable of absorption by the roots of plants.

The effects of the sea-weed as manure must principally depend upon this carbonic acid, and upon the soluble mucilage the weed contains; and I found that some fucus which had fermented so as to have lost about half its weight, afforded less than $\frac{1}{12}$ of mucilaginous matter; from which it may be fairly concluded that some of this substance is destroyed in fermentation.

Dry straw of wheat, oats, barley, beans and peas, and spoiled hay, or any other similar kind of dry vegetable matter, is, in all cases, useful manure. In general, such substances are made to ferment before they are employed, though it may be doubted whether the practice should be indiscriminately adopted.

From 400 grains of dry barley straw I obtained eight grains of matter soluble in water, which had a brown color, and tasted like mucilage. From 400 grains of wheaten straw I obtained five grains of a similar substance.

There can be no doubt that the straw of different crops immediately ploughed into the ground affords nourishment to plants; but there is an objection to this method of using straw, from the difficulty of burying long straw, and from its rendering the husbandry foul.

When straw is made to ferment, it becomes a more manageable manure; but there is likewise on the whole a great loss of nutritive matter. More manure is perhaps supplied for a single crop; but the land is less improved than it would be, supposing the whole of the vegetable matter could be finely divided and mixed with the soil.

It is usual to carry straw that can be employed for no other purpose to the dunghill to ferment and decompose, but it is worth experiment, whether it may not be more economically applied when chopped small by a proper machine, and kept dry till it is ploughed in for the use of a crop. In this case, though it would decompose much more slowly, and produce less effect at first, yet its influence would be much more lasting.

Mere woody fibre seems to be the only vegetable matter that requires fermentation to render it nutritive to plants. Tanners' *spent bark* is a substance of this kind. Mr. Young, in his excellent Essay on Manures, which gained him the Bedfordian medal of the Bath Agricultural Society, states, "that spent bark seemed rather to injure than assist vegetation;" which he attributes to the astrigent matter that it contains. But in fact it is freed from all soluble substances, by the operation of water in the tan-pit; and if injurious to vegetation, the effect is probably owing to its agency upon water, or to its mechanical effects. It is a substance very absorbent and retentive of moisture, and yet not penetrable by the roots of plants.

Inert peaty matter is a substance of the same kind. It remains for years exposed to water and air without undergoing change; and in this state yields little or no nourishment to plants.

Woody fibre will not ferment unless some substances are mixed with it which act the same part as the mucilage, sugar, and extractive or albuminous matters, with which it is usually associated in herbs and succulent vegetables. Lord Meadowbank has judiciously recommended a mixture of common farm-yard dung for the purpose of bringing peas into fermentation; any putrescible or fermentable substance will answer the end; and the more a substance heats, and the more readily it ferments, the better will it be fitted for the purpose.

Lord Meadowbank states, that one part of dung is sufficient to bring three or four parts of peat into a state in which it is fitted to be applied to land; but of course the quantity must vary according to the nature of the dung and of the peat. In cases in which some living vegetables are mixed with the peat, the fermentation will be more readily effected.

Tanners' spent bark, shavings of wood and sawdust, will probably require as much dung to bring them into fermentation, as the worst kind of peat.

Woody fibre may be likewise prepared so as to become a manure by the action of lime. This subject I shall discuss in the next lecture, as it follows naturally another series of facts relating to the effects of lime in the soil.

It is evident from the analysis of woody fibre by MM. Gay Lussac and Thenard, (which shows that it consists principally of the elements of water and carbon, the carbon being in larger quantity than in the other vegetable compounds), that any process which tends to abstract carbonaceous matter from it must bring it nearer in composition to the soluble principles; and this is done in fermentation by the absorption of oxygen and production of carbonic acid; and a similar effect, it will be shown, is produced by lime.

Wood-ashes imperfectly formed, that is, wood-ashes containing much charcoal, are said to have been used with success as a manure. A part of their effects may be owing to the slow and gradual consumption of the charcoal, which seems capable, under other circumstances than those of actual combustion, of absorbing oxygen so as to become carbonic acid.

In April, 1803, I inclosed some well burnt charcoal in a tube half filled with pure water, and half with common air; the tube was hermetically sealed. I opened the tube under pure water in the spring of 1804, at a time when the atmospheric temperature and pressure were nearly the same as at the commencement of the experiment. Some water rushed in; and on expelling a little air by heat from the tube, and analyzing it, it was found to contain only seven per cent. of oxygen. The water in the tube, when mixed with lime-water, produced a copious precipitate; so that carbonic acid had evidently been formed and dissolved by the water.

Manures from animal substances, in general, require no *chemical* preparation to fit them for the soil. The great object of the farmer is to blend them with the earthy constituents in a proper state of division, and to prevent their too rapid decomposition.

The entire parts of the muscles of land animals are not commonly used as a manure, though there are many cases in which such an application might be easily made. Horses, dogs, sheep, deer, and other quadrupeds that have died accidentally, or of disease, after their skins are separated are often suffered to remain exposed to the air, or immersed in water, till they are destroyed by birds or beasts of prey, or entirely decomposed; and in this case most of their organized matter is lost for the land in which they lie, and a considerable portion of it employed in giving off noxious gases to the atmosphere.

By covering dead animals with five or six times their bulk of soil, mixed with one part of lime, and suffering them to remain for a few months, their decomposition would impregnate the soil with soluble matters, so as to render it an excellent manure, and by mixing a little fresh quicklime with it at the time of its removal the disagreeable effluvia would be in a great measure destroyed; and it might be applied in the same way as any other manure to crops.

Fish forms a powerful manure, in whatever state it is applied; but it cannot be ploughed in too fresh, though the quantity should be limited. Mr. Young records an experiment, in which herrings spread over a field and ploughed in for wheat, produced so rank a crop that it was entirely laid before harvest.

The refuse pilchards in Cornwall are used throughout the county as a manure, with excellent effects. They are usually mixed with sand or soil, and sometimes with sea-weed, to prevent them from raising too luxuriant a crop. The effects are perceived for several years.

In the fens of Lincolnshire, Cambridgeshire, and Norfolk, the little fish called sticklebacks, are caught in the shallow waters in such quantities, that they form a great article of manure in the land bordering on the fens.

It is easy to explain the operation of fish as a manure. The skin is principally gelatine; which from its slight state of cohesion is readily soluble in water: fat or oil is always found in fishes, either under the skin or in some of the viscera; and their fibrous matter contains all the essential elements of vegetable substances.

Amongst oily substances, *blubber* has been employed as manure. It is most useful when mixed with clay, sand, or any common soil, so as to expose a large surface to the air, the oxygen of which produces soluble matter from it. Lord Somerville used blubber with great success at his farm in Surrey. It was made into a heap with soil, and retained its powers of fertilizing for several successive years.

The carbon and hydrogen abounding in oily substances fully account for their effects; and their durability is easily explained from the gradual manner in which they change by the action of air and water.

Bones are much used as a manure in the neighborhood of London. After being broken and boiled for grease, they are sold to the farmer. The more divided they are, the more powerful are their effects. The expense of grinding them in a mill would probably be repaid by the increase of their fertilizing powers; and in the state of powder they might be used in the drill husbandry, and delivered with the seed in the same manner as rape cake.

Bone dust and bone shavings, the refuse of the turning manufacture, may be advantageously employed in the same way.

The basis of bone is constituted by earthy salts, principally phosphate of lime, with some carbonate of lime and phosphate of magnesia; the easily decomposable substances in bone are fat, gelatine, and cartilage, which seem of the same nature as coagulated albumen.

According to the analysis of Fourcroy and Vauquelin, ox bones are composed,

Of decomposable animal matter	51
— phosphate of lime	37·7
— carbonate of lime	10
— phosphate of magnesia	1·3
	100

M. Merat Guillot has given the following estimate of the composition of the bones of different animals:—

	Phosphate of Lime.	Carbonate of Lime.
Bone of Calf	54	
—— Horse	67·5	1·25
—— Sheep	70	5
—— Elk	90	1
—— Hog	52	1
—— Hare	85	1
—— Pullet	72	1·5
—— Pike	64	1
—— Carp	45	5
Horses' teeth	85·5	25
Ivory	64	1

The remaining parts of the hundred must be considered as decomposable animal matter.

Horn is a still more powerful manure than bone, as it contains a larger quantity of decomposable animal matter. From 500 grains of ox horn Mr. Hatchett obtained only 1·5 grains of earthy residuum, and not quite half of this was phosphate of lime. The shavings or turnings of horn form an excellent manure, though they are not sufficiently abundant to be in common use. The animal matter in them seems to be of the nature of coagulated albumen, and it is slowly rendered soluble by the action of water. The earthy matter in horn, and still more that in bones, prevents the too rapid decomposition of the animal matter, and renders it very durable in its effects.

Hair, *woollen rags*, and *feathers*, are all analogous in composition, and principally consist of a substance similar to albumen, united to gelatine. This is shown by the ingenious researches of Mr. Hatchett. The theory of their operation is similar to that of bone and horn shavings.

The *refuse* of the different manufactures of *skin* and *leather* form very useful manures; such as the shavings of the currier, furriers' clippings, and the offals of the tan-yard and of the glue-maker. The gelatine contained in every kind of skin is in a state fitted for its gradual solution or decomposition; and when buried in the soil, it lasts for a considerable time, and constantly affords a supply of nutritive matter to the plants in its neighborhood.

Blood contains certain quantities of all the principles found in other animal substances, and is consequently a very good manure. It has been already stated that it contains fibrine; it likewise contains albumen: the red particles in it, which have been supposed by many foreign chemists to be colored by iron in a particular state of combination with oxygen and acid matter, Mr. Brande considers as formed of a peculiar animal substance, containing very little iron.

The scum taken from the boilers of the sugar bakers, and which is used as manure, principally consists of bullock's blood, which has been employed for the purpose of separating the impurities of common brown sugar, by means of the coagulation of its albuminous matter by the heat of the boiler.

The different species of *corals*, *corallines*, and *sponges*, must be considered as substances of animal origin. From the analysis of Mr. Hatchett, it appears that all these substances contain considerable quantities of a matter analogous to coagulated albumen; the sponges afford likewise gelatine.

According to Merat Guillot, white coral contains equal parts of animal matter and carbonate of lime; red coral 46·5 of animal matter, and 53·5 of carbonate of lime; articulated coralline 51 of animal matter, and 49 of carbonate of lime.

These substances are, I believe, never used as manure in this country, except in cases when they are accidentally mixed with sea-weed; but it is probable that the corallines might be advantageously employed, as they are found in considerable quantity on the rocks and bottoms of the rocky pools in many parts of our coast, where the land gradually declines towards the sea; and they might be detached by hoes, and collected without much trouble.

Amongst excrementitious animal substances used as manures, *urine* is the one upon which the greatest number of chemical experiments have been made, and the nature of which is best understood.

The urine of the crow contains, according to the experiments of Mr. Brande,

Of water	65
— phosphate of lime	3
— muriates of potassa and ammonia	15
— sulphate of potassa	6
— carbonates of potassa, and ammonia	4
— urea	4

The urine of the horse, according to Fourcroy and Vauquelin, contains

Of carbonate of lime	11
— carbonate of soda	9
— benzoate of soda	24
— muriate of potassa	9
— urea	7
— water and mucilage	940

In addition to these substances, Mr. Brande found in it phosphate of lime.*

The urine of the ass, the camel, the rabbit, and domestic fowls has been submitted to different experiments, and the constitution has been found similar. In the urine of the rabbit, in addition to most of the ingredients above mentioned, Vauquelin detected gelatine; and the same chemist discovered uric acid in the urine of domestic fowls.†

Human urine contains a greater variety of constituents than any other species examined.

Urea, uric acid, and another acid similar to it in nature, called rosacic acid, acetic acid, albumen, gelatine, a resinous matter, and various salts, are found in it.

The human urine differs in composition according to the state of the body, and the nature of the food and drink made use of. In many cases of disease there is a much larger quantity of gelatine and albumen than usual in the urine; and in diabetes it contains sugar.

It is probable that the urine of the same animal must likewise differ according to the different nature of the food and drink used; and this will account for discordances in some of the analyses that have been published on the subject.

Urine is very liable to change and to undergo the putrefactive process; and that of carnivorous animals more rapidly than that of graminivorous animals. In proportion as there is more gelatine and albumen in urine, so in proportion does it putrefy more quickly.

The species of urine that contain most albumen, gelatine, and urea, are the best as manures; and all urine contains the essential elements of vegetables in a state of solution.

During the putrefaction of urine the greatest part of the soluble animal matter that it contains is destroyed; it should consequently be used as fresh as possible; but if not mixed with solid matter, it should be diluted with water, as when pure it contains too large a quantity of animal matter to form a proper fluid nourishment for absorption by the roots of plants.

Putrid urine abounds in ammoniacal salts; and though less active than fresh urine, is a very powerful manure.

* This has not been confirmed by Chevreul. In trials made expressly for the purpose, he was not able to detect phosphate of lime, either in the urine of the horse or of the camel.

† The urine of the mammalia generally abounds most in urea; of birds and reptiles, in uric acid: the urine of the frog and toad, however, are exceptions; their urine is fluid, and not in part solid, like that of birds and reptiles, and contains a large proportion of urea. —J. D.

According to a recent analysis published by Berzelius, 1000 parts of urine are composed of

Water	933
Urea	30.1
Uric acid	1
Muriate of ammonia, free lactic acid, lactate of ammonia, and animal matter	17·14

The remainder different salts, phosphates, sulphates, and muriates.

Amongst excrementitious solid substances used as manures, one of the most powerful is the *dung* of *birds* that feed on *animal food*, particularly the dung of sea birds. The *guano*, which is used to a great extent in South America, and which is the manure that fertilizes the steril plains of Peru, is a production of this kind. It exists abundantly, as we are informed by M. Humboldt, on the small islands in the South Sea, at Chinche, Ilo, Iza, and Arica. Fifty vessels are laden with it annually at Chinche, each of which carries from 1500 to 2000 cubical feet. It is used as a manure only in very small quantities; and particularly for crops of maize. I made some experiments on specimens of guano sent from South America to the Board of Agriculture in 1805. It appeared as a fine brown powder; it blackened by heat, and gave off strong ammoniacal fumes: treated with nitric acid, it afforded uric acid. In 1806 MM. Fourcroy and Vauquelin published an elaborate analysis of guano. They state that it contains a fourth part of its weight of uric acid, partly saturated with ammonia, and partly with potassa; some phosphoric acid combined with the same bases, and likewise with lime, small quantities of sulphate and muriate of potassa, a little fatty matter, and some quartzose sand.

It is easy to explain its fertilizing properties: from its composition it might be supposed to be a very powerful manure. It requires water for the solution of its soluble matter, to enable it to produce its full beneficial effect on crops.

The dung of sea birds has, I believe, never been used as a manure in this country: but it is probable that even the soil of the small islands on our coast much frequented by them would fertilize. Some dung of sea birds brought from a rock on the coast of Merionethshire produced a powerful but transient effect on grass. It was tried, at my request, by Sir Robert Vaughan at Nannau.

The rains in our climate must tend very much to injure this species of manure, where it is exposed to them, soon after its deposition; but it may probably be found in great perfection in caverns or clefts in rocks, haunted by cormorants and gulls. I examined some recent cormorant's dung which I found on a rock near Cape Lizard in Cornwall. It had not at all the appearance of the guano; was of a grayish-white color; had a very fœtid smell, like that of putrid animal matter; when acted on by quicklime, it gave abundance of ammonia; treated with nitric acid, it yielded uric acid.

Night-soil, it is well known is a very powerful manure, and very liable to decompose. It differs in its composition; but always abounds in substances composed of carbon, hydrogen, azote, and oxygen. From the analysis of Berzelius, it appears that a part of it is always soluble in water; and in whatever state it is used, whether recent or fermented, it supplies abundance of food to plants.

The disagreeable smell of night-soil may be destroyed by mixing it with quicklime; and if exposed to the atmosphere in thin layers strewed over with quicklime in fine weather, it speedily dries, is easily pulverized, and in this state may be used in the same manner as rape-cake, and delivered into the furrow with the seed.

The Chinese, who have more practical knowledge of the use and application of manures than any other people existing, mix their night-soil with one-third of its weight of a fat marl, make it into cakes, and dry it by exposure to the sun. These cakes, we are informed by the French missionaries, have no disagreeable smell, and form a common article of commerce of the empire.

The earth, by its absorbent powers, probably prevents, to a certain extent, the action of moisture upon the dung, and likewise defends it from the effects of air.

After night-soil, *pigeons' dung* comes next in order, as to fertilizing power. I digested 100 grains of pigeons' dung in hot water for some hours, and obtained from it 23 grains of soluble matter; which afforded abundance of carbonate of ammonia by distillation; and left carbonaceous matter, saline matter principally common salt, and carbonate of lime, as a residuum. Pigeons' dung, when moist, readily ferments, and after fermentation contains less soluble matter than before: from 100 parts of fermented pigeons' dung, I obtained only eight parts of soluble matter, which gave proportionally less carbonate of ammonia in distillation than recent pigeons' dung.

It is evident that this manure should be applied as new as possible; and when dry, it may be employed in the same manner as the other manures capable of being pulverized.

The soil in woods where great flocks of wood-pigeons roost is often highly impregnated with their dung, and, it cannot be doubted, would form a valuable manure. I have found such soil yield ammonia when distilled with lime. In the winter, likewise, it usually contains abundance of vegetable matter, the remains of decayed leaves; and the dung tends to bring the vegetable matter into a state of solution.

The dung of *domestic fowls* approaches very nearly in its nature to pigeons' dung. Uric acid has been found in it. It gives carbonate of ammonia by distillation, and immediately yields soluble matter to water. It is very liable to ferment.

The dung of fowls is employed in common with that of pigeons by tanners to bring on a slight degree of putrefaction in skins that are to be used for making soft leather; for this purpose the dung is diffused through water. In this state, it rapidly undergoes putrefaction, and brings on a similar change in the skin. The excrements of dogs are employed by the tanner with similar effects. In all cases, the contents of the *grainer*, as the pit is called in which soft skins are prepared by dung, must form a very useful manure.

Rabbits' dung has never been analyzed. It is used with great success as a manure by Mr. Fane, who finds it profitable to keep rabbits in such a manner as to preserve their dung. It is laid on as fresh as possible, and is found better the less it has fermented.

The *dung* of *cattle*, *oxen*, and *cows*, has been chemically examined by MM. Einhof and Thaer. They found that it contained matter soluble in water; and that it gave in fermentation nearly the same products as vegetable substances, absorbing oxygen, and producing carbonic acid gas.

The recent *dung* of *sheep* and of *deer*, afford, when long boiled in water, soluble matters, which equal from two to three per cent. of their weight. I have examined these soluble substances procured by solution and evaporation: they contain a very small quantity of matter analogous to animal mucus; and are principally composed of a bitter extract soluble both in water and in alcohol. They give ammoniacal fumes by distillation; and appear to differ very little in composition.

I watered some blades of grass for several successive days with a solution of these extracts; they evidently became greener in consequence, and grew more vigorously than grass in other respects under the same circumstances.

The part of the dung of cattle, sheep and deer, not soluble in water; appears to be mere woody fibre, and precisely analogous to the residuum of those vegetables that form their food after they have been deprived of all their soluble materials.

The dung of horses gives a brown fluid, which, when evaporated, yields a bitter extract, which affords ammoniacal fumes more copiously than that from the dung of oxen.

If the pure dung of cattle is to be used as manure, like the other species of dung which have been mentioned, there seems no reason why it should be made to ferment, except in the soil; or if suffered to ferment, it should be only in a very slight degree. The grass in the neighborhood of recently voided dung is always coarse and dark green; some persons have attributed this to a noxious quality in unfermented dung; but it seems to be rather the result of an excess of food furnished to the plants.

The question of the proper mode of the application of the dung of horses and cattle, however, properly belongs to the subject of *composite manures*, for it is usually mixed in the farm-yard with straw, offal, chaff, and various kinds of litter; and itself contains a large proportion of fibrous vegetable matter.

A slight incipient fermentation is undoubtedly of use in the dunghill; for by means of it a disposition is brought on in the woody fibre to decay and dissolve, when it is carried to the land, or ploughed into the soil; and woody fibre is always in great excess in the refuse of the farm.

Too great degree of fermentation is, however, very prejudicial to the composite manure in the dunghill; it is better that there should be no fermentation at all before the manure is used, than that it should be carried too far. This must be obvious from what has been already stated in this lecture. The excess of fermentation tends to the destruction and dissipation of the most useful part of the manure; and the ultimate results of this process are like those of combustion.

It is a common practice amongst farmers to suffer the farm-yard dung to ferment till the fibrous texture of the vegetable matter is entirely broken down, and till the manure becomes perfectly cold, and so soft as to be easily cut by the spade.

Independent of the general theoretical views unfavorable to this practice founded upon the nature and composition of vegetable substances, there are many arguments and facts which show that it is prejudicial to the interests of the farmer.

During the violent fermentation which is necessary for reducing farm-yard manure to the state in which it is called *short muck*, not only a large quantity of fluid, but likewise of gaseous matter, is lost; so much so, that the dung is reduced one-half, or two-thirds in weight; and the principal elastic matter disengaged is carbonic acid, with some ammonia; and both these, if retained by the moisture in the soil, as has been stated before, are capable of becoming a useful nourishment of plants.

In October, 1808, I filled a large retort, capable of containing three pints of water, with some hot fermenting manure, consisting principally of the litter and dung of cattle; I adapted a small receiver to the retort, and connected the whole with a mercurial pneumatic apparatus, so as to collect the condensible and elastic fluids which might rise from the dung. The receiver soon became lined with dew, and drops began in a few hours to trickle down the sides of it. Elastic fluid likewise was generated; in three days 35 cubical inches had been formed, which, when analyzed, were found to contain 21 cubical inches of carbonic acid; the remainder was hydrocarbonate mixed with some azote, probably no more than existed in the common air in the receiver. The fluid matter collected in the receiver at the same time amounted to nearly half an ounce. It had a saline taste, and a disagreeable smell, and contained some acetate and carbonate of ammonia.

Finding such products given off from fermenting litter, I introduced the beak of another retort, filled with similar dung very hot at the time, into the soil amongst the roots of some grass in the border of a garden; in less than a week a very distinct effect was produced on the grass; upon the spot exposed to the influence of the matter disengaged in fermentation, it grew with much more luxuriance than the grass in any other part of the garden.

Besides the dissipation of gaseous matter when fermentation is pushed to the extreme, there is another disadvantage in the loss of *heat*, which, if excited in the soil, is useful in promoting the germination of the seed, and in assisting the plant in the first stage of its growth, when it is most feeble and most liable to disease: and the fermentation of manure in the soil must be particularly favorable to the wheat crop in preserving a genial temperature beneath the surface late in autumn, and during winter.

Again, it is a general principle in chemistry, that in all cases of decomposition, substances combine much more readily at the moment of their disengagement, than after they have been perfectly formed. And in fermentation beneath the soil, the fluid matter produced is applied instantly, even whilst it is warm, to the organs of the plant, and consequently, is more likely to be efficient than in manure that has gone through the process, and of which all the principles have entered into new combinations.

In the writings of scientific agriculturists, a great mass of facts may be found in favor of the application of farm-yard dung in a recent state. Mr. Young, in the essay on manures, which I have already quoted, adduces a number of excellent authorities in support of the plan. Many who doubted have been lately convinced; and perhaps there is no subject of investigation in which there is such a union of theoretical and practical evidence. I have myself within the last ten years witnessed a number of distinct proofs on the subject. I shall content myself with quoting that which ought to have, and which I am sure will have, the greatest weight among agriculturists. Within the last seven years, Mr. Coke has entirely given up the system formerly adopted on his farm, of applying fermented dung; and he informs me that his crops have been since as good as they ever were, and that his manure goes nearly twice as far.

A great objection against slightly fermented dung, is, that weeds spring up more luxuriantly where it is applied. If there are seeds carried out in the dung, they certainly will germinate; but it is seldom that this can be the case to any extent; and if the land is not cleansed of weeds, any kind of manure fermented or unfermented will occasion their rapid growth. If slightly fermented farm-yard dung is used as a top-dressing for pastures, the long straws and unfermented vegetable matter remaining on the surface should be removed as soon as the grass begins to rise vigorously by raking, and carried back to the dunghill: in this case no manure will be lost, and the husbandry will be at once clean and economical.

In cases when farm-yard dung cannot be immediately applied to crops, the destructive fermentation of it should be prevented as much as possible: the principles on which this may be effected have been already alluded to.

The surface should be defended as much as possible from the oxygen of the atmosphere; a compact marl, or a tenacious clay, offers the best protection against the air; and before the dung is covered over, or, as it were, sealed up, it should be dried as much as possible. If the dung is found at any time to heat strongly, it should be turned over, and cooled by exposure to air.

Watering dunghills is sometimes recommended for checking the progress of fermentation; but this practice is inconsistent with just chemical views. It may cool the dung for a short time; but moisture, as I have before stated, is a principal agent in all processes of decomposition. Dry fibrous matter will never ferment. Water is as necessary as air to the process; and to supply it to fermenting dung, is to supply an agent which will hasten its decay.

In all cases when dung is fermenting, there are simple tests by which the rapidity of the process, and consequently the injury done, may be discovered.

If a thermometer plunged into the dung does not rise to above 100 degrees of Fahrenheit, there is little danger of much aëriform matter flying off. If the temperature is higher, the dung should be immediately spread abroad.

When a piece of paper, moistened in muriatic acid, held over the steams arising from a dunghill, gives dense fumes, it is a certain test that the decomposition is going too far; for this indicates that volatile alkali is disengaged.

When dung is to be preserved for any time, the situation in which it is kept is of importance. It should, if possible, be defended from the sun. To preserve it under sheds would be of great use; or to make the site of a dunghill on the north side of a wall. The floor on which the dung is heaped should, if possible, be paved with flat stones; and there should be a little inclination from each side towards the centre, in which there should be drains connected with a small well, furnished with a pump, by which any fluid matter may be collected for the use of the land. It too often happens that a dense mucilaginous and extractive fluid is suffered to drain away from the dunghill, so as to be entirely lost to the farm.*

Street and *road dung*, and the *sweepings of houses*, may be all regarded as composite manures; the constitution of them is necessarily various, as they are derived from a number of different substances. These manures are usually applied in a proper manner, without being fermented.

Soot, which is principally formed from the combustion of pit-coal or coal, generally contains likewise substances derived from animal matters. This is a very powerful manure. It affords ammoniacal salts by distillation, and yields a brown extract to hot water, of a bitter taste. It likewise contains an empyreumatic oil. Its basis is charcoal, in a state in which it is capable of being rendered soluble by the action of oxygen and water.

This manure is well fitted to be used in the dry state, thrown into the ground with the seed, and requires no preparation.

The doctrine of the proper application of manures from organized substances offers an illustration of an important part of the economy of nature, and of the happy order in which it is arranged.

The death and decay of animal substances tend to resolve organized forms into chemical constituents; and the pernicious effluvia disengaged in the process seem to point out the propriety of burying them in the soil, where they are fitted to become the food of vegetables. The fermentation and putrefaction of organized substances in the free atmosphere are noxious processes; beneath the surface of the ground, they are salutary operations. In this case the food of plants is prepared where it can be used; and that which would offend the senses and injure the health, if exposed, is converted by gradual processes into forms of beauty and of usefulness; the fœtid gas is rendered a constituent of the aroma of the flower, and what might be poison becomes nourishment to animals and to man.

LECTURE VII.

ON MANURES OF MINERAL ORIGIN, OR FOSSIL MANURES; THEIR PREPARATION, AND THE MANNER IN WHICH THEY ACT. OF LIME IN ITS DIFFERENT STATES; OPERATION OF LIME AS A MANURE AND A CEMENT; DIFFERENT COMBINATIONS OF LIME. OF GYPSUM; IDEAS RESPECTING ITS USE. OF OTHER NEUTRO-SALINE COMPOUNDS, EMPLOYED AS MANURES. OF ALKALIES AND ALKALINE SALTS; OF COMMON SALT.

The whole tenor of the preceding lectures shows that a great variety of substances contributes to the growth of plants, and supplies the materials of their nourishment. The conversion of matter that has belonged to living structures into organized forms is a process than can be easily understood; but it is more difficult to follow those operations by which earthy and saline matters are consolidated in the fibre of plants, and by which they are made subservient to their functions. Some inquirers, adopting that sublime generalization of the ancient philosophers that matter is the same in essence, and that the different substances considered as elements by chemists are merely different arrangements of the same indestructible particles, have endeavored to prove that all the varieties of the principles found in plants may be formed from the substances in the atmosphere; and that vegetable life is a process in which bodies that the analytical philosopher is unable to change or to form are constantly composed and decomposed. These opinions have not been advanced merely as hypotheses; attempts have been made to support them by experiments. M. Schrader and Mr. Braconnot, from a series of distinct investigations, have arrived at the same conclusions. They state that different seeds sown in fine sand, sulphur, and metallic oxides, and supplied only with atmospherical air and water, produced healthy plants, which by analysis yielded various earthy and saline matters, which either were not contained in the seeds or the material in which they grew, or which were contained only in much smaller quantities in the seeds: and hence they conclude that they must have been formed from air or water, in consequence of the agencies of the living organs of the plant.

The researches of these two gentlemen were conducted with much ingenuity and address; but there were circumstances which interfered with their results, which they could not have known, as at the time their labors were published they had not been investigated.

I have found that common distilled water is far from being free from saline impregnations. In analyzing it by Voltaic electricity, I procured from it alkalies and earths; and many of the combinations of metals with chlorine are extremely volatile substances. When distilled water is supplied in an unlimited manner to plants, it may furnish to them a number of different substances, which, though in quantities scarcely perceptible in the water, may accumulate in the plant, which probably perspires only absolutely pure water.

In 1801 I made an experiment on the growth of oats, supplied with a limited quantity of distilled water in a soil composed of pure carbonate of lime. The soil and the water were placed in a vessel of iron, which was included in a large jar, connected with the free atmosphere by a tube, so curved as to prevent the possibility of any dust, or fluid, or solid matter from entering into the jar. My object was to ascertain whether any siliceous earth

* The state in which farm-yard manure should be used is still a *questio vexata*; and is likely to remain so, till an extensive series of judicious experiments shall have been made on the subject by competent persons, equally qualified by theoretical and practical knowledge to arrive at precise results, and to be able to communicate them. The question, in all its relations, is necessarily one of extreme difficulty, as well as of importance. Probably composts, or mixtures of stable and farm-yard manure, with marl, clay, or lime, according to circumstances, will prove most advantageous of all, if kept well covered with earth, so as to allow of a certain degree of fermentation, and yet prevent any material loss of gaseous matter.—J. D.

would be formed in the process of vegetation; but the oats grew very feebly, and began to be yellow before any flowers formed: the entire plants were burnt, and their ashes compared with those from an equal number of grains of oat. Less siliceous earth was given by the plants than by the grains; but their ashes yielded much more carbonate of lime. That there was less siliceous earth, I attribute to the circumstance of the husk of the oat being thrown off in germination; and this is the part which most abounds in silica. Healthy green oats, taken from a growing crop, in a field of which the soil was a fine sand, yielded siliceous earth in a much greater proportion than an equal weight of the corn artificially raised.

The general results of this experiment are very much opposed to the idea of the composition of the earths, by plants, from any of the elements found in the atmosphere, or in water; and there are other facts contradictory to the idea. Jacquin states that the ashes of glass wort (*salsola soda*,) when it grows in inland situations, afford the vegetable alkali; when it grows on the sea-shore, where compounds which afford the fossil or marine alkali are more abundant, it yields that substance. Du Hamel found that plants which usually grow on the sea-shore, made small progress when planted in soils containing little common salt. The sun-flower, when growing in lands containing no nitre, does not afford that substance; though when watered by a solution of nitre, it yields nitre abundantly. The tables of De Saussure, referred to in the third lecture, show that the ashes of plants are similar in constitution to the soils in which they have vegetated.

De Saussure made plants grow in solutions of different salts, and he ascertained that in all cases certain portions of the salts were absorbed by the plant, and found unaltered in their organs.

Even animals do not appear to possess the power of forming the alkaline and earthy substances. Dr. Fordyce found, that when canary birds, at the time they were laying eggs, were deprived of access to carbonate of lime, their eggs had soft shells; and if there is any process for which nature may be conceived most likely to supply resources of this kind, it is that connected with the reproduction of the species.

As the evidence on the subject now stands, it seems fair to conclude, that the different earths and saline substances found in the organs of plants are supplied by the soils in which they grow; and in no cases composed by new arrangements of the elements in air or water. What may be our ultimate view of the laws of chemistry, or how far our ideas of elementary principles may be simplified, it is impossible to say. We can only reason from facts. We cannot imitate the powers of composition belonging to vegetable structures; but at least we can understand them: and, as far as our researches have gone, it appears that in vegetation compound forms are uniformly produced from simpler ones; and the elements in the soil, the atmosphere, and the earth, absorbed and made parts of beautiful and diversified structures.

The views which have been just developed lead to correct ideas of the operation of these manures, which are not necessarily the result of decayed organized bodies, and which are not composed of different proportions of carbon, hydrogen, oxygen, and azote. They must produce their effect, either by becoming a constituent part of the plant, or by acting upon its more essential food, so as to render it more fitted for the purposes of vegetable life.

The only substances which can with propriety be called fossil manures, and which are found unmixed with the remains of any organized beings, are certain alkaline earths, or alkalies, and their combinations.

The only alkaline earths which have been hitherto applied in this way, are lime and magnesia. Potassa and soda, the two fixed alkalies, are both used in certain of their chemical compounds. I shall state in succession such facts as have come to my knowledge respecting each of these bodies in their applications to the purposes of agriculture; but I shall enlarge most upon the subject of lime; and if I should enter into some details which may be tedious and minute, I trust, my excuse will be found in the importance of the inquiry; and it is one which has been greatly elucidated by late discoveries.

The most common form in which lime is found on the surface of the earth, is in a state of combination with carbonic acid or fixed air. If a piece of limestone, or chalk, be thrown into a fluid acid, there will be an effervescence. This is owing to the escape of the carbonic acid gas. The lime becomes dissolved in the liquor.

When limestone is strongly heated, the carbonic acid gas is expelled, and then nothing remains but the pure alkali earth: in this case there is a loss of weight; and if the fire has been very high, it approaches to one-half the weight of the stone; but in common cases, limestones, if well dried before burning, do not lose much more than from 30 to 40 per cent., or from seven to eight parts out of 20.

I mentioned, in discussing the agencies of the atmosphere upon vegetables, in the beginning of the fifth lecture, that air always contains carbonic acid gas, and that lime is precipitated from water by this substance. When burnt lime is exposed to the atmosphere, in a certain time it becomes mild, and is the same substance as that precipitated from lime-water; it is combined with carbonic acid gas. Quicklime, when first made, is caustic and burning to the tongue, renders vegetable blues green, and is soluble in water; but when combined with carbonic acid it loses all these properties, its solubility, and its taste: it regains its power of effervescing, and becomes the same chemical substance as chalk or limestone.

Very few limestones or chalks consist entirely of lime and carbonic acid. The statuary marbles or certain of the rhomboidal spars, are almost the only pure species; and the different properties of limestones, both as manures and cements, depend upon the nature of the ingredients mixed in the limestone; for the true calcareous element, the carbonate of lime, is uniformly the same in nature, properties, and effects, and consists of one proportion of carbonic acid 41·4, and one of lime 55.

When a limestone does not copiously effervesce in acids, and is sufficiently hard to scratch glass, it contains siliceous, and probably aluminous earth. When it is deep brown or red, or strongly colored of any of the shades of brown or yellow, it contains oxide of iron. When it is not sufficiently hard to scratch glass, but effervesces slowly, and makes the acid in which it effervesces milky, it contains magnesia. And when it is black and emits a fœtid smell if rubbed, it contains coally or bituminous matter.

The analysis of limestones is not a difficult matter; and the proportions of their constituent parts may be easily ascertained by the process described in the lecture on the analysis of soils; and usually with sufficient accuracy for all the purposes of the farmer, by the fifth process.

Before any opinion can be formed of the manner in which the different ingredients in limestones modify their properties, it will be necessary to consider the operation of the pure calcareous element as a manure, and as a cement.

Quicklime in its pure state, whether in powder or dissolved in water, is injurious to plants. I have in several instances killed grass by watering it with lime-water. But lime, in its state of combination with carbonic acid, as is evident from the analysis given in the fourth lecture, is a useful ingredient in soils. Calcareous earth is found in the ashes of the greater number of plants; and exposed to the air lime cannot long continue caustic, for the reasons that were just now assigned, but soon becomes united to carbonic acid.

When newly burnt lime is exposed to air, it soon falls into powder; in this case it is called slacked-lime; and the same effect is immediately produced by throwing water upon it, when it heats violently, and the water dissappears.

Slacked-lime is merely a combination of lime with about one-third of its weight of water; *i. e.* 55 parts of lime absorb 17 parts of water; and in this case it is composed of a definite proportion of lime to a definite proportion of water, and is called by chemists *hydrate of lime;* and when hydrate of lime becomes carbonate of lime by long exposure to air, the water is expelled, and the carbonic acid gas takes its place.

When lime, whether freshly burnt or slacked, is mixed with any moist fibrous vegetable matter, there is a strong action between the lime and the vegetable matter, and they form a kind of compost together, of which a part is usually soluble in water.

By this kind of operation, lime renders matter which was before comparatively inert nutritive; and as charcoal and oxygen abound in all vegetable matters, it becomes at the same time converted into carbonate of lime.

Mild lime, powdered limestone, marls or chalks, have no action of this kind upon vegetable matter; by their action they prevent the too rapid decomposition of substances already dissolved; but they have no tendency to form soluble matters

It is obvious from these circumstances, that the operation of quicklime, and marl or chalk, depends upon principles altogether different. Quicklime, in being applied to land, tends to bring any hard vegetable matter that it contains into a state of more rapid decomposition and solution, so as to render it a proper food for plants. Chalk, and marl, or carbonate of lime, will only improve the texture of the soil, or its relation to absorption: it acts merely as one of its earthy ingredients. Quicklime, when it becomes mild, operates in the same manner as chalk; but in the act of becoming mild, it prepares soluble out of insoluble matter.

It is upon this circumstance that the operation of lime in the preparation for wheat crops depends; and its efficacy in fertilizing peats, and in bringing into a state of cultivation all soils abounding in hard roots, or dry fibres, or inert vegetable matter.

The solution of the question, whether quicklime ought to be applied to a soil, depends upon the quantity of inert vegetable matter that it contains. The solution of the question, whether marl, mild lime, or powdered limestone, ought to be applied, depends upon the quantity of calcareous matter already in the soil. All soils are improved by mild lime, and ultimately by quicklime, which do not effervesce with acids; and sands more than clays.

When a soil, deficient in calcareous matter, contains much *soluble* vegetable manure, the application of quicklime should always be avoided, as it either tends to decompose the soluble matters by uniting to their carbon and oxygen so as to become mild lime, or it combines with the soluble matters, and forms compounds, having less attraction for water than the pure vegetable substance.

The case is the same with respect to most animal manures; but the operation of the lime is different in different cases, and depends upon the nature of the animal matter. Lime forms a kind of insoluble soap with oily matters, and then gradually decomposes them by separating from them oxygen and carbon. It combines likewise with the animal acids; and probably assists their decomposition by abstracting carbonaceous matter from them combined with oxygen: and consequently it must render them less nutritive. It tends to diminish likewise the nutritive powers of albumen from the same causes; and always destroys to a certain extent the efficacy of animal manures, either by combining with certain of their elements, or by giving to them new arrangements. Lime should never be applied with animal manures, unless they are too rich, or for the purpose of preventing noxious effluvia, as in certain cases mentioned in the last lecture. It is injurious when mixed with any common dung, and tends to render the extractive matter insoluble.

I made an experiment on this subject: I mixed a quantity of the brown soluble extract, which was procured from sheep's dung, with five times its weight of quicklime. I then moistened them with water; the mixture heated very much; it was suffered to remain for 14 hours, and was then acted on by six or seven times its bulk of pure water: the water, after being passed through a filter, was evaporated to dryness; the solid matter obtained was scarcely colored, and was lime mixed with a little saline matter.

In those cases in which fermentation is useful to produce nutriment from vegetable substances, lime is always efficacious. I mixed some moist tanners' spent bark with one-fifth of its weight of quicklime, and suffered them to remain together in a close vessel for three months; the lime had become colored, and was effervescent: when water was boiled upon the mixture, it gained a tint of fawn-color, and by evaporation furnished a fawn-colored powder, which must have consisted of lime united to vegetable matter, for it burnt when strongly heated, and left a residuum of mild lime.*

* The manner in which lime acts in agriculture requires further and minute investigation, and is a most important subject for inquiry. From the experiments

The limestones containing alumina and silica are less fitted for the purposes of manure than pure limestones; but the lime formed from them has no noxious quality. Such stones are less efficacious, merely because they furnish a smaller quantity of quicklime.

I mentioned bituminous limestones. There is very seldom any considerable portion of coally matter in these stones; never as much as five parts in 100; but such limestones make very good lime. The carbonaceous matter can do no injury to the land, and may, under certain circumstances, become a food of the plant, as is evident from what was stated in the last lecture.

The subject of the application of the magnesian limestone is one of great interest.

It had been long known to farmers in the neighborhood of Doncaster, that lime made from a certain limestone applied to the land often injured the crops considerably, as I mentioned in the introductory lecture. Mr. Tennant, in making a series of experiments upon this peculiar calcareous substance, found that it contained magnesia; and on mixing some calcined magnesia with soil in which he sowed different seeds, he found that they either died, or vegetated in a very imperfect manner, and the plants were never healthy. And with great justice and ingenuity he referred the bad effects of the peculiar limestone to the magnesian earth it contains.

In making some inquiries concerning this subject, I found that there were cases in which this magnesian limestone was used with good effect.

Amongst some specimens of limestone which Lord Somerville put into my hands, two marked as peculiarly good proved to be magnesian limestones. And lime made from the Breedon limestone is used in Leicestershire, where it is called hot lime; and I have been informed by farmers in the neighborhood of the quarry, that they employ it advantageously in small quantities, seldom more than 25 or 30 bushels to the acre. And that they find it may be used with good effect in larger quantities upon rich land.

A minute chemical consideration of this question will lead to its solution.

Magnesia has a much weaker attraction for carbonic acid than lime, and will remain in the state of caustic or calcined magnesia for many months, though exposed to the air. And as long as any caustic lime remains, the magnesia cannot be combined with carbonic acid, for lime instantly attracts carbonic acid from magnesia.

When a magnesian limestone is burnt, the magnesia is deprived of carbonic acid much sooner than the lime; and if there is not much vegetable or animal matter in the soil to supply by its decomposition carbonic acid, the magnesia will remain for a long while in the caustic state; and in this state acts as a poison to certain vegetables. And that more magnesian lime may be used upon rich soils, seems to be owing to the circumstance, that the decomposition of the manure in them supplies carbonic acid. And magnesia in its mild state, *i. e.* fully combined with carbonic acid, seems to be always a useful constituent of soils. I have thrown carbonate of magnesia (procured by boiling the solution of magnesia in super-carbonate of potassa) upon grass, and upon growing wheat and barley, so as to render the surface white: but the vegetation was not injured in the slightest degree. And one of the most fertile parts of Cornwall, the Lizard, is a district in which the soil contains mild magnesian earth.

The Lizard Downs bear a short and green grass; which feeds sheep, producing excellent mutton; and the cultivated parts are amongst the best corn lands in the country.

That the theory which I have ventured to give of the operation of magnesian lime is not unfounded, is shown by an experiment which I made expressly for the purpose of determining the true nature of the operation of this substance. I took four portions of the same soil: with one I mixed $\frac{1}{20}$ of its weight of caustic magnesia, with another I mixed the same quantity of magnesia and a proportion of a fat decomposing peat equal to one-fourth of the weight of the soil. One portion of soil remained in its natural state: and another was mixed with peat without magnesia. The mixtures were made in December 1806, and in April 1807 barley was sown in all of them. It grew very well in the pure soil; but better in the soil containing the magnesia and peat, and nearly as well in the soil containing peat alone: but in the soil containing the magnesia alone, it rose very feeble, and looked yellow and sickly.

I repeated this experiment in the summer of 1810 with similar results; and I found that the magnesia in the soil mixed with peat became strongly effervescent, whilst the portion in the unmixed soil gave carbonic acid in much smaller quantities. In the one case the magnesia had assisted in the formation of a manure, and had become mild; in the other case it had acted as a poison.

It is obvious, from what has been said, that lime from the magnesian limestone may be applied in large quantities to peats; and that where lands have been injured by the application of too large a quantity of magnesian lime, peat will be a proper and efficient remedy.

I mentioned that magnesian limestones effervesced little when plunged into an acid. A simple test of magnesia in a limestone is this circumstance, and its rendering diluted nitric acid or aqua fortis milky.

From the analysis of Mr. Tennant, it appears that the magnesian limestones contain from

20·3 to 22·5 magnesia.
29·5 to 31·7 lime.
47·2 carbonic acid.
0·8 clay and oxide of iron.

Magnesian limestones are usually colored brown or a pale yellow. They are found in Somersetshire, Leicestershire, Derbyshire, Shropshire, Durham, and Yorkshire. I have never met with any in other counties in England; but they abound in many parts of Ireland, particularly near Belfast.

The use of lime as a cement is not a proper subject for extensive discussion in a course of lectures

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I have made, I have satisfied myself that it arrests equally vinous and the putrid fermentation, and that in close vessels it may be used for preserving both animal and vegetable substances. When it promotes the solution of vegetable substances, it is probably owing either to forming with them soluble compounds, as in the instance of ulmin, (before mentioned,) or in promoting the production of proximate principles from their elements, capable of entering into union with it, and with which it forms such soluble compounds.—J. D.

on the chemistry of agriculture; yet as the theory of the operation of lime in this way is not fully stated in any elementary book that I have perused, I shall say a very few words on the applications of this part of chemical knowledge.

There are two modes in which lime acts as a cement; in its combination with water, and in its combination with carbonic acid.

The hydrate of lime has been already mentioned. When quicklime is rapidly made into a paste with water, it soon loses its softness, and the water and the lime form together a solid coherent mass, which consists, as has been stated before, of 17 parts of water to 55 parts of lime. When hydrate of lime whilst it is consolidating is mixed with red oxide of iron, alumina, or silica, the mixture becomes harder and more coherent than when lime alone is used; and it appears that this is owing to a certain degree of chemical attraction between hydrate of lime and these bodies; and they render it less liable to decompose by the action of the carbonic acid in the air, and less soluble in water.

The basis of all cements that are used for works which are to be covered with water must be formed from hydrate of lime; and the lime made from impure limestones answers this purpose very well. Puzzolana is composed principally of silica, alumina, and oxide of iron; and it is used mixed with lime, to form cements intended to be employed under water. Mr. Smeaton, in the construction of the Eddystone lighthouse, used a cement composed of equal parts by weight of slacked lime and puzzolana. Puzzolana is a decomposed lava. Tarras, which was formerly imported in considerable quantities from Holland, is a mere decomposed basalt: two parts of slacked lime and one part of tarras form the principal part of the mortar used in the great dikes of Holland. Substances which will answer all the ends of puzzolana and tarras are abundant in the British islands. An excellent red tarras may be procured in any quantities from the Giants' Causeway in the north of Ireland; and decomposing basalt is abundant in many parts of Scotland, and in the northern districts of England in which coal is found.

Parker's cement, and cements of the same kind made at the alum works of Lord Dundas and Lord Mulgrave, are mixtures of calcined ferruginous, siliceous, and aluminous matter, with hydrate of lime.

The cements which act by combining with carbonic acid, or the common mortars, are made by mixing together slacked lime and sand. These mortars at first solidify as hydrates, and are slowly converted into carbonate of lime by the action of the carbonic acid of the air. Mr. Tennant found that a mortar of this kind in three years and a quarter had regained 63 per cent. of the quantity of carbonic acid gas which constitutes the definite proportion in carbonate of lime. The rubbish of mortar from houses owes its power to benefit lands principally to the carbonate of lime it contains, and the sand in it; and its state of cohesion renders it particularly fitted to improve clayey soils.

The hardness of the mortar in very old buildings depends upon the perfect conversion of all its parts into carbonate of lime. The purest limestones are the best adapted for making this kind of mortar; the magnesian limestones make excellent water cements, but act with too little energy upon carbonic acid gas to make good common mortar.

The Romans, according to Pliny, made their best mortar a year before it was used; so that it was partially combined with carbonic acid gas before it was employed.*

In burning lime there are some particular precautions required for the different kinds of limestones. In general, one bushel of coal is sufficient to make four or five bushels of lime. The magnesian limestone requires less fuel than the common limestone. In all cases in which a limestone containing much aluminous or siliceous earth is burnt, great care should be taken to prevent the fire from becoming too intense; for such lime easily vitrifies, in consequence of the affinity of lime for silica and alumina. And as in some places there are no other limestones than such as contain other earths, it is important to attend to this circumstance. A moderately good lime may be made at a low red heat; but it will melt into a glass at a white heat. In lime-kilns for burning such lime, there should be always a damper.

In general, when limestones are not magnesian, their purity will be indicated by their loss of weight in burning; the more they lose, the larger is the quantity of calcareous matter they contain. The magnesian limestones contain more carbonic acid than the common limestones; and I have found all of them lose more than half their weight by calcination.

Besides being used in the forms of lime and carbonate of lime, calcareous matter is applied for the purposes of agriculture in other combinations. One of these bodies is *gypsum* or sulphate of lime. This substance consists of sulphuric acid (the same body that exists combined with water in oil of vitriol) and lime; and when dry it is composed of 55 parts of lime and 75 parts of sulphuric acid. Common gypsum or selenite, such as that found at Shotover Hill near Oxford, contains, besides sulphuric acid and lime, a considerable quantity of water; and its composition may be thus expressed:—

Sulphuric acid, one proportion	-	75
Lime, one proportion - - -	-	55
Water, two proportions -	-	34

The nature of gypsum is easily demonstrated: if oil of vitriol be added to quicklime, there is a violent heat produced; when the mixture is ignited, water is given off, and gypsum alone is the result, if the acid has been used in sufficient quantity; and gypsum mixed with quicklime, if the quantity has been deficient. Gypsum free from water is sometimes found in nature, when it is called anhydrous selenite. It is distinguished from common gypsum by giving off no water when heated.

When gypsum, free from water, or deprived of water by heat, is made into a paste with water, it rapidly sets by combining with that fluid. Plaster of Paris is powdered dry gypsum,† and its property as a cement, and in its use in making casts, depends upon its solidifying a certain quan-

* Pliny, speaking of the qualities of mortars, says, "Intrita quoque quo vetustior eo melior. In antiquarum edium legibus invenitur, ne recentiore trima uteretur redemptor." Nat. Hist. lib. xxxvi. cap. 23.—J. D.

† Anhydrous gypsum.

tity of water, and making with it a coherent mass. Gypsum is soluble in about 500 times its weight of cold water, and is more soluble in hot water; so that when water has been boiled in contact with gypsum, crystals of this substance are deposited as the water cools. Gypsum is easily distinguished when dissolved by its properties of affording precipitates to solutions of oxalates and barytic salts.

Great difference of opinion has prevailed amongst agriculturists with respect to the uses of gypsum. It has been advantageously used in Kent, and various testimonies in favor of its efficacy have been laid before the Board of Agriculture by Mr. Smith. In America it is employed with signal success; but in most counties of England it has failed, though tried in various ways and upon different crops.

Very discordant notions have been formed as to the mode of operation of gypsum. It has been supposed by some persons to act by its power of attracting moisture from the air; but this agency must be comparatively insignificant. When *combined* with water, it retains that fluid too powerfully to yield it to the roots of the plant, and its adhesive attraction for moisture is inconsiderable; the small quantity in which it is used, likewise, is a circumstance hostile to this idea.

It has been said that gypsum assists the putrefaction of animal substances, and the decomposition of manure. I have tried some experiments on this subject, which are contradictory to the notion. I mixed some minced veal with about $\frac{1}{100}$ part of its weight of gypsum, and exposed some veal without gypsum under the same circumstances; there was no difference in the time in which they began to putrefy, and the process seemed to me most rapid in the case in which there was no gypsum present. I made other similar mixtures, employing in some cases larger and in some cases smaller quantities of gypsum; and I used pigeons' dung in one instance instead of flesh, and with precisely similar results. It certainly in no case increased the rapidity of putrefaction.

Though it is not generally known, yet a series of experiments has been carried on for a great length of time in this country upon the operation of gypsum as a manure. The Berkshire and the Wiltshire peat-ashes contain a considerable portion of this substance. In the Newbury peat-ashes I have found from one-fourth to one-third of gypsum; and a larger quantity in some peat-ashes from the neighborhood of Stockbridge: the other constituents of these ashes are calcareous, aluminous, and siliceous earth, with variable quantities of sulphate of potassa, a little common salt, and sometimes oxide of iron. The red ashes contain most of this last substance.

These peat-ashes are used as a top-dressing for cultivated grasses, particularly sainfoin and clover. In examining the ashes of sainfoin, clover, and rye grass, I found that they afforded considerable quantities of gypsum; and this substance, probably, is intimately combined as a necessary part of their woody fibre. If this be allowed, it is easy to explain the reason why it operates in such small quantities; for the whole of a clover crop, or sainfoin crop, on an acre, according to my estimation, would afford by incineration only three or four bushels of gypsum. In examining the soil in a field near Newbury, which was taken from below a footpath near the gate, where gypsum could not have been artificially furnished, I could not detect any of this substance in it; and at the very time I collected the soil, the peat-ashes were applied to the clover in the field. The reason why gypsum is not generally efficacious, is probably because most cultivated soils contain it in sufficient quantities for the use of the grasses. In the common course of cultivation, gypsum is furnished in the manure; for it is contained in stable dung, and in the dung of all cattle fed on grass; and it is not taken up in corn crops, or crops of peas and beans, and in very small quantities in turnip crops; but where lands are exclusively devoted to pasturage and hay, it will be continually consumed. I have examined four different soils, cultivated by a series of common courses of crops, for gypsum. One was a light sand from Norfolk; another a clay, bearing good wheat, from Middlesex; the third a sand from Sussex; the fourth a clay from Essex. I found gypsum in all of them; and in the Middlesex soil it amounted nearly to one per cent. Lord Dundas informs me, that having tried gypsum without any benefit on two of his estates in Yorkshire, he was induced to have the soil examined for gypsum, according to the process described in the fourth lecture, and this substance was found in both the soils.

Should these statements be confirmed by future inquiries, a practical inference of some value may be derived from them. It is possible that lands which have ceased to bear good crops of clover, or artificial grasses, may be restored by being manured with gypsum. I have mentioned that this substance is found in Oxfordshire; it is likewise abundant in many other parts of England; in Gloucestershire, Somersetshire, Derbyshire, Yorkshire, &c.; and requires only pulverisation for its preparation.*

Some very interesting documents upon the use of sulphate of iron or green vitriol, which is a salt produced from peat in Bedfordshire, have been laid before the Board by Dr. Pearson; and I have witnessed the fertilizing effects of a ferruginous water used for irrigating a grass meadow made by the Duke of Manchester, at Priestley Bog, near Woburn, an account of the produce of which has been published by the Board of Agriculture. I have no doubt that the peat salt and the vitriolic water acted chiefly by producing gypsum.

The soils on which both are efficacious are calcareous; and sulphate of iron is decomposed by the carbonate of lime in such soils. The sulphate of iron consists of sulphuric acid and oxide of iron, and is an acid and a very soluble salt: when a solution of it is mixed with carbonate of lime, the sulphuric acid quits the oxide of iron to unite to the lime, and the compounds produced are insipid and comparatively insoluble.

I collected some of the deposition from the ferruginous water on the soil in Priestley meadow. I found it consisted of gypsum, carbonate or iron,

* The manner in which gypsum acts in promoting the vegetation of the grasses, is still a disputed question. M. De Candolle rejects the opinion expressed in the text, and adopts that of M. Soquet, somewhat modified; he thinks that gypsum is not so much useful in the soil, if indeed it is at all, as when scattered on the surface, and that it acts chiefly by stimulating the leaves of the plants to which it adheres. (Vide Physiologie Végétale, p. 1273.—J. D.

and insoluble sulphate of iron. The principal grasses in Priestley meadow are, meadow fox-tail, cock's-foot, meadow fescue, fiorin, and sweet-scented vernal grass. I have examined the ashes of three of these grasses, meadow fox-tail, cock's-foot, and fiorin. They contained a considerable proportion of gypsum.

Vitriolic impregnations, in soils where there is no calcareous matter, as in a soil from Lincolnshire, to which I referred in the fourth lecture, are injurious; but it is probably in consequence of their supplying an excess of ferruginous matter to the sap. Oxide of iron in small quantities forms a useful part of soils; and, as is evident from the details in the third lecture, it is found in the ashes of plants; and probably, is hurtful only in its acid combinations.

I have just mentioned certain peats, the ashes of which afford gypsum; but it must not be inferred from this that all peats agree with them. I have examined various peat-ashes from Scotland, Ireland, Wales, and the northern and western parts of England, which contained no quantity that could be useful; and these ashes abounded in siliceous, aluminous earths, and oxide of iron.

Lord Charleville found in some peat-ashes from Ireland sulphate of potassa, *i. e.* the sulphuric acid combined with potassa.

Vitriolic matter is usually formed in peats; and if the soil or substratum is calcareous, the ultimate result is the production of gypsum. In general, when a recent peat-ash emits a strong smell resembling that of rotten eggs when acted upon by vinegar, it will furnish gypsum.

Phosphate of lime is a combination of phosphoric acid and lime, one proportion of each. It is a compound insoluble in pure water, but soluble in water containing any acid matter. It forms the greatest part of calcined bones. It exists in most excrementitious substances, and is found both in the straw and grain of wheat, barley, oats, and rye, and likewise in beans, peas, and tares. It exists in some places in these islands native; but only in very small quantities. Phosphate of lime is generally conveyed to the land in the composition of other manure; and it is probably necessary to corn crops and other white crops.

Bone-ashes ground to powder will probably be found useful on arable lands containing much vegetable matter, and may perhaps enable soft peats to produce wheat; but the powdered bone in an uncalcined state is much to be preferred in all cases when it can be procured.

The *saline compounds of magnesia* will require very little discussion as to their uses as manures. The most important relations of this subject to agriculture have been considered in the former part of this lecture, when the application of the magnesian limestone was examined. In combination with sulphuric acid magnesia forms a soluble salt. This substance, it is stated by some inquirers, has been found of use as a manure; but it is not found in nature in sufficient abundance, nor is it capable of being made artificially sufficiently cheap to be of useful application in the common course of husbandry.

Wood ashes consist principally of the vegetable alkali united to carbonic acid; and as this alkali is found in almost all plants, it is not difficult to conceive that it may form an essential part of their organs. The general tendency of the alkalies is to give solubility to vegetable matters; and in this way they may render carbonaceous and other substances capable of being taken up by the tubes in the radicle fibres of plants. The vegetable alkali, likewise, has a strong attraction for water, and even in small quantities may tend to give a due degree of moisture to the soil, or to other manures*; though this operation, from the small quantities used, or existing in the soil, can be only of a secondary kind.

The *mineral alkali or soda* is found in the ashes of sea-weed, and may be procured by certain chemical agencies from *common salt.* Common salt consists of the metal named sodium combined with chlorine; and pure soda consists of the same metal united to oxygen. When water is present which can afford oxygen to the sodium, soda may be obtained in several modes from salt.

The same reasoning will apply to the operation of the pure mineral alkali, or the carbonated alkali, as to that of the vegetable alkali; and when common salt acts as a manure, it is probably by entering into the composition of the plant in the same manner as gypsum, phosphate of lime, and the alkalies. Sir John Pringle has stated that salt in small quantities assists the decomposition of animal and vegetable matter. This circumstance may render it useful in certain soils. Common salt likewise is offensive to insects. That in small quantities it is sometimes a useful manure, I believe is fully proved; and it is probable that its efficacy depends upon many combined causes.

Some persons have argued against the employment of salt; because, when used in large quantities, it either does no good, or renders the ground steril; but this is a very unfair mode of reasoning. That salt in large quantities rendered land barren, was known long before any records of agricultural science existed. We read in the Scriptures, that Abimelech took the city of Shechem, "and beat down the city, and sowed it with salt," that the soil might be for ever unfruitful. Virgil reprobates a salt soil; and Pliny, though he recommends giving salt to cattle, yet affirms that when strewed over land it renders it barren. But these are not arguments against a proper application of it. Refuse salt in Cornwall, which, however, likewise contains some of the oil and exuviæ of fish, has long been known as an admirable manure. And the Cheshire farmers contend for the benefit of the peculiar produce of their country. It is not unlikely that the same causes influence the effects of salt as those which act in modifying the operation of gypsum. Most lands in this island, particularly those near the sea, probably contain a sufficient quantity of salt for all the purposes of vegetation; and in such cases the supply of it to the soil will not only be useless, but may be injurious. In great storms the spray of the sea has been carried more than 50 miles from the shore; so that from this source salt must be often supplied to the soil. I have found salt in all the sandstone rocks that I have examined, and it must

* This effect is well illustrated by the dampness of walls and floors impregnated with minute quantities of deliquescent salts, such as exist in sea-water. In further illustration, I may mention a striking instance of dampness, amounting to a constant dropping of water, from the ceiling of an uninhabited room impregnated with salt, from brine having been spilt on the floor of the room above some years previously.—J. D

exist in the soil derived from these rocks. It is a constituent, likewise, of almost every kind of animal and vegetable manure.

Besides these compounds of the alkaline earths and alkalies, many others have been recommended for the purpose of increasing vegetation; such as *nitre*, or the nitrous acid combined with potassa. Sir Kenelm Digby states, that he made barley grow very luxuriantly by watering it with a very weak solution of nitre; but he is too speculative a writer to awaken confidence in his results. This substance consists of one proportion of azote, six of oxygen, and one of potassium; and it is not unlikely that it may furnish azote to form albumen or gluten in those plants that contain them; but the nitrous salts are too valuable for other purposes to be used as manures.

Dr. Home states that *sulphate of potassa*, which as I just now mentioned is found in the ashes of some peats, is a useful manure. But Mr. Naismith* questions his results; and quotes experiments hostile to his opinion, and, as he conceives, unfavorable to the efficacy of any species of saline manure.

Much of the discordance of the evidence relating to the efficacy of saline substances depends upon the circumstance of their having been used in different proportions, and in general in quantities much too large.

I made a number of experiments in May and June, 1807, on the effects of different saline substances on barley and on grass growing in the same garden, the soil of which was a light sand, of which 100 parts were composed of 60 parts of siliceous sand, and 24 parts finely divided matter, consisting of 7 parts carbonate of lime, 12 parts alumina and silica, less than one part saline matter, principally common salt, with a trace of gypsum and sulphate of magnesia: the remaining 16 parts were vegetable matter.

The solutions of the saline substances were used twice a week in the quantity of two ounces, on spots of grass and corn, sufficiently remote from each other to prevent any interference of results. The substances tried were *super-carbonate, sulphate, acetate, nitrate* and *muriate of potassa; sulphate of soda, sulphate, nitrate, muriate*, and *carbonate of ammonia*. I found that in all cases when the quantity of the salt equalled $\frac{1}{30}$ part of the weight of the water, the effects were injurious; but least so in the instances of the carbonate, sulphate, and muriate of ammonia. When the quantities of the salts where $\frac{1}{300}$ part of the solution, the effects were different. The plants watered with the solutions of the sulphates grew just in the same manner as similar plants watered with rain water. Those acted on by the solution of nitre, acetate, and supercarbonate of potassa, and muriate of ammonia, grew rather better.—Those treated with the solution of carbonate of ammonia grew most luxuriantly of all. This last result is what might be expected, for carbonate of ammonia consists of carbon, hydrogen, azote, and oxygen. There was, however, another result which I had not anticipated; the plants watered with solution of nitrate of ammonia did not grow better than those watered with rain water. The solution reddened litmus paper; and probably the free acid exerted a prejudicial effect, and interfered with the result.

Soot doubtless owes a part of its efficacy to the ammoniacal salt it contains. The liquor produced by the distillation of coal contains carbonate and acetate of ammonia, and is said to be a very good manure.

In 1808, I found the growth of wheat in a field at Roehampton assisted by a very weak solution of acetate of ammonia.

Soapers' waste has been recommended as a manure, and it has been supposed that its efficacy depended upon the different saline matters it contains; but their quantity is very minute, indeed, and its principal ingredients are mild lime and quicklime. In the soapers' waste from the best manufactories, there is scarcely a trace of alkali. Lime moistened with sea-water affords more of this substance, and is said to have been used in some cases with more benefit than common lime.

Mr. Knight informs me, that he has found, in the two last seasons, that pond mud, of very poor quality, chiefly clay, having been mixed with coal dust, to afford fuel for his hot-houses, afforded a manure of considerable power. It acts, however, much more beneficially upon soils which are in tolerably good condition, and perhaps rather stimulates than feeds; for on very poor soil, where some was laid in the last winter, its effects can scarcely be perceived.

It is unnecessary to discuss to any greater extent the effects of saline substances on vegetation; except the ammoniacal compounds, or the compounds containing nitric, acetic, and carbonic acid, none of them can afford by their decomposition any of the common principles of vegetation, carbon, hydrogen, and oxygen.

The alkaline sulphates and the earthy muriates are so seldom found in plants, or are found in such minute quantities, that it can never be an object to apply them to the soil. It was stated in the beginning of this lecture, that the earthy and alkaline substances seem never to be formed in vegetation; and there is every reason likewise to believe that they are never decomposed; for after being absorbed they are found in their ashes.

The metallic bases of them cannot exist in contact with aqueous fluids; and these metallic bases, like other metals, have not as yet been resolved into any other forms of matter by artificial processes; they combine readily with other elements; but they remain undestructible, and can be traced undiminished in quantity, through their diversified combinations.

LECTURE VIII.

ON THE IMPROVEMENT OF LANDS BY BURNING; CHEMICAL PRINCIPLES OF THIS OPERATION. ON IRRIGATION AND ITS EFFECTS. ON FALLOWING; ITS DISADVANTAGES AND USES. ON THE CONVERTIBLE HUSBANDRY FOUNDED ON REGULAR ROTATIONS ON DIFFERENT CROPS. ON PASTURE; VIEWS CONNECTED WITH ITS APPLICATION. ON VARIOUS AGRICULTURAL OBJECTS CONNECTED WITH CHEMISTRY. CONCLUSION.

The improvement of steril lands by burning was known to the Romans. It is mentioned by

* Elements of Agriculture, p. 78.

Virgil in the first book of the Georgics: "Sæpe etiam steriles incendere profuit agros." It is a practice still much in use in many parts of these islands; the theory of its operation has occasioned much discussion, both among scientific men and farmers. It rests entirely upon chemical doctrines; and I trust I shall be able to offer you satisfactory elucidations on the subject.

The bases of all common soils, as I stated in the fourth lecture, are mixtures of the primitive earths and oxide of iron; and these earths have a certain degree of attraction for each other. To regard this attraction in its proper point of view, it is only necessary to consider the composition of any common siliceous stone. Feldspar, for instance, contains siliceous, aluminous, calcareous earths, fixed alkali, and oxide of iron, which exist in one compound, in consequence of their chemical attractions for each other. Let this stone be ground into impalpable powder, it then becomes a substance like clay: if the powder be heated very strongly it fuses, and on cooling forms a coherent mass similar to the original stone; the parts separated by mechanical division adhere again in consequence of chemical attraction. If the powder is heated less strongly, the particles only superficially combine with each other, and form a gritty mass, which, when broken into pieces, has the characters of sand.

If the power of the powdered feldspar to absorb water from the atmosphere, before and after the application of the heat, be compared, it is found much less in the last case.

The same effect takes place when the powder of other siliceous or aluminous stones is made the subject of experiment.

I found that two equal portions of basalt ground into impalpable powder, of which one had been strongly ignited, and the other exposed only to a temperature equal to that of boiling water, gained very different weights in the same time when exposed to air. In four hours the one had gained only two grains, whilst the other had gained seven grains.

When clay or tenacious soils are burnt, the effect is of the same kind; they are brought nearer to a state analogous to that of sands.

In the manufacture of bricks the general principle is well illustrated; if a piece of dry brick earth be applied to the tongue, it will adhere to it very strongly, in consequence of its power to absorb water; but after it has been burnt there will be scarcely a sensible adhesion.*

The process of burning renders the soil less compact, less tenacious and retentive of moisture; and when properly applied, may convert a matter that was stiff, damp, and in consequence cold, into one powdery, dry, and warm; and much more proper as a bed for vegetable life.

The great objection made by speculative chemists to paring and burning is, that it destroys vegetable and animal matter, or the manure in the soil; but in cases in which the texture of its earthy ingredients is permanently improved, there is more than a compensation for this temporary disadvantage. And in some soils where there is an excess of inert vegetable matter, the destruction of it must be beneficial: and the carbonaceous matter remaining in the ashes may be more useful to the crop than the vegetable fibre from which it was produced.

I have examined by a chemical analysis three specimens of ashes, from different lands that had undergone paring and burning. The first was a quantity sent to the board by Mr. Boys of Bellhanger, in Kent, whose treatise on paring and burning has been published. They were from a chalk soil, and 200 grains contained

80 Carbonate of lime.
11 Gypsum.
9 Charcoal.
15 Oxide of iron.
3 Saline matter; viz. sulphate of potash, muriate of magnesia, with a minute quantity of vegetable alkali.

The remainder alumina and silica.

Mr. Boys estimates that 2660 bushels are the common produce of an acre of ground, which, according to his calculation, would give 172900 lbs. containing

Carbonate of lime -	69160 *lbs.*
Gypsum - -	9509·5
Oxide of iron -	12967·5
Saline matter -	2593·5
Charcoal - -	7780·5

In this instance there was undoubtedly a very considerable quantity of matter capable of being active as manure produced in the operation of burning. The charcoal was very finely divided; and, exposed on a large surface on the field, must have been gradually converted into carbonic acid. And gypsum and oxide of iron, as I mentioned in the last lecture, seem to produce the very best effects when applied to lands containing an excess of carbonate of lime.

The second specimen was from a soil near Coleorton, in Leicestershire, containing only four per cent. of carbonate of lime, and consisting of three-fourths light siliceous sand, and about one-fourth clay. This had been turf before burning, and 100 parts of the ashes gave

6 Parts charcoal.
3 Muriate of soda and sulphate of potash, with a trace of vegetable alkali.
9 Oxide of iron.

And the remainder the earths.

In this instance, as in the other, finely divided charcoal was found; the solubility of which would be increased by the presence of the alkali.

The third instance was that of a stiff clay, from Mount's Bay, Cornwall. This land had been brought into cultivation from a heath by burning about ten years before; but having been neglected, furze was springing up in different parts of it, which gave rise to the second paring and burning: 100 parts of the ashes contained

8 Parts of charcoal.
2 Of saline matter, principally common salt, with a little vegetable alkali.
7 Oxide of iron.
2 Carbonate of lime.

Remainder alumina and silica.

Here the quantity of charcoal was greater than in the other instances. The salt, I suspect, was owing to the vicinity of the sea, it being but two miles off. In this land there was certainly an excess of dead vegetable fibre, as well as unprofita-

* Clay has the remarkable property of confining water; and therefore a thin layer of clay may have a very injurious effect, by preventing rain water from penetrating deeply and saturating the subsoil; an evil which may be corrected by paring and burning.—J. D.

ble living vegetable matter; and I have since heard that a great improvement took place.

Many obscure causes have been referred to for the purpose of explaining the effects of paring and burning; but I believe they may be referred entirely to the diminution of the coherence and tenacity of clays, and to the destruction of inert and useless vegetable matter, and its conversion into a manure.

Dr. Darwin, in his Phytologia, has supposed that clay during torrefaction may absorb some nutritive principles from the atmosphere that afterwards may be supplied to plants; but the earths are pure metallic oxides, saturated with oxygen; and the tendency of burning is to expel any other volatile principles that they may contain in combination. If the oxide of iron in soils is not saturated with oxygen, torrefaction tends to produce its further union with this principle; and hence in burning the color of clays changes to red. The oxide of iron containing its full proportion of oxygen has less attraction for acids than the other oxide, and is consequently less likely to be dissolved by any fluid acid in the soil; and it appears in this state to act in the same manner as the earths. A very ingenious author, whom I quoted at the end of the last lecture, supposes that the oxide of iron when combined with carbonic acid is poisonous to plants, and that one use of torrefaction is to expel the carbonic acid from it; but the carbonate of iron is not soluble in water, and is a very inert substance; and I have raised a luxuriant crop of cresses in a soil composed of one-fifth carbonate of iron, and four-fifths carbonate of lime. Carbonate of iron abounds in some of the most fertile soils in England, particularly the red hop soil. And there is no theoretical ground for supposing that carbonic acid, which is an essential food of plants, should in any of its combinations be poisonous to them; and it is known that lime and magnesia are both noxious to vegetation unless combined with this principle.

All soils that contain too much dead vegetable fibre, and which consequently lose from one-third to one-half of their weight by incineration, and all such as contain their earthy constituents in an impalpable state of division, *i. e.* the stiff clays and marls, are improved by burning; but in coarse sands, or rich soils containing a just mixture of the earths, and in all cases in which the texture is already sufficiently loose, or the organisable matter sufficiently soluble, the process of torrefaction cannot be useful.

All poor siliceous sands must be injured by it; and here practice is found to accord with theory. Mr. Young, in his Essay on Manures, states, "that he found burning injure sand;" and the operation is never performed by good agriculturists upon siliceous sandy soils, after they have once been brought into cultivation.

An intelligent farmer in Mount's Bay told me that he had pared and burned a small field several years ago, which he had not been able to bring again into good condition. I examined the spot; the grass was very poor and scanty, and the soil an arid siliceous sand.

Irrigation, or *watering land*, is a practice which, at first view, appears the reverse of torrefaction; and in general, in nature, the operation of water is to bring earthy substances into an extreme state of division. But in the artificial watering of meadows, the beneficial effects depend upon many different causes,—some chemical, some mechanical.

Water is absolutely essential to vegetation; and when land has been covered by water in the winter, or in the beginning of spring, the moisture that has penetrated deep into the soil, and even the sub-soil, becomes a source of nourishment to the roots of the plant in the summer, and prevents those bad effects that often happen in lands in their natural state, from a long continuance of dry weather.

When the water used in irrigation has flowed over a calcareous country, it is generally found impregnated with carbonate of lime; and in this state it tends, in many instances, to ameliorate the soil.*

Common river-water, also, generally contains a certain portion of organisable matter, which is much greater after rains than at other times; and which exists in the largest quantity when the stream rises in a cultivated country.

Even in cases when the water used for flooding is pure, and free from animal or vegetable substances, it acts by causing the more equable diffusion of nutritive matter existing in the land; and in very cold seasons it preserves the tender roots and leaves of the grass from being affected by frost.

Water is of greater specific gravity at 42° Fahrenheit, than at 32°; the freezing point; and hence in a meadow irrigated in winter, the water immediately in contact with the grass is rarely below 40°, a degree of temperature not at all prejudicial to the living organs of plants.

In 1804, in the month of March, I examined the temperature in a water meadow near Hungerford, in Berkshire, by a very delicate thermometer. The temperature of the air at seven in the morning was 29°. The water was frozen above the grass. The temperature of the soil below the water in which the roots of the grass were fixed was 43°.

In general those waters which breed the best fish are the best fitted for watering meadows; but most of the benefits of irrigation may be derived from any kind of water. It is, however, a general principle, that waters containing ferruginous impregnations, though possessed of fertilizing effects, when applied to a calcareous soil, are injurious on soils that do not effervesce with acids; and that calcareous waters, which are known by the earthy deposite they afford when boiled, are of most use on siliceous soils, or other soils containing no remarkable quantity of carbonate of lime.

The most important processes for improving land are those which have been already discussed, and that are founded upon the circumstance of removing certain constituents from the soil, or adding others, or changing their nature; but there is an operation of very ancient practice still much

* And, I may add, to counteract the effect of rain-water, to dissolve and remove carbonate of lime from the soil. In Malta, where irrigation is much employed, the water containing carbonate of lime, I have found no deficiency of this compound in the soil of the irrigated lands; but in this country, even in chalk districts, the superficial soil is often entirely destitute of carbonate of lime; it has been removed in process of time, supposing that it previously existed in the soil, by the solvent power of rain-water.—J. D.

employed, in which the soil is exposed to the air, and submitted to processes which are purely mechanical, namely, *fallowing*.

The benefits arising from fallows have been much overrated. A summer fallow, or a clean fallow, may be sometimes necessary in lands overgrown with weeds, particularly if they are sands which cannot be pared and burnt with advantage; but is certainly unprofitable as part of a general system in husbandry.

It has been supposed by some writers, that certain principles necessary to fertility are derived from the atmosphere, which are exhausted by a succession of crops, and that these are again supplied during the repose of the land, and the exposure of the pulverized soil to the influence of the air; but this, as was mentioned in the introductory lecture, is not a correct statement. Oxygen is absorbed by the vegetable film, and, perhaps, in certain cases, azote; but the earths, the great elements of soils, cannot be combined with new elements from the air; none of them unite to azote; and such of them as are capable of attracting carbonic acid, are always saturated with it in those soils on which the practice of fallowing is adopted. The vague ancient opinion of the use of nitre and of nitrous salts in vegetation, seems to have been one of the principal speculative reasons for the defence of summer fallows. Nitrous salts are produced during the exposure of soils containing vegetable and animal remains, and in greatest abundance in hot weather;* but it is probably by the combination of azote from these remains with oxygen in the atmosphere that the acid is formed, and at the expense of an element which otherwise would have formed ammonia; the compounds of which, as is evident from what is stated in the last lecture, are much more efficacious than the nitrous compounds in assisting vegetation.

When weeds are buried in the soil, by their absorption of oxygen and gradual decomposition they furnish a certain quantity of soluble matter, and a soil will certainly in consequence produce better crops at the end of a fallow; but the use of this practice must depend upon the quantity of vegetable fibre and its nature, and upon the quality of the soil. Carbonic acid gas is formed during the whole time by the action of the vegetable matter upon the oxygen of the air, and the greater part of it is lost to the soil in which it was formed, and dissipated in the atmosphere.

The action of the sun upon the surface of the soil tends to disengage the gaseous and the volatile fluid matters that it contains; and heat increases the rapidity of fermentation: and in the summer fallow, nourishment is rapidly produced, at a time when no vegetables are present capable of absorbing it.

Land, when it is not employed in preparing food for animals, should be applied to the purpose of the preparation of manure for plants; and this is effected by means of green crops, in consequence of the absorption of carbonaceous matter in the carbonic acid of the atmosphere. In a summer's fallow a period is always lost in which vegetables may be raised, either as food for animals, or as nourishment for the next crop; and the texture of the soil is not so much improved by it exposure as in winter, when the expansive powers of ice, the gradual dissolution of snows, and the alternations from wet to dry, tend to pulverize it, and to mix its different parts together.

In the drill husbandry the land is preserved clean by the extirpation of the weeds by hand, by raising the crops in rows, which renders the destruction of the weeds much more easy. Manure is supplied either by the green crops themselves, or from the dung of the cattle fed upon them; and the plants having large systems of leaves are made to alternate with those bearing grain.

It is a great advantage in the convertible system of cultivation, that the whole of the manure is employed; and that those parts of it which are not fitted for one crop remain as nourishment for another. Thus, in Mr. Coke's course of crops, the turnip is the first in the order of succession; and this crop is manured with recent dung, which immediately affords sufficient soluble matter for its nourishment; and the heat produced in fermentation assists the germination of the seed and the growth of the plant. After turnips, barley with grass seeds is sown; and the land, having been little exhausted by the turnip crop, affords the soluble parts of the decomposing manure to the grain. The grasses, rye-grass, and clover remain, which derive a small part only of their organized matter from the soil, and probably consume the gypsum in the manure, which would be useless to other crops: these plants, likewise, by their large systems of leaves, absorb a considerable quantity of nourishment from the atmosphere; and when ploughed in at the end of two years, the decay of their roots and leaves affords manure for the wheat crop: and at this period of the course, the woody fibre of the farm-yard manure, which contains the phosphate of lime and the other difficultly soluble parts, is broken down; and as soon as the most exhausting crop is taken, recent manure is again applied.

Mr. Gregg, whose ingenious system of cultivation has been published by the Board of Agriculture, and who has the merit of first adopting a plan similar to Mr. Coke's upon strong clays, suffers the ground after barley to remain at rest for two years in grass: sows peas and beans on the leys; ploughs in the pea or bean stubble for wheat; and in some instances follows his wheat crops by a course of winter tares and winter barley, which is eat off in the spring, before the land is sowed for turnips.

Peas and beans, in all instances, seem well adapted to prepare the ground for wheat; and in some rich lands, as in the alluvial soil of the Parret, mentioned in the fourth lecture, and at the foot of the South Downs in Sussex, they are raised in alternate crops for years together. Peas and beans contain, as appears from the analyses in the third lecture, a small quantity of matter analogous to albumen; but it seems that the azote, which forms a constituent part of this matter, is derived from the atmosphere. The dry bean leaf, when burnt, yields a smell approaching to that of decomposing animal matter; and in its decay in the

* Nitre and nitrate of lime are the two nitrous salts of most common occurrence; the presence of lime appears to be essential to the production of both. In situations, however favorable in other respects, in which there is no potash pre-existing, there nitre will not form; nitrate of lime will appear alone. Nitre, therefore, is chiefly confined to countries of primary rock formations, containing feldspar or some analogous mineral, which in decomposing yields potassa.—J. D.

soil, may furnish principles capable of becoming a part of the gluten in wheat.

In considering what vegetables are likely to be profitable on a particular *soil*, it is necessary always to attend, not only to the mean temperature of the climate, but likewise to the summer's heat and winter's cold. Thus, maize, or Indian corn, and the vine, require a very hot summer; and the olive would be destroyed by our winter. It is unnecessary, therefore, to say any thing of these plants, or similar plants, in relation to a British system of cultivation: but, in some of our colonies, particularly the Cape of Good Hope, almost all the vegetable productions of Italy, Portugal, or Spain, are or may be raised. The wines of the Cape may be doubtless improved by a proper selection of soils, and by employing peasants from the vine countries of France in cultivating the grape, and in the manufacture of wine. The flavor of the juice of the grape changes as the soil is different; and in selecting a place for a vineyard, much may be gained by analyses or chemical examination of the soil, and by comparing it with the best soils of the best wine provinces of France, Germany, and Spain. This is a subject not unworthy the attention of our government.

Though the general composition of plants is very analogous, yet the specific difference in the products of many of them, and the facts stated in the last lecture, prove that they must derive different materials from the soil; and though the vegetables having the smallest systems of leaves will proportionably most exhaust the soil of common nutritive matter, yet particular vegetables, when their produce is carried off, will require peculiar principles to be supplied to the land in which they grow. Strawberries and potatoes at first produce luxuriantly in virgin mould recently turned up from pasture; but in a few years they degenerate, and require fresh soil; and the organisation of these plants is such, as to be constantly producing the migration of their layers: thus the strawberry by its long shoots is constantly endeavoring to occupy a new soil; and the fibrous radicles of the potato produce bulbs at a considerable distance from the parent plant. Lands in a course of years often cease to afford good cultivated grasses; they become (as it is popularly said) tired of them; and one of the probable reasons for this was stated in the last lecture.

The most remarkable instance of the powers of vegetables to exhaust the soil of certain principles necessary to their growth, is found in certain funguses. Mushrooms are said never to rise in two successive seasons on the same spot, and the production of the phenomena called fairy wings has been ascribed by Dr. Wollaston to the power of the peculiar fungus which forms it to exhaust the soil of the nutriment necessary for the growth of the species. The consequence is, that the ring annually extends, for no seeds will grow where their parents grew before them, and the interior part of the circle has been exhausted by preceding crops; but where the fungus has died, nourishment is supplied for grass, which usually rises within the circle, coarse, and of a dark green color.*

When cattle are fed upon land not benefited by their manure, the effect is always an exhaustion of the soil; this is particularly the case where carrying horses are kept on estates; they consume the pasture during the night, and drop the greatest part of their manure during their labor in the day-time.

The exportation of grain from a country, unless some articles capable of becoming manure are introduced in compensation, must ultimately tend to exhaust the soil. Some of the spots now desert sands in northern Africa, and Asia Minor, were anciently fertile. Sicily was the granary of Italy; and the quantity of corn carried off from it by the Romans is probably a chief cause of its present sterility.* In this island, our commercial system at present has the effect of affording substances, which in their use and decomposition must enrich the land. Corn, sugar, tallow, oil, skins, furs, wine, silk, cotton, &c., are imported, and fish are supplied from the sea. Amongst our numerous exports, woollen, and linen, and leather goods are almost the only substances which contain any nutritive materials derived from the soil.

In all courses of crops it is necessary that every part of the soil should be made as useful as possible to the different plants; but the depth of the furrow in ploughing must depend upon the nature of the soil, and of the subsoil. In rich clayey soils the furrow can scarcely be too deep; and even in sands, unless the subsoil contains some principles noxious to vegetables, the same practice should be adopted. When the roots are deep, they are less liable to be injured, either by excess of rain, or drought; the layers shoot forth their radicles into every part of the soil; and the space from which the nourishment is derived is more considerable, than when the seed is superficially inserted in the soil.

There has been much difference of opinion with respect to permanent pasture; but the advantages or disadvantages can only be reasoned upon according to the circumstances of situation and climate. Under the circumstances of irrigation, lands are extremely productive, with comparatively little labor; and in climates where great quantites of rain fall, the natural irrigation produces the same effects as artificial. When hay is in great demand, as sometimes happens in the neighborhood of the metropolis, where manure

* Some effects attributed to exhaustion of soil may be owing to excretions from the roots, injurious to the plants which have yielded them, and yet beneficial to other kinds of plants: in one instance acting the part of a poison, in the other of a manure. *Vide* Physiologie Végétale, pp. 248 and 1474, for some curious information on this important subject, the investigation of which is only just begun.—J. D.

* Sicily is still abundant in corn, and produces more than is sufficient for the use of its inhabitants. If its fertility is diminished, which there is reason to believe is the case, since the best times of the Romans, it may be referred to a bad system of agriculture, connected with an oppressive government. The corn-lands of the adjoining little island of Malta, well cultivated, are wonderfully fertile, yielding often a return of fifteen fold of wheat, and sometimes of thirty-two fold of barley; whilst in the Ionian Islands, especially at Cerigo, where the soil is similar, but where manure is not used, and the same land is yearly under the plough, the produce of wheat seldom exceeds five fold; and in all these islands, from time immemorial, corn has been imported, the most fertile of them not yielding sufficient for six months' consumption.—J. D.

can be easily procured, the application of it to pasture is repaid by the increase of crop; but top-dressing grass land with animal or vegetable manure cannot be recommended as a general system. Dr. Coventry very justly observes, that there is a greater waste of the manure in this case than when it is ploughed into the soil for seed crops. The loss by exposure to the air and the sunshine offers reasons, in addition to those that have been already quoted in the sixth lecture, for the application of manure, even in this case, in a state of incipient and not completed fermentation.

Very little attention has been paid to the nature of the grasses best adapted for permanent pasture. The chief circumstance which gives value to a grass is the quantity of nutritive matter that the whole crop will afford; but the time and duration of its produce are likewise points of great importance; and a grass that supplies green nutriment throughout the whole of the year may be more valuable than a grass which yields its produce only in summer, though the whole quantity of food supplied by it should be much less.

The grasses that propagate themselves by layers, the different species of agrostis, supply pasture throughout the year; and, as it has been mentioned on a former occasion, the concrete sap stored up in their joints renders them a good food even in winter. I saw four square yards of fiorin grass cut in the end of January, this year, in a meadow exclusively appropriated to the cultivation of fiorin, by the Countess of Hardwicke, the soil of which is a damp stiff clay. They afforded 28 pounds of fodder; of which 1000 parts afforded 64 parts of nutritive matter, consisting nearly of one-sixth of sugar, and five-sixths of mucilage, with a little extractive matter. In another experiment, four square yards gave 27 pounds of grass. The quality of this grass is inferior to that of the fiorin referred to in the table, in the latter part of the third lecture, which was cultivated by Sir Joseph Banks in Middlesex, in a much richer soil, and cut in December.

The fiorin grass, to be in perfection, requires a moist climate or a wet soil; and it grows luxuriantly in cold clays unfitted for other grasses. In light sands and in dry situations its produce is much inferior as to quantity and quality.

The common grasses, properly so called, that afford most nutritive matter in early spring, are the vernal meadow grass and meadow fox-tail grass; but their produce, at the time of flowering and ripening the seed, is inferior to that of a great number of other grasses; their latter-math is, however, abundant.

Tall fescue grass stands highest, according to the experiments of the Duke of Bedford, of any grass properly so called, as to the quantity of nutritive matter afforded by the whole crop when cut at the time of flowering; and meadow cat's-tail grass affords most food when cut at the time the seed is ripe: the highest latter-math produce of the grasses examined in the Duke of Bedford's experiments is from the sea-meadow grass.

Nature has provided in all permanent pastures a mixture of various grasses, the produce of which differs at different seasons. Where pastures are to be made artificially, such a mixture ought to be imitated; and, perhaps, pastures superior to the natural ones may be made by selecting due proportions of those species of grasses fitted for the soil which afford respectively the greatest quantities of spring, summer, latter-math, and winter produce. A reference to the details in the appendix will show that such a plan of cultivation is very practicable.

The propagation of grasses by layers has lately given rise to a considerable improvement in the formation of pasture, by what has been called inocculation. A certain portion of old pasture is removed with the roots of the grasses and a part of the soil, and planted (as it were) in arable land at certain intervals. By the spreading of the layers, a surface of grasses is speedily formed; and the old pasture, if too much of it be not removed, soon recovers itself, in consequence of the operation of the same principle. This improvement has arisen in the same place where agriculture has so long been an object of unremitted and patriotic exertions. Mr. Coke's steward is the author.

In all lands, whether arable or pasture, weeds, of every description, should be rooted out before the seed is ripe; and if they are suffered to remain in hedge-rows, they should be cut when in flower, or before, and made into heaps for manure: in this case they will furnish more nutritive matter in their decomposition; and their increase by the dispersion of seeds will be prevented. The farmer, who suffers weeds to remain till their ripe seeds are shed, and scattered by the winds, is not only hostile to his own interests, but is likewise an enemy to the public: a few thistles neglected soon will stock a farm; and by the light down which is attached to their seeds, they may be distributed over a whole country. Nature has provided such ample resources for the continuance of even the meanest vegetable tribes, that it is very difficult to ensure the destruction of such as are hostile to the agriculturist, even with every precaution. Seeds excluded from the air will remain for years inactive in the soil*, and yet germinate under favorable circumstances; and the different plants, the seeds of which, like those of the thistle and dandelion, are furnished with beards or wings, may be brought from an immense distance. The flea-bane of Canada has only lately been found in Europe; and Linnæus supposes that it has been transported from America, by the very light downy plumes with which the seed is provided.

In feeding cattle with green food, there are many advantages in *soiling*, or supplying them with food, where their manure is preserved, out of the field: the plants are less injured when cut than when torn or jagged by the teeth of the cattle, and no food is wasted by being trodden down. They are likewise obliged to feed without making a selection; and in consequence the whole food is con-

*The appearance of seeds in places where their parent plants are not found may be easily accounted for from this circumstance, and other circumstances. Many seeds are carried from island to island by currents in the sea, and are defended by their hard coats from the immediate action of the water. West Indian seeds (of this description) are often found on our coasts, and readily germinate; their long voyage having been barely sufficient to afford the cotyledon its due proportion of moisture. Other seeds are carried indigested in the stomach of birds, and supplied with food at the moment of their deposition. The light seeds of the mosses and lichens probably float in every part of the atmosphere, and abound on the surface of the sea.

sumed: the attachment or dislike to a particular kind of food exhibited by animals, offers no proof of its nutritive powers. Cattle, at first, refuse linseed cake, one of the most nutritive substances on which they can be fed.*

When food artificially composed is to be given to cattle, it should be brought as nearly as possi-

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* For the following observations on the selection of different kinds of common food by sheep and cattle, I am obliged to Mr. George Sinclair.

"*Lolium perenne*, rye-grass. Sheep eat this grass when it is in the early stage of its growth, in preference to most others; but after the seed approaches towards perfection, they leave it for almost any other kind. A field in the park at Woburn was laid down in two equal parts; one part with rye-grass and white clover, and the other part with cock's-foot and red clover: from the spring till midsummer the sheep kept almost constantly on the rye-grass; but after that time they left it, and adhered with equal constancy to the cock's-foot during the remainder of the season.

"*Dactylis glomerata*, cock's-foot. Oxen, horses, and sheep eat this grass readily. The oxen continue to eat the straws and flowers, from the time of flowering till the time of perfecting the seed: this was exemplified in a striking manner in the field before alluded to. The oxen generally kept to the cock's-foot and red clover, and the sheep to the rye-grass and white clover. In the experiments published in the Amœnitates Academicæ, by the pupils of Linnæus, it is asserted that this grass is rejected by oxen: the above fact, however, is in contradiction of it.

"*Alopecurus pratensis*, meadow fox-tail. Sheep and horses seem to have a greater relish for this grass than oxen. It delights in a soil of intermediate quality as to moisture or dryness, and is very productive. In the water-meadow at Priestley, it constitutes a considerable part of the produce of that excellent meadow. It there keeps invariably possession of the top of the ridges, extending generally about six feet from each side of the water-course; the space below that to where the ridge ends is stocked with cock's-foot, the rough-stalked meadow grass, *Festuca pratensis*, *Festuca duriuscula*, *Agrostis stolonifera*, *Agrostis palustris*, and sweet-scented vernal grass, with a small admixture of some other kinds.

"*Phleum pratense*, meadow cat's-tail. This grass is eaten without reserve by oxen, sheep, and horses. Dr. Pulteney says that it is disliked by sheep; but in pastures where it abounds, it does not appear to be rejected by these animals, but eaten in common with such others as are growing with it. Hares are remarkably fond of it. The *Phleum nodosum*, *Phleum alpinum*, *Poa fertilis* and *Poa compressa*, were left untouched, although they were closely adjoining to it. It seems to attain the greatest perfection in a rich deep loam.

"*Agrostis stolonifera*, fiorin. In the experiments detailed in the Amœnitates Academicæ, it is said that horses, sheep, and oxen eat this grass readily. On the Duke of Bedford's farm at Maulden, fiorin hay was placed in the racks before horses in small distinct quantities, alternately with common hay; but no decided preference for either was manifested by the horses in this trial. But that cows and horses prefer it to hay, when in a green state, seems fully proved by Dr. Richardson, in his several publications on fiorin; and of its productive powers in England (which have been doubted by some,) there are satisfactory proofs. Lady Hardwicke has given an account of a trial of this grass; wherein twenty-three milch cows and one young horse, besides a number of pigs, were kept a fortnight on the produce of one acre.

"*Poa trivialis*, rough-stalked meadow. Oxen, horses, and sheep eat this grass with avidity. Hares also eat it; but they give a decided preference to the smooth-stalked meadow grass, to which it is, in many respects, nearly allied.

"*Poa pratensis*, smooth-stalked meadow-grass. Oxen and horses are observed to eat this grass in common with others; but sheep rather prefer the hard fescue, and sheep's fescue, which affect a similar soil. This species exhausts the soil in a greater degree than almost any other species of grass; the roots being numerous, and powerfully creeping, become in two or three years completely matted together; the produce diminishes as this takes place. It grows common in some meadows, dry banks, and even on walls.

"*Cynosurus cristatus*, crested dog's-tail grass. The South Down sheep and deer appear to be remarkably fond of this grass: in some parts of Woburn Park this grass forms the principal part of the herbage on which these animals chiefly browse; while another part of the park, that contains the *Agrostis capillaris*, *Agrostis pumilis*, *Festuca ovina*, *Festuca duriuscula*, and *Festuca cambrica*, is seldom touched by them: but the Welsh breed of sheep almost constantly browse upon these, and neglect the *Cynosurus cristatus*, *Lolium perenne*, and *Poa trivialis*.

"*Agrostis vulgaris* (*capillaris*, Linn.), fine bent; common bent. This is a very common grass on all poor dry sandy soils. It is not palatable to cattle, as they never eat it readily, if any other kinds be within their reach. The Welsh sheep, however, prefer it, as I before observed; and it is singular that those sheep being bred in the park, when some of the best grasses are equally within their reach, should still prefer those grasses which naturally grow on the Welsh mountains: it seems to argue that such a preference is the effect of some other cause than that of habit.

"*Festuca ovina*, sheep's fescue. All kinds of cattle relish this grass; but it appears from the trial that has been made with it on clayey soils, that it continues but a short time in possession of such, being soon overpowered by the more luxuriant kinds. On dry shallow soils that are incapable of producing the larger sorts, this should form the principal crop, or rather the whole; for it is seldom or ever, in its natural state, found intimately mixed with others, but by itself.

"*Festuca duriuscula*, hard fescue grass. This is certainly one of the best of the dwarf sorts of grasses. It is grateful to all kinds of cattle; hares are very fond of it; they cropped it close to the roots, and neglected the *Festuca ovina* and *Festuca rubra*, which were contiguous to it. It is present in most good meadows and pastures.

"*Festuca pratensis*, meadow fescue. This grass is seldom absent from rich meadows and pastures; it is observed to be highly grateful to oxen, sheep, and horses, particularly the former. It appears to grow most luxuriantly when combined with the hard fescue and *Poa trivialis*.

"*Avena elatior*, tall oat grass. This is a very productive grass, frequent in meadows and pastures, but is disliked by cattle, particularly by horses; this perfectly agrees with the small portion of nutritive matter which it affords. It seems to thrive best on a strong tenacious clay.

"*Avena flavescens*, yellow oat-grass. This grass seems partial to dry soils and meadows, and appears to be eaten by sheep and oxen equally with the meadow barley, crested dog's-tail, and sweet-scented vernal grasses, which naturally grow in company with it. It nearly doubles the quantity of its produce by the application of calcareous manure.

"*Holcus lanatus*, meadow soft grass. This is a very common grass, and grows on all soils, from the richest to the poorest. It affords an abundance of seed, which is light, and easily dispersed by the wind. It appears to be generally disliked by all sorts of cattle. The produce is not so great as a view of it in fields would indicate; but being left almost entirely untouched by cattle, it appears as the most productive part of the herbage. The hay which is made of it, from the ble to the state of natural food. Thus, when sugar is given to them, some dry fibrous matter should be mixed with it, such as chopped straw, or dry withered grass, in order that the functions of the stomach and bowels may be performed in a natural manner. The principle is the same as that of the practice alluded to in the third lecture, of giving chopped straw with barley.

In washing sheep, the use of water containing carbonate of lime should be avoided; for this substance decomposes the yolk of the wool, which is an animal soap, the natural defence of the wool; and wool often washed in calcareous water becomes rough and more brittle. The finest wool, such as that of the Spanish and Saxon sheep, is most abundant in yolk. M. Vauquelin has analyzed several different species of yolk, and has found the principal part of all of them a soap, with a basis of potassa (*i. e.* a compound of oily matter and potassa,) with a little oily matter in excess. He has found in them, likewise, a notable quantity of acetate of potassa, and minute quantities of carbonate of potassa, and muriate of potassa, and a peculiar odorous animal matter.

M. Vauquelin states, that he found some specimens of wool lose as much as 45 per cent. in being deprived of their yolk; and the smallest loss in his experiments was 35 per cent.

The yolk is most useful to the wool on the back of the sheep in cold and wet seasons; probably the application of a little soap of potassa, with excess of grease to the sheep brought from warmer climates in our winter, that is, increasing their yolk artificially, might be useful in cases where the fineness of the wool is of great importance. A mixture of this kind is more conformable to nature than that ingeniously adopted by Mr. Bakewell; but at the time his labors commenced the chemical nature of the yolk was unknown.

I have now exhausted all the subjects of discussion, which my experience or information has been able to supply, on the connexion of chemistry with agriculture.

I venture to hope that some of the views brought forward may contribute to the improvement of the most important and useful of the arts.

I trust that the inquiry will be pursued by others; and that, in proportion as chemical philosophy advances towards perfection, it will afford new aids to agriculture.

There are sufficient motives, connected both with pleasure and profit, to encourage ingenious men to pursue this new path of investigation. Science cannot long be despised by any persons as the mere speculation of theorists; but must soon be considered by all ranks of men in its true point of view, as the refinement of common sense, guided by experience, gradually substituting sound and rational principles for vague popular prejudices.

The soil offers inexhastible resources, which when properly appreciated and employed, must increase our wealth, our population, and our physical strength.

We possess advantages in the use of machinery, and the division of labor, belonging to no other nation. And the same energy of character, the same extent of resources which has always distinguished the people of the British Islands, and made them excel in arms, commerce, letters, and philosophy, apply with the happiest effect to the improvement of the cultivation of the earth. Nothing is impossible to labor, aided by ingenuity. The true objects of the agriculturist are likewise those of the patriot. Men value most what they have gained with effort; a just confidence in their own powers results from success; they love their country better, because they have seen it improved by their own talents and industry; and they identify with their interests the existence of those institutions which have afforded them security, independence, and the multiplied enjoyments of civilized life.

APPENDIX.

AN ACCOUNT OF THE RESULTS OF EXPERIMENTS ON THE PRODUCE AND NUTRITIVE QUALITIES OF DIFFERENT GRASSES, AND OTHER PLANTS, USED AS THE FOOD OF ANIMALS. INSTITUTED BY JOHN DUKE OF BEDFORD.

Introduction by Sir H. Davy.

Of the 215 proper grasses which are capable of being cultivated in this climate, two only have been employed to any extent for making artificial pastures,—rye-grass and cock's-foot grass; and their application for this purpose seems to have been rather the result of accident than of any proofs of their superiority over other grasses.

A knowledge of the comparative merits and value of all the different species and varieties of grasses cannot fail to be of the highest importance in practical agriculture. The hope of obtaining this knowledge was the motive that induced the Duke of Bedford to institute this series of experiments.

Spots of ground, each containing four square feet, in the garden at Woburn Abbey, were inclosed by boards in such a manner that there was no lateral communication between the earth included by the boards and that of the garden. The soil was removed in these inclosures, and new soils supplied; or a mixture of soils was made in them, to furnish as far as possible to the different

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number of downy hairs which cover the surface of the leaves, is soft and spongy, and disliked by cattle in general.

"*Anthoxanthum odoratum*, sweet-scented vernal grass. Horses, oxen, and sheep eat this grass; though in pastures where it is combined with the meadow fox-tail, and white clover, cock's-foot, rough-stalked meadow, it is left untouched; from which it would seem unpalatable to cattle. Mr. Grant of Leighton laid down one-half a field of a considerable extent with this grass, combined with white clover. The other half of the field with fox-tail and red clover. The sheep would not touch the sweet-scented vernal, but kept constantly upon the fox-tail. The writer of this saw the field when the grasses were in the highest state of perfection; and hardly any thing could be more satisfactory. Equal quantities of the seeds of white clover were sown with each of the grasses; but from the dwarf nature of the sweet-scented vernal grass, the clover mixed with it had attained to greater luxuriance than that mixed with the meadow fox-tail."

grasses those soils which seem most favorable to their growth; a few varieties being adopted for the purpose of ascertaining the effect of different soils on the same plant.

The grasses were either planted or sown, and their produce cut and collected and dried, at the proper seasons, in summer and autumn, by Mr. Sinclair, his grace's gardener. For the purpose of determining, as far as possible, the nutritive powers of the different species, equal weights of the dry grasses or vegetable substances were acted upon by hot water till all their soluble parts were dissolved; the solution was then evaporated to dryness by a gentle heat in a proper stove, and the matter obtained carefully weighed. This part of the process was likewise conducted with much address and intelligence by Mr. Sinclair, by whom all the following details and calculations are furnished.

The dry extracts, supposed to contain the nutritive matter of the grasses, were sent to me for chemical examination. The composition of some of them is stated in a foregoing table; I shall offer a few chemical observations on others at the end of this appendix. It will be found from the general conclusions, that the mode of determining the nutritive power of the grasses, by the quantity of matter they contain soluble in water, is sufficiently accurate for all the purposes of agricultural investigation.

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Hort. Kew.—Hortus Kewensis. By W. J. Aiton, vol. i. London, 1810.

Details of Experiments on Grasses. By George Sinclair, Gardener to his Grace the Duke of Bedford, and Corresponding Member of the Horticultural Society of Edinburgh.

I. *Anthoxanthum odoratum.* Engl. Bot. 647. Curt. Lond.

Sweet-scented vernal-grass. Nat. of Britain.

At the time of flowering, the produce from the space of an acre equal to ·000091827364 of a brown sandy loam with manure, is—

	oz.	or lbs. per acre.
Grass, 11 oz. 8 dr.* The produce per acre	125235 0 =	7827 3 0
80 dr. of grass weigh when dry . 21½ dr. The produce of the space, ditto 49.1$\frac{3}{10}$	33656 0 =	2103 8 0
The weight lost by the produce of one acre in drying . .	. .	5723 10 0
64 dr. of grass afford of nutritive matter 1 dr. The produce of the space, ditto . 2.3$\frac{5}{10}$	1956 12 =	122 4 12

At the time the seed is ripe, the produce is—

	oz.	or lbs. per acre.
Grass 9 oz. The produce per acre .	98010 0 =	6125 10 0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . 43$\frac{1}{16}$	29403 0 =	1837 11 0
The weight lost by the produce of one acre in drying . .	. .	4287 15 0
64 dr. of grass afford of nutritive matter 3.1 dr. The produce of the space, ditto . 7.1¼	4977 10 =	311 1 1
The weight of nutritive matter which is lost by taking the crop at the time the grass is in flower, exceeding half of its value . .	. .	188 12 4

The proportional value which the grass at the time of flowering bears to that at the time the seed is ripe, is as 4 to 13.

The latter-math produce is—

	oz.	or lbs. per acre.
Grass, 10 oz. The produce per acre . .	108900 0 =	6806 4 0
64 dr. of grass afford of nutritive matter 2.1 dr.	3828 8 =	239 4 8

The proportional value which the grass of the latter-math bears to that at the time the seed is ripe, is nearly as 9 to 13.

The smallness of the produce of this grass renders it improper for the purpose of hay; but its early growth, and the superior quantity of nutritive matter which the latter-math affords, compared with the quantity afforded by the grass at the time of flowering, causes it to rank high as a pasture grass, on such soils as are well fitted for its growth; such are peat-bogs, and lands that are deep and moist,

II. *Holcus odoratus.* Host. G. A. Growing in woods.

Sweet-scented soft grass. Nat. of Germany. Flo. Ger. — H. borealis. Growing in moist meadows.

At the time of flowering, the produce from a rich sandy loam is—

	oz.	or lbs. per acre.
Grass, 14 oz. The produce per acre .	152460 0 =	9528 12 0
80 dr. of grass weigh when dry 20.2 dr. The produce of the space, ditto 57.1$\frac{3}{5}$	39067 14 =	2441 11 14
The weight lost by the produce of one acre in drying . .	.	7087 0 2
64 dr. of grass afford of nutritive matter 4.1 dr. The produce of the space, ditto 14.3½	10124 13 =	610 15 5

At the time the seed is ripe, the produce is—

	oz.	or lbs. per acre.
Grass, 40 oz. The produce per acre .	435600 0 =	27225 0 0

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* The weight is avoirdupois; lbs. pounds, oz. ounces, dr. drachms. The weights not named are quarters of drachms, and fractions of quarters of drachms; thus 7.1¼ means 7 drachms, 1 quarter of a drachm, and ¼ of a quarter.

	oz.	or lbs. per acre.		
64 dr. of grass weigh when dry . . 28 dr. The produce of the space ditto . . 224	152460	0= 9528	12	0
The weight lost by the produce of one acre in drying		17696	4	0
64 dr. of grass afford of nutritive matter 5.1 dr. The produce of the space, ditto . . 52.2	35732	13= 2233	4	13
The weight of nutritive matter which is lost by taking the crop at the time the grass is in flower, being more than half of its value		1600	8	10

The proportional value which the grass at the time of flowering bears to that at the time the seed is ripe, is as 17 to 21.

The produce of latter-math is—

Grass, 25 oz. The produce per acre	272250	0=17015	10	0
64 dr. of grass afford of nutritive matter 4.1 dr. .	18079	1= 1129	15	1

The grass of the latter-math crop, and of the crop at the time of flowering, taking the whole quantity, and their relative proportions of nutritive matter, are in value nearly as 6 to 10; the value of the grass at the time the seed is ripe exceeds that of the latter-math in proportion as 21 to 17.

Though this is one of the earliest of the flowering grasses, it is tender, and the produce in the spring is inconsiderable. If, however, the quantity of nutritive matter which it affords be compared with that of any of those species which flower nearly at the same time, it will be found greatly superior. It sends forth but a small number of flower-stalks, which are of a slender structure compared to the size of the leaves. This will account in a great measure for the equal quantities of nutritive matter afforded by the grass at the time of flowering, and the latter-math.

III. *Cynosurus cæruleus.* Engl. Bot. 1613. Host. G. A. ii. t. 98.

Blue moor-grass. Nat. of Britain. Sesleria cærulea.

At the time the seed is ripe, the produce from a light sandy soil is—

Grass, 10 oz. The produce per acre	1089000	0=6806	4	0
64 dr. of grass afford of nutritive matter 3.3 dr. . .	6380	13= 398	12	13

The produce of this grass is greater than its appearance would denote; the leaves seldom attain to more than four or five inches in length, and the flower stalks seldom rise to more. Its growth is not rapid after being cropped, nor does it seem to withstand the effects of frost, which, if it happen to be severe and early in the spring, checks it so much as to prevent it from flowering for that season; otherwise the quantity of nutritive matter which the grass affords (for the straws are very inconsiderable) would rank it as a valuable grass for permanent pasture.

IV. *Alopecurus pratensis.* Curt. Lond. Alo. myosuroides. Meadow fox-tail grass. Nat. of Brit. Engl. Bot. 848.

At the time of flowering, the produce from a clayey loam is—

	oz.	or lbs. per acre.		
Grass, 30 oz. The produce per acre . . .	326700	0=20418	12	0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . . 336	98010	0= 6125	10	0
The weight lost by the produce of one acre in drying . . .		14293	2	0
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . . 11.1	7657	0= 478	9	0

The produce from a sandy loam is—

Grass, 12 oz. 8 dr. The produce per acre . .	136125	0= 8507	13	0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . . 60	40837	9= 2552	5	8
64 dr. of grass afford of nutritive matter 1 The produce of the space, ditto . . 3.0½	2126	15= 132	14	15

At the time the seed is ripe, the produce from the clayey loam is—

Grass, 19 oz. The produce per acre . . .	206910	0=12931	14	0
80 dr. of grass weigh when dry . . . 36 dr. The produce of the space, ditto . . 136.3⅕	93109	8= 5819	5	2
The weight lost by the produce of one acre in drying . .		7111	8	14
64 dr. of grass afford of nutritive matter 2.1 dr. The produce of the space, ditto . . 9.975	7376	4= 461	0	4
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, being one twenty-fifth part of its value		17	8	11

The proportional value which the grass at the time of flowering bears to that at the time the seed is ripe, is as 6 to 9.

The latter-math produce, from the clayey loam, is—

Grass, 12 oz. The produce per acre . . .	130680	0= 8167	8	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto . . 6	4083	12= 255	3	12

The proportional value which the whole of the latter-math crop bears to that at the time the seed is ripe, is as 5 to 9, and to that at the time of flowering, proportionably as 13 to 24.

The above statement clearly shows that there is nearly three-fourths of produce greater from a clayey loam than from a sandy soil, and the grass from the latter is comparatively of less value, in proportion as 4 to 6. The straws produced by the sandy soil are deficient in number, and in every respect less than those from the clayey loam; which will account for the unequal quantities of nutritive matter afforded by them; but the proportional value in which the grass of the latter-math exceeds that of the crop at the time of flowering, is as 4 to 3: a difference which appears extraordinary, when the quantity of flower-stalks which are in the grass at the time of flowering is considered. In the *Anthoxanthum odoratum* the proportional difference between the grass of these crops is still greater, nearly as 4 to 9: in the *Poa pratensis* they are equal; but in all the latter flowering grasses experimented upon, the flowering straws of which resemble those of the *Alopecurus pratensis*, or *Anthoxanthum odoratum*, the greater proportional value is always, on the contrary, found in the grass of the flowering crop. Whatever the cause may be, it is evident that the loss sustained by taking the crops of these grasses at the time of flowering is considerable.

V. *Alopecurus alpinus.* Engl. Bot. 1126.
Alpine fox-tail grass. Nat. of Scotland.

At the time of flowering, the produce from a sandy loam with a small portion of manure, is—

	oz.		or lbs. per acre.		
Grass, 8 oz. The produce per acre . .	87120	0=	5445	5	0
60 dr. of grass weigh when dry . . 16 dr. The produce of the space, ditto . . $34\frac{2}{16}$	23232	0=	1452	0	0
The weight lost by the produce of one acre in drying . . .			3993	5	0
64 dr. of grass afford of nutritive matter 1 dr. . The produce of the space, ditto . . . 2	1361	4=	85	1	4

VI. *Poa alpina.* Engl. Bot. 1003. Flor. Dan. 107.
Alpine meadow grass. Nat. of Scotland.

At the time of flowering, the produce from a light sandy loam is—

Grass, 8 oz. The produce per acre . .	87120	0=	5445	0	0
64 dr. of grass afford of nutritive matter . 1.2 dr.	2041	14	127	9	14

VII. *Avena pubescens.* Engl. Bot. 1640. Host. G. A. ii. t. 50.
Downy oat-grass. Nat. of Britain.

At the time of flowering, the produce from a rich randy soil is—

Grass, 23 oz. The produce per acre . .	250470	0=	15654	6	0
80 dr. of grass weigh when dry . . 30 dr. The produce of the space, ditto . . 138 dr.	93926	0=	5870	6	4
The weight lost by the produce of one acre in drying . . .			9783	15	12
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . $8.2\frac{2}{16}$	5870	0=	366	14	6

At the time the seed is ripe, the produce is—

Grass 10 oz. The produce per acre . .	108900	0=	6806	4	0
80 dr. of grass weigh when dry . . 16 dr. The produce of the space, ditto . . 32	21780	0=	1361	4	0
The weight lost by the produce of one acre in drying . . .			5545	0	0
64 dr. of grass afford of nutritive matter . 2 dr. The produce of the space, ditto . . . 5	3403	2=	212	11	0
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, being more than half of its value			154	6	3

The proportional value which the grass at the time of flowering bears to that at the time the seed is ripe, is as 6 to 8.

The produce of latter-math is—

	oz.		or lbs. per acre.		
Grass, 10 oz. The produce per acre . .	108900	0=	6806	4	0
64 dr. of grass afford of nutritive matter . 2 dr.	3403	2=	212	11	0

The proportional value which the grass at the time of flowering bears to that of the latter-math, is as 6 to 8. The grass of the seed-crop, and that of the latter-math, are of equal value.

The downy hairs which cover the surface of the leaves of this grass, when growing on poor light soils, almost entirely disappear when it is cultivated on a richer soil. It possesses several good qualities which recommend it to particular notice; it is hardy, early, and more productive than many others which affect similar soils and situations. Its growth after being cropped is tolerably rapid, although it does not attain to a great length if left growing: like the *Poa pratensis*, it sends forth flower-stalks but once in a season, and it appears well calculated for permanent pasture on rich light soils.

VIII. *Poa pratensis.* Curt. Lond. Engl. Bot. 1073.
Smooth-stalked meadow grass. Nat. of Britain.

At the time of flowering, the produce from a mixture of bog-earth and clay is—

Grass, 15 oz. The produce per acre . .	163350	0=	10209	6	0
80 dr. of grass weigh when dry . . 22.2 dr. The produce of the space, ditto . . 67.2	45942	3=	2871	6	3
The weight lost by the produce of one acre in drying . . .			7337	15	13
34 dr. of grass afford of nutritive matter . 1.3 dr. The produce of the space, ditto . . $6.2\frac{1}{16}$	4466	9=	279	2	9

At the time the seed is ripe, the produce is—

Grass, 12·8 oz. The produce per acre .	136125	0=	8507	13	0
80 dr. of grass weigh when dry . . 32 dr. The produce of the space, ditto . . . 80	5445	0=	3403	2	0
The weight lost by the produce of one acre in drying . .			5104	11	0
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . . $4.2\frac{3}{16}$	3190	6=	199	6	0
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, being nearly one-fourth of its value . . .			79	12	9

The produce of latter-math is—

Grass, 6 oz. The produce per acre . .	65340	0=	4083	12	0
64 dr. of grass afford of nutritive matter 1.3 dr.	1786	10=	111	10	0

The proportional value in which the grass of the latter-math exceeds that of the flowering crop, is as 6 to 7. The grass of the seed-crop and that of the latter-math are of equal value.

This grass is, therefore, of least value at the time the seed is ripe; a loss of more than one-fourth of the value of the whole crop is sustained if it is not cut till that period: the straws are then dry, and the root-leaves in a sickly decaying state; those of the latter-math, on the contrary, are luxuriant and healthy. This species sends forth flower-stalks but once in a season; and these being the most valuable part of the plant for the purpose of hay, it will, from this circumstance, and the superior value of the grass of the latter-math compared to that of the seed-crop, appear well adapted for permanent pasture.

IX. *Poa cærulea.*—Var. *Poa pratensis.* Engl. Bot. 1004.

Poa subcærulea. Short bluish meadow-grass. Nat. of Britain. H. Kew. 1—155 Poa humilis.

At the time of flowering, the produce from a soil of the like nature as the preceding is—

	oz.		or lbs. per acre.		
Grass, 11 oz. The produce per acre . .	119790	0=	7486	14	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto . . 5·2	3743	7=	233	15	0
80 dr. of grass weigh when dry . . 24 The produce of the space, ditto . . 52·3 3/16	35937	0=	2246	1	0
The weight lost by the produce of one acre in drying . . .	.	.	5240	13	0

If the produce of this variety be compared with that of the preceding one, it will be found less; nor does it seem to possess any superior excellence. The superior nutritive power does not make up for the deficiency of produce by 80 lbs. of nutritive matter per acre.

X. *Festuca hordiformis.* Poa hordiformis. H. Cant.

Barley-like fescue grass. Nat. of Hungary.

At the time of flowering, the produce from a sandy soil, with manure, is—

Grass, 20 oz. The produce per acre . .	217800	0=	13612	8	0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . 96	65340	0=	4083	12	0
The weight lost by the produce of one acre in drying . . .	.	.	9528	12	0
64 dr. of grass afford of nutritive matter 2·1 dr. The produce of the space, ditto . . 11·1	7657	0=	478	9	0

This is rather an early grass, though later than any of the preceding species; its foliage is very fine, resembling the *F. duriuscula*, to which it seems nearly allied, differing only in the length of the awns, and the glaucous color of the whole plant. The considerable produce it affords, and the nutritive powers it appears to possess, joined to its early growth, are qualities which strongly recommend it to further trial.

XI. *Poa trivialis.* Curt. Lond. Engl. Bot. 1072. Host. G. A. ii. t. 62.

Roughish meadow-grass. Nat. of Britain.

At the time of flowering, the produce from a light brown loam, with manure, is—

	oz.		or lbs. per acre.		
Grass, 11 oz. The produce per acre . .	119790	0=	7486	14	0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . 45 3/16	35937	0=	2246	1	0
The weight lost by the produce of one acre in drying			5240	13	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto . . 5.2	3743	7=	233	15	7

At the time the seed is ripe, the produce is—

Grass, 11·8 oz. The produce per acre .	125235	0=	7827	3	0
80 dr. of grass weigh when dry . . 36 dr. The produce of the space, ditto . 82.3 3/16	56355	12=	3522	3	12
The weight lost by the produce of one acre in drying			4304	15	4
64 dr. of grass afford of nutritive matter 2.3 dr. The produce of the space, ditto . . 7.3 3/5	5381	3=	336	5	3
The weight of nutritive matter which is lost by taking the crop at the time of flowering, exceeding one-fourth of its value			102	5	12

The proportional value in which the grass of the seed-crop exceeds that at the time of flowering, is as 8 to 11.

The produce of the latter-math is—

Grass, 7 oz. The produce per acre . .	76230	0=	4764	6	0
64 dr. of grass afford of nutritive matter 3 dr.	3573	4=	223	5	4

The proportional value by which the grass of the latter-math exceeds that of the flowering crop, is as 8 to 12, and that of the seed-crop as 11 to 12.

Here, then, is a satisfactory proof of the superior value of the crop at the time the seed is ripe, and of the consequent loss sustained by taking it when in flower; the produce of each crop being nearly equal. The deficiency of hay in the flowering crop, in proportion to that of the seed-crop, is very striking. Its superior produce, the highly nutritive powers which the grass seems to possess, and the season in which it arrives at perfection, are merits which distinguish it as one of the most valuable of those grasses which affect moist rich soils and sheltered situations; but on dry exposed situations it is altogether inconsiderable: it yearly diminishes, and ultimately dies off, not unfrequently in the space of four or five years.

XII. *Festuca glauca.* Curtis.

Glaucous fescue-grass. Nat. of Britain.

At the time the seed is ripe, the produce from a brown loam is—

Grass, 14 oz. The produce per acre . .	152460	0=	9528	12	0
80 dr. of grass weigh when dry . 32 dr. The produce of the space, ditto . 89.2 $\frac{1.2}{16.32}$	60984	0=	3811	8	0
The weight lost by the produce of one acre in drying . .			5717	4	0
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . . 5.1	2573	4=	223	5	4

At the time of flowering, the produce is—

	oz.		or lbs. per acre.		
Grass, 14 oz. The produce per acre . .	152460	0=	9528	12	0
80 dr. of grass weigh when dry . . 32 dr. The produce of the space, ditto . . 89.2$\frac{3}{5}$	60984	0=	4811	8	0
The weight lost by the produce of one acre in drying . .			5717	4	0
64 dr. of grass afford of nutritive matter 3 dr. The produce of the space, ditto . . 10.2	7146	9=	446	10	9
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, being half of the value of the crop . . .			223	5	5

The proportional value by which the grass at the time of flowering exceeds that at the time the seed is ripe, is as 6 to 12.

The proportional difference in the value of the flowering and seed crops of this grass is directly the reverse of that of the preceding species, and affords another strong proof of the value of the straws in grass which is intended for hay. The staws at the time of flowering are of a very succulent nature; but from that period till the seed be perfected, they gradually become dry and wiry. Nor do the root-leaves sensibly increase in number or in size, but a total suspension of increase appears in every part of the plant, the roots and seed-vessels excepted. The straws of the *Poa trivialis* are, on the contrary, at the time of flowering, weak and tender; but as they advance towards the period of ripening the seed, they become firm and succulent: after that period, however, they rapidly dry up, and appear little better than a mere dead substance.

XIII. *Festuca glabra.* Wither. B. ii. p. 154.
Smooth fescue-grass. Nat. of Scotland.

At the time of flowering, the produce from a clayey loam with manure is—

Grass, 21 oz. The produce per acre . .	228690	0=	14293	0	0
80 dr. of grass weigh when dry . 32 dr. The produce of the space, ditto . 134.1$\frac{2}{16}$.$\frac{2}{5}$	91476	0=	5717	4	0
The weight lost by the produce of one acre in drying . .			8576	14	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto . 10.2	7146	0=	446	10	0

At the time the seed is ripe, the produce is—

Grass, 14 oz. The produce per acre .	152460	0=	9528	12	0
80 dr. of grass weigh when dry . 32 dr. The produce of the space, ditto . 89.2$\frac{3}{5}$	60984	0=	3811	8	0
The weight lost by the produce of one acre in drying . .			5717	4	0
64 dr. of grass afford of nutritive matter 1.1 dr. The produce of the space, ditto . 4.1$\frac{3}{4}$	2977	11=	186	1	11
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, exceeding half of its value .			260	9	0

The proportional value which the grass at the time the seed is ripe bears to that of the crop at the time of flowering, is as 5 to 8.

The produce of latter-math is—

	oz.		or lbs. per acre.		
Grass, 9 oz. The produce per acre . .	98010	0=	6125	10	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto . 1.0$\frac{1}{2}$ dr.	765	11=	47	13	0

The proportional value which the grass of the latter-math bears to that of the crop at the time of flowering is as 2 to 8, and to that of the crop at the time the seed is ripe is as 2 to 5.

The general appearance of this grass is very similar to that of the *Festuca duriuscula*: it is, however, specifically different, and inferior in many respects, which will be manifest on comparing their several produce with each other; but if it be compared with some others, now under general cultivation, the result is much in its favor, the soil which it affects being duly attended to. The *Anthoxanthum odoratum* being taken as an example, it appears that

Festuca glabra affords of nutritive matter—

	lbs. per acre.	
From the crop at the time of flowering	446	632
At the time the seed is ripe, ditto .	186	

Anthoxanthum odoratum,

At the time of flowering, ditto .	122	433
At the time the seed is ripe, ditto .	311	
The weight of nutritive matter which is afforded by the produce of one acre of the *Festuca glabra*, exceeding that of the *Anthoxanthum odoratum* in proportion nearly as 6 to 9 . .		199

XIV. *Festuca rubra.* Wither. B. ii. p. 153.
Purple fescue-grass. Nat. of Britain.

At the time of flowering, the produce from a light sandy soil is—

Grass, 15 oz. The produce per acre . .	163350	0 =	10209	6	0
80 dr. of grass weigh when dry . . 34 dr. The produce of the space, ditto . . 102	56923	12=	3557	11	0
The weight lost by the produce of one acre in drying			6651	11	0
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . . 22$\frac{2}{16}$	3828	8=	239	4	8

At the time the seed is ripe, the produce is—

Grass, 16 oz. The produce per acre . .	174240	0=	10890	0	0
80 dr. of grass weigh when dry . . 36 dr. The produce of the space, ditto . . 115$\frac{3}{16}$	78408	0=	4900	8	0
The weight lost by the produce of one acre in drying			5989	8	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto . . 8	5445	0=	340	5	0
The weight of nutritive matter which is lost by taking the crop when the grass is in flower, being nearly one-third part of its value . .			101	0	8

The proportional value which the grass at the time of flowering bears to that at the time the seed is ripe, is as 6 to 8.

This species is smaller in every respect than the preceding. The leaves are seldom more than from three to four inches in length; it affects a soil similar to that favorable to the growth of the *Festuca ovina*, for which it would be a profitable substitute, as will clearly appear on a comparison of their produce with each other.

The produce of latter-math is—

	oz.		or lbs. per acre.		
Grass, 5 oz. The produce per acre . .	54450	0=	3403	2	0
64 dr. of grass afford of nutritive matter . 1.2 dr.	1276	2=	79	12	0

The proportional value which the grass of the latter-math bears to that at the time the seed is ripe, is as 6 to 8, and is of equal value with the grass at the time of flowering.

XV. *Festuca ovina*. Engl. Bot. 585. Wither. B. ii. p. 152.

Sheep's fescue grass. Nat. of Britain.

At the time the seed is ripe, the produce is—

Grass, 8 oz. The produce per acre . .	87120	0=	5445	0	0
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . . 3	2031	14=	127	9	0

The produce of latter-math is—

Grass, 5 oz. The produce per acre . .	54450	0=	3403	2	0
64 dr. of grass afford of nutritive matter 1.1 dr.	1063	7=	66	7	7

The dry weight of this species was not ascertained, because the smallness of the produce renders it entirely unfit for hay. If the nutritive powers of this species be compared with those of the preceding, the inferiority will appear thus:

Festuca ovina affords of nutritive matter		1.2	2.3
Ditto	ditto	1.1	
Festuca rubra	ditto	2	3.2
Ditto	ditto	1.2	

The comparative degree of nourishment which the grass of the *Festuca rubra* affords exceeds therefore that afforded by the *F. ovina* in proportion as 11 to 14.

From the trial that is here detailed, it does not seem to possess the nutritive powers generally ascribed to it; it has the advantage of a fine foliage, and may, therefore, very probably, be better adapted to the masticating organs of sheep than the larger grasses, whose nutritive powers are shown to be greater: hence, on situations where it naturally grows, and as pasture for sheep, it may be inferior to few others. It possesses natural characters very distinct from *F. rubra*.

XVI. *Briza media*. Engl. Bot. 340. Host. G. A. ii. t. 29.

Common quaking-grass. Nat. of Britain.

At the time of flowering, the produce from a rich brown loam is—

	oz.		or lbs. per acre.		
Grass, 14 oz. The produce per acre . .	152460	0=	9528	12	0
80 dr. of grass weigh when dry . . 26 dr. The produce of the space ditto . . 72.3$\frac{1}{16}$	49549	8=	3096	13	8
The weight lost by the produce of one acre in drying . . .			6431	14	8
64 dr. of grass afford of nutritive matter 2.3 dr. The produce of the space, ditto . . 9.2$\frac{2}{16}$	6551	0=	409	7	0

At the time the seed is ripe, the produce is—

Grass, 14 oz. The produce per acre . .	152460	0=	9528	12	0
80 dr. of grass weigh when dry . . 28 dr. The produce of the space, ditto . 78.1$\frac{3}{5}$	53362	0=	3335	1	0
The weight lost by the produce of one acre in drying . . .			6183	11	0
64 dr. of grass afford of nutritive matter 3.1 dr. The produce of the space, ditto . . 11.1$\frac{1}{2}$	7742	1=	483	14	1
The weight of nutritive matter which is lost by taking the crop at the time of flowering, being nearly one-fourth part of its value . . .			109	1	0

The proportional value which the grass at the time of flowering bears to that at the time the seed is ripe, is as 11 to 13.

The latter-math produce is—

Grass, 12 oz. The produce per acre . .	130680	0=	8167	8	0
64 dr. of grass afford of nutritive matter 2 dr. .	483	12=	255	3	12

The proportional value in which the grass at the time of flowering exceeds that of the latter-math, is as 8 to 11; and the latter-math stands to that at the time the seed is ripe in proportion as 8 to 13.

The merits of this grass seem to demand notice: its nutritive powers are considerable, and its produce large when compared with others which affect a similar soil.

XVII. *Dactylis glomerata*. Engl. Bot. 335. Fl. Dan. 743.

Round-headed cock's-foot grass. Nat. of Britain. Wither. B. ii. p. 149.

At the time of flowering, the produce from a rich sandy loam is—

Grass, 41 oz. The produce per acre . .	446490	0=	27905	10	0
80 dr. of grass weigh when dry . 34 dr. The produce of the space, ditto . 278$\frac{4}{5}$	189758	4=	11859	14	4
The weight lost by the produce of one acre in drying . .			16045	11	12
64 dr of grass afford of nutritive matter 2.2 dr. The produce of the space, ditto . 25.2$\frac{1}{2}$	17424	0=	1089	0	0

At the time the seed is ripe, the produce is—

Grass, 39 oz. The produce per acre .	424710	0=	26544	6	0
80 dr. of grass weigh when dry . 40 dr. The produce of the space, ditto . 312	21235	0=	13272	3	0
The weight lost by the produce of one acre . . .			13272	3	0
64 dr. of grass afford of nutritive matter 3.2 dr. The produce of the space, ditto , 34.0$\frac{1}{2}$	23226	5=	1451	10	0
The weight of nutritive matter which is gained by leaving the crop till the seed be ripe, being more than one-third part of its value, is . .			362	10	5

The proportional value which the grass at the time of flowering bears to that at the time the seed is ripe, is as 5 to 7, nearly.

The produce of latter-math is—

	oz.	or lbs. per acre.
Grass, 17 oz. 8 dr. The produce per acre .	190575	0=11910 15 0
64 dr. of grass afford of nutritive matter 1.2 dr.	4466	9= 281 10 9

The proportional value which the grass of the latter-math bears to that at the time of flowering is as 6 to 10; and to that at the time the seed is ripe, as 6 to 14. 64 dr. of the straws at the time of flowering afford of nutritive matter 1.2 dr. The leaves or latter-math, and the straws simply, are therefore of equal proportional value; a circumstance which will point out this grass to be more valuable for permanent pasture than for hay. The above details prove, that a loss of nearly one-third of the value of the crop is sustained if it is left till the period when the seed is ripe, though the proportional value of the grass at that time is greater, *i. e.* as 7 to 5. The produce does not increase if the grass is left growing after the period of flowering, but uniformly decreases; and the loss of latter-math, which (from the rapid growth of the foliage after the grass is cropped) is very considerable. These circumstances point out the necessity of keeping this grass closely cropped, either with the scythe or cattle, to reap the full benefit of its great merits.

XVIII. *Bromus tectorum.* Host. G. A. i. t. 15. Nodding panicled brome-grass. Nat. of Europe. Introduced 1776. H. K. i. 168.

At the time of flowering, the produce from a light sandy soil is—

Grass, 11 oz. The produce per acre .	119790	0= 7486 14 0
80 dr. of grass weigh when dry . 42 dr. The produce of the space, ditto : $92.1\frac{3}{5}$	62889	12= 3930 9 12
The weight lost by the produce of one acre in drying . .		3556 4 4
64 dr. of grass afford of nutritive matter 3 dr. The produce of the space, ditto . 8.1	5615	2= 350 15 2

This species, being strictly annual, affords no latter-math, which renders it comparatively of little value.

XIX. *Festuca cambrica.* Hudson. W. B. ii. p. 155. Nat. of Britain.

At the time of flowering, the produce from a light sandy soil is—

Grass, 10 oz. The produce per acre .	108900	0= 6806 4 0
80 dr. of grass weigh when dry . 34 dr. The produce of the space, ditto . 68	46282	8= 2892 10 8
The weight lost by the produce of one acre in drying . .		3913 9 8
64 dr. of grass afford of nutritive matter 2.1 dr. The produce of the space, ditto . $5.2\frac{1}{2}$	3828	8= 239 4 8

This species is nearly allied to the *Festuca ovina*, from which it differs little, except that it is larger in every respect. The produce, and the nutritive matter which it affords, will be found superior to those given by the *F. ovina*, if they are brought into comparison.

XX. *Bromus diandrus.* Curt. Lond. Eng. Bot. 1006 Nat. of Britain.

At the time the grass is ripe in flower, the produce from a rich brown loam is—

	oz.	or lbs. per acre.
Grass, 30 oz. The produce per acre . . .	326700	0=20418 12 0
80 dr. of grass weigh when dry . . . 34 dr. The produce of the space, ditto . . 204	138847	8= 8677 15 0
The weight lost by the produce of one acre in drying . .		11740 13 0
64 dr. of grass afford of nutritive matter 3 dr. The produce of the space, ditto . . 22.2	15314	1= 957 2 1

This species, like the preceding, is strictly annual; the above is therefore the produce for one year, which, if compared with that of the least productive of the perennial grasses, will be found inferior, and it must consequently be regarded as unworthy of culture.

XXI. *Poa angustifolia.* With. ii. p. 142. Narrow-leaved meadow-grass. Nat. of Britain.

At the time of flowering, the produce from a brown loam is—

Grass, 27 oz. The produce per acre . . .	294030	0=18376 14 0
80 dr. of grass weigh when dry . . 34 dr. The produce of the space, ditto . . $183.2\frac{2}{5}$	124962	12= 7810 2 12
The weight lost by the produce of one acre in drying . .		10566 11 4
64 dr. of grass afford of nutritive matter 5 dr. The produce of the space, ditto . . 33.3	22886	11= 1430 6 11

At the time the seed is ripe the produce is—

Grass, 14 oz. The produce per acre . . .	152460	0=9528 12 0
80 dr. of grass weigh when dry . . 32 dr. The produce of the space, ditto . . $89.2\frac{2}{5}$	60984	0= 3811 8 0
The weight lost by the produce of one acre in drying . .		5717 4 0
64 dr. of grass afford of nutritive matter 5.1 dr. The produce of the space, ditto . . $18.1\frac{1}{2}$	12506	7= 701 6 7
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, exceeding one-third part of its value		649 0 4

In the early growth of the leaves of this species of *Poa* there is a striking proof that early flowering in grasses is not always connected with the most abundant early produce of leaves. In this respect all the species which have already come under examination are greatly inferior to that now spoken of. Before the middle of April the leaves attain to the length of more than twelve inches, and are soft and succulent; in May, however, when the flower-stalks make their appearance, it is subject to the disease termed rust, which affects the whole plant; the consequence of which is manifest in the great deficiency of produce in the crop at the time the seed is ripe, being one-half less than at the time of the flowering of the grass. Though this disease begins in the straws, the leaves suffer most from its effects, being at the time the seed is ripe completely dried up: the straws, therefore, constitute the principal part of the crop for mowing, and they contain more nutritive matter in proportion than the leaves. This grass is evidently most valuable for permanent pasture, for which, in consequence of its superior, rapid, and early growth, and the disease beginning at the straws, nature seems to have designed it. The grasses which approach nearest to this in respect of early produce of leaves, are the *Poa fertilis*, *Dactylis glomerata*, *Phleum pratense*, *Alopecurus pratensis*, *Avena eliator*, and *Bromus littoreus*, all grasses of a coarser kind.

XXII. *Avena eliator.* Curtis, 112. Engl. Bot. 813.—Holcus avenaceus.

Tall oat-grass. Nat. of Britain.

At the time the seed is ripe, the produce is—

	oz.		or lbs. per acre.		
Grass, 24 oz. The produce per acre . . .	261360	0=	16335	0	0
80 dr. of grass weigh when dry . . 28 dr. The produce of the space, ditto . . 134.1$\frac{3}{5}$	91475	14=	5717	3	14
The weight lost by the produce of one acre in drying . . .			10617	12	2
64 dr. of grass afford of nutritive matter 1 dr. The produce of the space, ditto . . 6	4083	12=	255	3	12

The produce of latter-math is—

Grass 20 oz. The produce per acre . .	217800	0=	13612	8	0
64 dr. of grass afford of nutritive matter 1.1 dr. .	4253	14=	265	13	14
The weight of nutritive matter which is afforded by the crop of the latter-math exceeding that afforded by the grass of the seed crop in proportion nearly as 26 to 25			10	9	2

This grass sends forth flower-straws during the whole season: the latter-math contains nearly an equal number with the flowering crop. It is subject to the rust, but the disease does not make its appearance till after the period of flowering: it affects the whole plant, and at the time the seed is ripe the leaves and straws are withered and dry. This accounts for the superior value of the latter-math over the seed crop, and points out the propriety of taking the crop when the grass is in flower.

XXIII. *Poa eliator.* Curtis, 50.

Tall meadow-grass. Nat. of Scotland.

At the time of flowering, the produce from a rich clayey loam is—

	oz.		or lbs. per acre.		
Grass, 18 oz. The produce per acre . . .	196020	0=	12251	4	0
80 dr. of grass weigh when dry . . 28 dr. The produce of the space, ditto . . 100.3$\frac{2}{10}$	60607	0=	4287	15	0
64 dr. of grass afford of nutritive matter 3.2 The produce of the space, ditto . 15.3	10719	13=	669	15	13
The weight lost by the produce of one acre in drying . . .			3617	15	3

The botanical characters of this grass are almost the same as those of the *Avena eliator*, differing in the want of the awns only. It has the essential character of the *Holci* (Florets male, and hermaphrodite: Calyx husks two valved, with two florets,) and since the *Avena eliator* is now referred to that genus, this may with certainty be considered a variety of it.

XXIV. *Festuca duriuscula.* Engl. Bot. 470. W. B. ii. p. 153.

Hard fescue-grass. Nat. of Britain.

At the time of flowering, the produce from a light sandy loam is—

Grass, 27 oz. The produce per acre . .	294030	0=	18376	14	0
80 dr. of grass weigh when dry . . 36 dr. The produce of the space, ditto . . 194.1$\frac{3}{5}$	132313	8=	8269	9	0
The weight lost by the produce of one acre in drying . . .			10106	4	8
64 dr. of grass afford of nutritive matter 3.2 dr. The produce of the space, ditto . . 23.2$\frac{1}{2}$	16079	12=	1004	15	12

At the time the seed is ripe, the produce is—

Grass, 28 oz. The produce per acre . .	304920	0=	19075	8	0
80 dr. of grass weigh when dry - - 36 dr. The produce of the space, ditto - - 201.2$\frac{2}{5}$	137214	0=	8575	14	0
The weight lost by the produce of one acre in drying - -			10481	10	0
64 dr. of grass afford of nutritive matter 1·2 dr. The produce of the space, ditto - - 10.2 dr.	7146	9=	446	10	9
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe exceeding one-half of its value - - - - -			558	5	3

The proportional value which the grass, at the time the seed is ripe, bears to that at the time of flowering, is as 6 to 14, nearly.

The produce of latter-math is

Grass, 15 oz. The produce per acre - -	163350	0=	10209	6	0
64 dr. of grass afford of nutritive matter 1.1 dr.	3190	4=	199	6	4

The proportional value which the grass of the lattar-math bears to that at the time of flowering, is as 5 to 14, and to that at the time the seed is ripe, 5 to 6.

The above particulars will confirm the favorable opinion which was given of this grass when speaking of the *festuca hordiformis*, and *F. glabra.* Its produce in the spring is not very great, but of the finest quality, and at the time of flowering is considerable. If it be compared with those affecting similar soils, such as *Poa pratensis*, *Festuca ovina*, &c., either considered as a grass for hay, or permanent pasture, it will be found of greater value.

XXV. *Bromus erectus.* Engl. Bot. 471. Host. G. A.

Upright perennial brome-grass. Nat. of Britain.

At the time of flowering, the produce from a rich sandy soil is—

	oz.		or lbs. per acre.		
Grass, 19 oz. The produce per acre - -	206910	0=	12931	14	0
80 dr. of grass weigh when dry - 36 dr. The produce of the space, ditto - $136.3\frac{1}{5}$	93109	8=	5819	5	8
The weight lost by the produce of one acre in drying - - -			7112	8	8
64 dr. of grass afford of nutritive matter 2.3 dr. The produce of the space, ditto - $13.0\frac{1}{4}$	8890	10=	555	10	10

XXVI. *Milium effusum.* Curt. Lond. Engl. Bot. 1106.

Common millet-grass. Nat. of Britain.

At the time of flowering, the produce from a light sandy soil is—

Grass 11 oz. 8 dr. The produce per acre - -	196020	0=	12251	4	0
80 dr. of grass weigh when dry - - 31 dr. The produce of the space, ditto - - $111.2\frac{2}{6}$	75957	12 =	4747	5	12
64 dr. of grass afford of nutritive matter 1.3 The produce of the space, ditto - - $7.3\frac{2}{4}$	5359	14=	334	15	14

This species in its natural state seems confined to woods as its place of growth; but the trial that is here mentioned, confirms the opinion that it will grow and thrive in open exposed situations. It is remarkable for the lightness of the produce, in proportion to its bulk. It produces foliage early in the spring, in considerable abundance; but its nutritive powers appear comparatively little.

XXVII. *Festuca pratensis.* Engl. Bot. 1592. C. Lond.

Meadow fescue-grass. Nat. of Britain.

At the time of flowering, the produce from a bog soil, with coal ashes for manure, is—

Grass, 20 oz. The produce per acre .	217800	0=	13612	8	0
80 dr. of grass weigh when dry . 38 dr. The produce of the space, ditto . 152	103455	8=	6465	15	0
The weight lost by the produce of one acre in drying . .			7146	9	0
64 dr. of grass afford of nutritive matter 4.2 dr. The produce of the space, ditto . 22.2	15314	1=	957	2	1

At the time the seed is ripe, the produce is—

Grass, 28 oz. The produce per acre . .	304920	0=	19057	8	0
80 dr. of grass weigh when dry . 32 dr. The produce of the space, ditto . . $179.0\frac{4}{5}$	121968	0=	7623	0	0
The weight lost by the produce of one acre in drying . .			11434	8	8
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . 10.2	7146	9=	446	10	9
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe exceeding one half of its value			510	7	8

The value of the grass at the time the seed is ripe, is to that of the grass at the time of flowering, as 6 to 18.

The loss which is sustained by leaving the crop of this grass till the seed be ripe is very great. That it loses more of its weight in drying at this stage of growth, than at the time of flowering, perfectly agrees with the deficiency of nutritive matter in the seed crop, in proportion to that in the flowering crop: the straws being succulent in the former, they constitute the greatest part of the weight; but in the latter they are comparatively withered and dry; consequently the leaves constitute the greatest part of the weight. It may be observed here, that there is a great difference between straws or leaves that have been dried after they were cut in a succulent state, and those which are dried (if I may so express it) by nature while growing. The former retain all their nutritive powers; but the latter, if completely dry, very little, if any.

XXVIII. *Lolium perenne.* Engl. Bot. 315. Flo. Dan. 747.

Perennial rye-grass. Nat. of Britain.

At the time of flowering, the produce from a rich brown loam is—

	oz.		or lbs. per acre.		
Grass, 11 oz. 8 dr. The produce per acre .	125235	0=	7827	3	0
80 dr. of grass weigh when dry . 34 dr The produce of the space, ditto . $78\frac{4}{16}$	53156	13=	3322	4	13
The weight lost by the produce of one acre in drying . . .			4494	14	3
64 dr. of grass afford of nutritive matter 2.2 dr. The produce of the space, ditto . $7.0\frac{3}{4}$	4891	15=	305	11	15

At the time the seed is ripe, the produce is—

Grass, 22 oz. The produce per acre . .	239580	0=	14973	12	0
80 dr. of grass weigh when dry . 24 dr. The produce of the space, ditto . $105.2\frac{2}{3}$	71874	0=	4492	2	0
The weight lost by the produce of one acre in drying . . .			10481	10	0
64 dr. of grass afford of nutritive matter 2.3 dr. The produce of the space, ditto . $15.0\frac{2}{16}$	10294	7=	643	6	7
The weight of nutritive matter which is lost by taking the crop at the time of flowering exceeding nearly one half of its value . . .			337	8	8

The proportional value which the grass at the time of flowering bears to that at the time the seed is ripe is as 10 to 11.

The produce of the latter-math is—

Grass, 5 oz. The produce per acre . .	54450	0=	3403	2	0
64 dr. of grass afford of nutritive matter 1 dr. .	850	12=	53	2	12

The proportional value which the grass of the latter-math bears to that at the time of flowering, is as 4 to 10, and to that at the time the seed is ripe, as 4 to 11.

XXIX. *Poa maritima.* Engl. Bot. 1140.
Sea meadow-grass. Nat. of Britain.

At the time of flowering, the produce from a light brown loam is—

	oz.		or lbs. per acre.		
Grass, 18 oz. The produce per acre . .	196020	0=	12251	4	0
80 dr. of grass weigh when dry . . 32 dr. The produce of the space, ditto . . $115.\frac{1}{5}$	78408	0=	4900	0	0
The weight lost by the produce of one acre in drying . .			7350	4	0
64 dr. of grass afford of nutritive matter 4.2 dr. The produce of the space, ditto . . 20.1	13782	0=	861	6	0

The produce of the latter-math is—

Grass, 18 oz. The produce per acre . .	196020	0=	12251	4	0
64 dr. of grass afford of nutritive matter 1 dr.	3062	13=	191	6	31

The proportional value which the grass of the latter-math bears to that at the time of flowering is as 4 to 18.

XXX. *Cynosurus cristatus.* Engl. Bot. 316. Host. G. A. ii. t. 96.
Crested dog's-tail grass.

At the time of flowering, the produce from the brown loam, with manure, is—

Grass, 9 oz. The produce per acre	98010	0=	6125	10	0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . . 43	29403	0=	1837	11	0
The weight lost by the produce of one acre in drying . .			4287	15	0
64 dr. of grass afford of nutritive matter 4.1 dr. The produce of the space, ditto . . $9.2\frac{1}{16}$	6508	7=	406	12	7

At the time the seed is ripe, the produce is—

Grass, 18 oz. The produce per acre . .	196020	0=	12251	4	0
80 dr. of grass weigh when dry . . 32 dr. The produce of the space, ditto . . $115.0\frac{3}{10}$	78408	0=	4900	0	0
The weight lost by the produce of one acre in drying . .			7350	12	0
64 dr. of grass afford of nutritive matter 2.2 dr. The produce of the space, ditto . . 11.1	7657	0=	478	9	0
The weight of nutritive matter which is lost by taking the crop at the time of flowering, exceeding one-sixth of its value			71	12	9

XXXI. *Avena pratensis.* Engl. Bot. 1204. Fl. Dan. 1083.
Meadow oat-grass. Nat. of Britain.

At the time of flowering, the produce from a rich sandy loam is—

	oz.		or lbs. per acre.		
Grass, 10 oz. The produce per acre . . .	108900	0=	6806	4	0
80 dr. of grass weigh when dry . . 22 dr. The produce of the space, ditto . . 44	29947	8=	1871	11	8
The weight lost by the produce of one acre in drying			4934	8	8
64 dr. of grass afford of nutritive matter 2.1 dr. The produce of the space, ditto . . $5.2\frac{1}{2}$	3828	8=	239	4	8

At the time the seed is ripe, the produce is—

Grass, 14 oz. The produce per acre . .	152460	0=	9528	12	0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . . $67.0\frac{4}{5}$	45738	0=	2858	10	0
The weight lost by the produce of one acre in drying			6670	2	0
64 dr. of grass afford of nutritive matter 1 dr. The produce of the space, ditto . . 3.2	2382	3=	148	14	3
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, exceeding one-third part of its value			90	6	0

The proportional value which the crops, at the time the seed is ripe, bear to that at the time of flowering, is as 4 to 9.

XXXII. *Bromus multiflorus.* Engl. Bot. 1884. Host. G. A. i. t. 11.
Many-flowering brome-grass. Nat. of Britain.

At the time of flowering, the produce from a clayey loam is—

Grass, 33 oz. The produce per acre .	359370	0=	22460	10	0
80 dr. of grass weigh when dry . . 44 dr. The produce of the space, ditto . . $290.0\frac{2}{5}$	197653	8=	12353	5	8
The weight lost by the produce of one acre in drying . . .			10107	4	8
64 dr. of grass afford of nutritive matter 5 dr. The produce of the space, ditto . 41.1	28075	12=	1754	11	12

This species is annual, and no valuable properties have as yet been discovered in the seed. It is only noticed on account of its being frequently found in poor grass lands, and sometimes in meadows. It appears from the above particulars to possess nutritive powers equal to some of the best perennial kinds, if taken when in flower; but if left till the seed be ripe (which, from its early growth, is frequently the case), the crop is comparatively of no value, the leaves and straws being then completely dry.

XXXIII. *Festuca loliacea.* Curt. Lond. Engl. Bot. 1821.
Spiked fescue-grass. Nat. of Britain.

At the time of flowering, the produce from a brown rich loam is—

Grass, 24 oz. The produce per acre . .	261360	0=	16335	0	0
80 dr. of grass weigh when dry . 35 dr. The produce of the space, ditto . 168	114345	0=	7146	9	0
The weight lost by the produce of one acre in drying . .			9188	7	0
64 dr. of grass afford of nutritive matter 3 dr. The produce of the space, ditto . 18	12251	4=	765	11	0

At the time the seed is ripe, the produce is—

	oz.		or lbs. per acre.		
Grass, 16 oz. The produce per acre .	174240	0=	10890	0	0
80 dr. of grass weigh when dry . 33 dr. The produce of the space, ditto . $105\frac{3}{5}$	71874	0=	4492	2	0
The weight lost by the produce of one acre in drying			6397	14	0
64 dr. of grass afford of nutritive matter 3.1 dr. The produce of the space, ditto . 13	8848	2=	553	2	0

The latter-math produce is—

Grass, 5 oz. The produce per acre . .	54450	0=	3403	2	0
64 dr. of grass afford of nutritive matter 1.1 dr. .	1063	7=	66	7	7
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, exceeding one-fourth part of its value			212	11	0

The proportional value which the grass, at the time of flowering, bears to that at the time the seed is ripe, is as 12 to 13; and the value of the latter-math stands in proportion to that of the crop at the time of flowering, as 5 to 12, and to that of the crop taken at the time the seed is ripe, as 5 to 13.

This species of fescue greatly resembles the rye-grass, in habit and place of growth; it has excellencies which make it greatly superior to that grass, for the purposes of either hay or permanent pasture. This species seems to improve in produce in proportion to its age, which is directly the reverse of the *Lolium perenne.*

XXXIV. *Poa cristata.* Host. G. A. ii. t. 75.—Aira Cristata. Engl. Bot. 648.
Crested meadow-grass. Nat. of Britain.

At the time of flowering, the produce from a sandy loam is—

Grass, 16 oz. The produce per acre . .	174240	0=	10890	0	0
80 dr. of grass weigh when dry . . 36 dr. The produce of the space, ditto . . $115\frac{3}{16}$	7848	0=	4900	8	0
The weight lost by the produce of one acre in drying . . .	-	-	5989	8	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto . . 8	5445	0=	340	5	0

The produce of this species, and the nutritive matter that it affords, are equal to those of the *Festuca ovina* at the time the seed is ripe: they equally delight in dry soils. The greater bulk of grass in proportion to the weight, with the comparative coarseness of the foliage, render the *Poa cristata* inferior to the *Festuca ovina.*

XXXV. *Festuca myurus.* Engl. Bot. 1412. Host. G. A. ii. t. 93.
Wall fescue-grass. Nat. of Britain.

At the time of flowering, the produce from a light sandy soil is—

	oz.		or lbs. per acre.		
Grass, 14 oz. The produce per acre . .	152460	0=	9528	12	0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . $67\frac{2}{10}$	45738	0=	2858	10	0
The weight lost by the produce of one acre in drying . . .	.	.	6670	2	0
64 dr. of grass afford of nutritive matter 1·2 dr. The produce of the space, ditto . . 5·1	8573	4=	223	5	4

This species is strictly annual; it is likewise subject to the rust; and the above being its whole produce for one year, it ranks as a very inferior grass.

XXXVI. *Aira flexuosa.* Engl. Bot. 1519. Host. G. A. ii. t. 43.
Waved mountain hair-grass. Nat. of Britain.

At the time of flowering, the produce from a heath soil is—

Grass, 12 oz. The produce per acre .	130680	0=	8167	8	0
80 dr. of grass weigh when dry . 31 dr. The produce of the space, ditto . $74\frac{2}{5}$	50638	0=	3164	14	8
The weight lost by the produce of one acre in drying . .			5002	9	8
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . 4.2	3062	13=	191	6	13

XXXVII. *Hordeum bulbosum.* Hort. Kew. i. p. 179.
Bulbous barley-grass. Nat. of Italy and the Levant. Introduced 1770, by Mons. Richard.

At the time of flowering, the produce from a clayey loam, with manure, is—

Grass, 35 oz. The produce per acre . .	381150	0=	23821	0	0
80 dr. of grass weigh when dry . 93 dr. The produce of the space, ditto . 231	157224	0=	9826	8	6
The weight lost by the produce of one acre in drying . .			13994	7	10
64 dr. of grass afford of nutritive matter 3.2 dr. The produce of the space, ditto . $30.2\frac{2}{4}$	20844	2=	1302	12	2

XXXVIII. *Festuca calamaria.* Engl. Bot. 1005.
Reed-like fescue-grass. Nat. of Britain.

At the time of flowering, the produce from a clayey loam is—

Grass, 80 oz. The produce per acre . .	871200	0=	54450	0	0
80 dr. of grass weigh when dry . . 28 dr. The produce of the space, ditto . . 448	304920	0=	19057	8	0
The weight lost by the produce of one acre in drying			35392	8	0
64 dr. of grass afford of nutritive matter 4.2 dr. The produce of the space, ditto . . 90	61256	4=	3828	8	4

At the time the seed is ripe, the produce is—

Grass, 75 oz. The produce per acre . .	816750	0=	51046	14	0
80 dr. of grass weigh when dry . . 19 dr. The produce of the space, ditto . . 283	193978	2=	12123	10	0

	oz.	or lbs. per acre.
The weight lost by the produce of one acre in drying		38223 1 0
64 dr. of grass afford of nutritive matter 3 dr. The produce of the space, ditto . . 56.1	38285 2=	2392 13 2
The weight of nutritive matter which is lost by leaving the crop till the seed is ripe, being nearly one-third part of its value		1435 11 2

The proportional value which the grass at the time the seed is ripe, bears to that at the time of flowering, is as 12 to 18.

This grass, as has already been remarked, produces a fine early foliage in the spring. The produce is very great, and its nutritive powers are considerable. It appears, from the above particulars, to be best adapted for hay. A very singular disease attacks, and sometimes nearly destroys, the seed of this grass: the cause of this disease seems to be unknown; it is denominated Clavus by some; it appears by the seed swelling to three times its usual size in length and thickness, and the want of the carcle. Dr. Willdenow describes two distinct species of it: 1st, the simple clavus, which is mealy and of a dark color, without any smell or taste; 2dly, the malignant clavus, which is violet blue, or blackish, and internally too has a bluish color, a fœtid smell, and a sharp pungent taste. Bread made from grain affected with this last species is of a bluish color; when eaten, produces cramps and giddiness.

XXXIX. *Bromus littoreus.* Host. G. A. P. vii. t. 8.

Sea-side brome-grass. Nat. of Germany: grows on the banks of the Danube and other rivers.

At the time of flowering, the produce from a clayey loam is—

	oz.	or lbs. per acre.
Grass, 61 oz. The produce per acre . .	664290 0=	41518 2 0
80 dr. of grass weigh when dry . . 41 dr. The produce of the space, ditto . . 500.$\frac{2}{16}$	340448 10=	21278 0 10
The weight lost by the produce of one acre in drying . .		20540 1 6
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . 22.3½	15567 4=	973 1 4

At the time the seed is ripe, the produce is—

	oz.	or lbs. per acre.
Grass, 56 oz. The produce per acre . .	609840 0=	38115 0 0
80 dr. of grass weigh when dry - - 32 dr. The produce of the space, ditto - - $358\frac{1}{6}$	243936 0=	15246 0 0
The weight lost by the produce of one acre in drying - -		22869 0 0
64 dr. of grass afford of nutritive matter 3·2 dr. The produce of the space, ditto - - 196	33950 0=	2084 6 10
The weight of nutritive matter which is lost by taking the crop at the time of flowering, exceeding one-half of its value - - - -		1111 5 6

The proportional value which the grass, at the time of flowering, bears to that at the time the seed is ripe, is as 6 to 14.

This species greatly resembles the preceding in habit and manner of growth, but is inferior to it in value, which is evident from the deficiency of its produce, and of the nutritive matter afforded by it. The whole plant is likewise coarser, and of greater bulk in proportion to its weight. The seed is affected with the same disease which destroys that of the former species.

XL. *Festuca eliator.* Engl. Bot. 1593. Host. G. A. ii. t. 79.

Tall fescue-grass. Nat. of Britain.

At the time of flowering, the produce from a black rich loam is—

	oz.	or lbs. per acre.
Grass, 75 oz. The produce per acre - - -	816750 0=	51046 14 0
80 dr. of grass weigh when dry - - 28 dr. The produce of the space, ditto - - 420	285362 1=	17866 6 8
The weight which is lost by the produce of one acre in drying -		33180 7 8
64 dr. of grass afford of nutritive matter 5 dr. The produce of the space, ditto - - 93.3	63808 9=	3988 0 9

At the time the seed is ripe the produce is—

	oz.	or lbs. per acre.
Grass 75 oz. The produce per acre - -	816750 0=	51046 4 0
80 dr. of grass weigh when dry . . 28 dr. The produce of the space, ditto . . 420	285862 8=	17866 6 0
The weight lost by the produce of one acre in drying . . .		33180 7 8
64 dr. of grass afford of nutritive matter 3 dr. The produce of the space, ditto . . 56.1	38285 2=	2392 13 2
The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, exceeding one-third part of its value		1595 3 7

The proportional value which the grass, at the time the seed is ripe, bears to that at the time of flowering, is as 12 to 20.

The produce of the latter-math is—

	oz.	or lbs. per acre.
Grass, 23 oz. The produce per acre - -	250470 0=	15654 6 0
64 dr. of grass afford of nutritive matter 4 dr.	15054 6=	978 6 6

The proportional value which the grass of the latter-math bears to that of the crop, is as 16 to 20; and to that at the time the seed is ripe, as 12 to 16 inverse.

This species of fescue is closely allied to the *Festuca pratensis*, from which it differs in little, except that it is larger in every respect. The produce is nearly three times that of the *F. pratensis*, and the nutritive powers of the grass are superior, in direct proportion, as 6 to 8.

XLI. *Nardus stricta.* Engl. Bot. 290. Host. G. A. ii. t. 4.

Upright mat-grass. Nat. of Britain.

At the time the seed is ripe, the produce is—

	oz.	or lbs. per acre.
Grass, 9 oz. The produce per acre . .	98010 0=	6125 10 0

	oz.		or lbs. per acre.		
80 dr. of grass weigh when dry . . 32 dr. The produce of the space, ditto . $57.2\frac{2}{5}$	39204	0=	2450	4	0
The weight lost by the produce of one acre in drying . . .			3675	6	0
64 dr. of grass afford of nutritive matter 2.1 dr. The produce of the space, ditto . $5.0\frac{1}{5}$	3445	10=	215	5	10

XLII. *Triticum, Sp.*
Wheat-grass.

At the time of flowering, the produce from a rich randy loam is—

Grass, 18 oz. The produce per acre . .	196020	0=	12251	4	0
80 dr. of grass weigh when dry . . 32 dr. The produce of the space, ditto . . $115\frac{1}{5}$	78408	0=	4900	8	0
The weight lost by the produce of one acre in drying . . .			7350	12	0
64 dr. of grass afford of nutritive matter 2.2 dr. The produce of the space, ditto . 11.1	7657	0=	478	9	0

XLIII. *Festuca fluitans.* Curt. Lond. Engl. Bot. 1520. Poa fluitans.
Floating fescue-grass. Nat. of Britain.

At the time of flowering, the produce from a strong tenacious clay is—

Grass, 20 oz. The produce per acre . .	217800	0=	13612	8	0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . . 96	65340	0=	4083	12	0
The weight lost by the produce of one acre in drying . . .			9528	12	0
64 dr. of grass afford of nutritive matter . 1.3 dr. The produce of the space, ditto . . 8.3	5955	0=	372	3	7

The above produce was taken from grass that had occupied the ground for four years, during which time it had increased every year; it therefore appears contrary to what some have supposed to be capable of being cultivated in perennial pastures.

XLIV. *Holcus lanatus.* Curt. Lond. Fl. Dan. 1811.
Meadow soft grass. Yorkshire grass. Nat. of Britain.

At the time of flowering, the produce from a strong clayey loam is—

Grass, 28 oz. The produce per acre . .	304920	0=	19057	8	0
80 dr. of grass weigh when dry . . 26 dr. The produce of the space, ditto . $157.2\frac{2}{5}$	106585	14=	6661	9	14
The weight lost by the produce of one acre in drying . . .			12395	14	2
64 dr. of grass afford of nutritive matter . 4 dr. The produce of the space, ditto . . 28	19057	8=	1191	1	8

At the time the seed is ripe, the produce is—

Grass, 28 oz. The produce per acre . . .	304920	0=	19057	8	0

	oz.		or lbs. per acre.		
80 dr. of grass weigh when dry . . . 16 dr. The produce of the space, ditto . . $89.2\frac{2}{5}$	60984	0=	3811	8	0
The weight lost by the produce of one acre in drying . .			15246	0	0
64 dr. of grass afford of nutritive matter 2.3 dr. The produce of the space, ditto . . 19.1	13102	0=	818	14	0
The weight of nutritive matter which is lost by leaving the crop till the seed is ripe, exceeding one-third part of its value . . .			372	3	8

The proportional value which the grass, at the time the seed is ripe, bears to that at the time of flowering, is as 11 to 12.

XLV. *Festuca dumetorum.* Flor. Dan. 700.
Pubescent fescue-grass. Nat. of Britain.

At the time of flowering, the produce from a black sandy loam is—

Grass, 16 oz. The produce per acre . . .	174240	0=	10890	0	0
80 dr. of grass weigh when dry . . 40 dr. The produce of the space, ditto . . 128	87120	0=	5445	0	0
The weight lost by the produce of one acre in drying . .			5445	0	0
64 dr. of grass afford of nutritive matter 1 dr. The produce of the space, ditto . . 4	2722	8=	170	2	8

XLVI. *Poa fertilis.* Host. G. A.
Fertile meadow-grass. Nat. of Germany.

At the time of flowering, the produce from a clayey loam is—

Grass, 22 oz. The produce per acre . . .	239580	0=	14973	12	0
80 dr. of grass weigh when dry . . 42 dr. The produce of the space, ditto . . $184\frac{1}{5}$	125779	8=	7861	3	8
The weight lost by the produce of one acre in drying . .			7111	8	8
64 dr. of grass afford of nutritive matter 4.2 dr. The produce of the space, ditto . 24.3	16845	7=	1052	13	7

If the nutritive powers and produce of this species be compared with any other of the same family, or such as resemble it in habit and the soil which it affects, a superiority will be found, which ranks this as one of the most valuable grasses; next to the *Poa angustifolia*, it produces the greatest abundance of early foliage, of the best quality, which fully compensates for the comparative lateness of flowering.

XLVII. *Arundo colorata.* Hort. Kew. i. p. 174. Engl. Bot. 402. Phalaris arundinacea.
Striped-leaved reed-grass. Nat. of Britain.

At the time of flowering, the produce from a black sandy loam is—

Grass, 40 oz. The produce per acre . .	435600	0=	27225	0	0

	oz.	or lbs. per acre.
80 dr. of grass weigh when dry . . 36 dr. The produce of the space, ditto . . 288	196020	0=12251 4 0
64 dr. of grass afford of nutritive matter 4 dr. The produce of the space, ditto . 40	27225	0= 1701 9 0

The strong nutritive powers which this grass possesses recommend it to the notice of occupiers of strong clayey lands which cannot be drained. Its produce is great, and the foliage will not be denominated coarse, if compared with those which afford a produce equal in quantity.

XLVIII. *Trifolium pratense.* W. Bot. iii. p. 137. Broad-leaved cultivated clover. Nat. of Britain.

At the time the seed is ripe, the produce from a rich clayey loam is—

Grass, 72 oz. The produce per acre . .	784080	0=49005 0 0
80 dr. of grass weigh when dry . 20 dr. The produce of the space, ditto . 288	196020	0=12251 0 0
The weight lost by the produce of one acre in drying . .		3675 4 0
64 dr. of grass afford of nutritive matter 2.2 dr. The produce of the space, ditto . 45	30628	2= 1914 4 2

If the weight which is lost by the produce of this species of clover, in drying, be compared with that of many of the natural grasses, its inferior value for the purpose of hay, compared to its value for green food or pasture, will appear; for it is certain that the difficulty of making good hay increases in proportion with the quantity of superfluous moisture which the grass may contain. Its value for green food, or pasture, may further be seen by comparing its nutritive powers with those manifested by other plants generally esteemed best for this purpose.

Trifolium pratense (as above) affords of nutritive matter - - - - 2.2 dr.

XLIX. *Trifolium repens* (white clover) from an equal quantity of grass 2.0 dr.

L. Ditto, variety, with brown leaves, ditto 2.2

The grass of the *T. pratense*, therefore, exceeds in value that of the *T. repens* by a proportion as 8 to 10; but it is of equal proportional value with the brown variety.

LI. *Burnet* (Poterium sanguisorba) affords of nutritive matter - - - - - 2.2 dr.

LII. *Brunias orientalis* (a newly introduced plant) ditto - - - 2.2

The proportional value of these two last, and of the *T. pratense*, and the brown-leaved variety of *T. repens*, are equal: they exceed the *T. repens* as 8 to 10.

The comparative produce of these four last-mentioned species, per acre, has not been ascertained.

LIII. *Trifolium macrorhizum.* Log-rooted clover. Nat. of Hungary.

At the time the seed is ripe, the produce from a rich clayey loam is—

	oz.	or lbs. per acre.
Grass, 144 oz. The produce per acre .	1568160	0=98010 0 0
80 dr. of grass weigh when dry . . 34 dr. The produce of the space, ditto . . 979 1/5	666168	0=41654 4 0
The weight lost by the produce of one acre in drying . .		56355 12 0
64 dr. of grass afford of nutritive matter 2.3 dr. The produce of the space, ditto . 99	67381	14= 4211 5 14

The root of this species of clover is biennial; it penetrates to a great depth in the ground, and is in consequence little affected by the extremes of wet or dry weather. It requires good shelter, and a deep soil. The produce, when compared to that of others that are allied to it in habit and place of growth, proves greatly superior. The following particulars, some of which refer to results stated in the next two pages, will make this manifest:—

		lbs.
Trifolium pratense, Broad-leaved clover	Produces per acre, Grass	49005
	Ditto, Hay	12251
	Affords, do., of nutritive matter	1914
Medicago sativa, Lucern. From a soil of the like nature	Produces per acre, Grass	70785
	Ditto, Hay	28314
	Affords of nutritive matter	1659
Hedysarum onobrychis, Saintfoin	Produces per acre, Grass	8848
	Ditto, Hay	3536
	Affords of nutritive matter	314

The weight of nutritive matter afforded by the produce of the *T. macrorhizum*, exceeding that of the *T. pratense* in proportion nearly as 7 to 15 . . . lbs. 2297

The proportional value of the grass of *T. pratense*, to that of *T. macrorhizum*, is 10 to 11.

The weight of nutritive matter afforded by the *T. macrorhizum*, exceeding that of the *Medicago sativa* in proportion nearly as 13 to 33 . . . 2552

The proportional value of the grass is as 11 to 6.

The weight of nutritive matter which is afforded by the produce of the *T. macrorhizum*, exceeding that of the *Hedysarum onobrychis* in proportion as 5 to 67 3897

The proportional value of the grass, like that of the *T. pratense*, is as 11 to 10.

The produce of each of the above-mentioned species was taken from a similar soil, and in the same situation; the conclusions must therefore be considered positive with respect to such soils only. It is evident that more than twice the quantity of nutritive matter is afforded by the produce of one acre of the *T. macrorhizum*, than from the produce of an equal space covered by the *T. pratense.* Its short duration in the soil (for if sown early in the autumn, on a rich light soil, it is only an annual plant) renders it fit only for green-food or hay; this in some measure lessens its value when compared with the *T. pratense.* It possesses the essential property of affording abundance of good seed; and if the ground be kept clear of weeds, it sows itself, vegetates, and grows rapidly, without covering-in, or any operation whatever. For four years it has propagated itself in this manner, on the space of ground which it now occupies, and from which this statement of its comparative value is made. The produce of lucern in grass comes nearer to this species in quantity, but is greatly deficient in nutritive matter, as much as 13 to 33. The long continuance of lucern in the soil is therefore the only merit which it possesses above the two last-mentioned species; and when that is the object of the cultivator, it will of necessity have the preference.

The value of the grass of saintfoin is equal to that of the *T. pratense;* and proportionally less than that of the *Trifolium macrorhizum*, as 10 to 11. The quantity of grass is very small, and on soils of the nature above described it is doubtless inferior. However, from the superior value of the grass, on dry hilly situations, or chalky soils, it may in such situations possibly be their superior in every respect.

LIV. *Medicago Sativa.* Wither. B. iii. p. 643. Lucern. Nat. of Brit.

At the time the seed is ripe, the produce from a rich clayey loam is—

	oz.	or lbs. per acre.
Grass, 104 oz. The produce per acre . .	1132560 0	=70785 0 0
80 dr. of grass weigh when dry . 32 dr. The produce of the space, ditto . 665·2⅖	453024 0	=28314 0 0
The weight lost by the produce of one acre in drying . .		42471 0 0
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto . . 39	26544 6	= 7659 0 6

LV. *Hedysarum onobrychis.* Wither. iii. p. 628. Saintfoin. Nat. of Britain.

At the time the seed is ripe, the produce from a rich clayey loam is—

	oz.	or lbs. per acre.
Grass, 13 oz. The produce per acre	141570 0	= 8848 2 0
80 dr. of grass weigh when dry . 32 dr. The produce of the space, ditto . 83⅕	56628 0	= 3539 4 0
The weight lost by the produce of one acre in drying . . .		5308 14 0
64 dr. of grass afford of nutritive matter 2.2 dr. The produce of the space, ditto . 8.0½	5530 1	= 345 10 1

LVI. *Hordeum pratense.* Engl. Bot. 409. Host. G. A. i. t. 33. Meadow barley-grass. Nat. of Britain.

At the time of flowering, the produce from a brown loam, with manure, is—

	oz.	or lbs. per acre.
Grass, 12 oz. The produce per acre . .	130680 0	= 8167 8 0
80 dr. of grass weigh when dry . . 32 dr. The produce of the space, ditto . . 67.1	52272 0	= 3267 0 0
The weight lost by the produce of one acre in drying . .		4900 8 0
64 dr. of grass afford of nutritive matter 3.3 dr. The produce of the space, ditto . 11.1	7657 0	= 478 9 0

LVII. *Poa compressa.* Engl. Bot. 365. Flat-stalked meadow-grass. Nat. of Brit.

At the time of flowering, the produce from a gravelly soil, with manure, is—

	oz.	or lbs. per acre.
Grass, 5 oz. The produce per acre . . .	54450 0	= 3403 2 0
80 dr. of grass weigh when dry . . 34 dr. The produce of the space, ditto . . 34	23141 4	= 1446 5 4
The weight lost by the produce of one acre in drying . . .		1956 12 12
64 dr. of grass afford of nutritive matter 5 dr. The produce of the space, ditto . . 6.1	4253 14	= 265 13 14

The specific characters of this species are much the same as those of the *Poa fertilis*, differing in the compressed figure of the straws, and creeping root only. If the produce was of magnitude, it would be one of the most valuable grasses; for it produces foliage early in the spring, and possesses strong nutritive powers.

LVIII. *Poa aquatica.* Curt. Lond. Engl. Bot. 1315. Reed meadow-grass. Nat. of Britain.

At the time of flowering, the produce from a strong tenacious clay is—

	oz.	or lbs. per acre.
Grass, 186 oz. The produce per acre . . .	2025540	= 126596 4 0
80 dr. of grass weigh when dry . . 48 dr. The produce of the space, ditto . . 1785.2 2/16	1215324	= 75957 12 0
The weight lost by the produce of one acre in drying . .		50638 8 0
64 dr. of grass afford of nutritive matter 2.2 dr. The produce of the space, ditto . . 116.1	79122	= 4945 2 10

LIX. *Aira aquatica.* Curt. Lond. Engl. Bot. 1557. Water hair-grass. Nat. of Britain.

At the time of flowering, the produce from water is—

	oz.	or lbs. per acre.
Grass, 16 oz. The produce per acre . . .	174240 0	= 10890 0 0
80 dr. of grass weigh when dry . . 24 dr. The produce of the space, ditto . . 76.3 1/16	52272 0	= 3267 0 0
The weight lost by the produce of one acre in drying . . .		7623 0 0
64 dr. of grass afford of nutritive matter 2.1 dr. The produce of the space, ditto - . 9	6122 10	= 382 13 10

LX. *Bromus cristatus.* Triticum cristatum, H. G. A. 2. t. 24. Secale prostratum. Jacquin. Nat. of Germany.

At the time of flowering, the produce from a clayey loam is—

	oz.	or lbs. per acre.
Grass, 13 oz. The produce per acre . . .	141570 0	= 8848 0 0
80 dr. of grass weigh when dry . . . 32 dr. The produce of the space, ditto . . 83.1	56628 0	= 3539 4 0
The weight lost by the produce of one acre in drying . . .		5308 14 0
64 dr. of grass afford of nutritive matter 2.2 dr. The produce of the space, ditto . . 8.0 2/16	5530 1	= 345 10 0

LXI. *Elymus Sibiricus.* Hort. K. i. p. 176. Cult. 1758, by Mr. P. Millar.

Siberian lyme-grass. Nat. of Siberia.

At the time of flowering, the produce from a sandy loam, with manure, is—

	oz.	or lbs. per acre.
Grass, 24 oz. The produce per acre . .	261360 0	=16335 0 0
80 dr. of grass weigh when dry . . 28 dr. The produce of the space, ditto . 1341.$\frac{3}{5}$	91476 0	= 5717 4 0
The weight lost by the produce of one acre in drying . . .		10617 12 0
64 dr. of grass afford of nutritive matter 2.1 dr. The produce of the space, ditto . . 13.2	9188 7	= 511 7 0

LXII. *Aira cæspitosa.* Host. G. A. ii. t. 42. Engl. Bot. 1557.

Turfy hair-grass. Nat. of Britain.

At the time the seed is ripe, the produce from a strong tenacious clay is—

	oz.	or lbs. per acre.
Grass, 15 oz. The produce per acre .	163350 6	=10209 6 0
80 dr. of grass weigh when dry . 26 dr. The produce of the space, ditto . 135$\frac{1}{5}$	53088 12	= 3318 0 12
The weight lost by the produce of one acre in drying . .		6891 5 4
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto . 7.2	5104 11	= 319 0 1

LXIII. *Hordeum murinum.* Curt. Lond. Engl. Bot. 1971.

Wall barley-grass. Way Bennet. Nat. of Britain.

At the time of flowering, the produce from a clayey loam is—

	oz.	or lbs. per acre.
Grass, 18 oz. The produce per acre . .	196020 0	= 12251 4 0
80 dr. of grass weigh when dry - - 28 dr. The produce of the space, ditto - - 100.3$\frac{1}{5}$	68607 0	= 4287 15 0
The weight lost by the produce of one acre in drying . . .		7963 5 0
64 dr. of grass afford of nutritive matter 3 dr. The produce of the space, ditto . . 3.3$\frac{3}{16}$	2679 15	= 167 7 15

LXIV. *Avena flavescens.* Curt. Lond. Engl. Bot. 952.

Yellow oat-grass. Nat. of Britain.

At the time of flowering, the produce from a clayey loam is—

	oz.	or lbs. per acre.
Grass 12 oz. The produce per acre - . -	130680 0	= 8167 8 0
80 dr. of grass weigh when dry . 28 dr. The produce of the space, ditto . 67.1	45738 0	= 2858 10 0
The weight lost by the produce of one acre in drying . . .		5308 14 0
64 dr. of grass afford of nutritive matter 3.3 dr. The produce of the space, ditto . . 11.1	7657 0	= 478 9 0

At the time the seed is ripe, the produce is—

	oz.	or lbs. per acre.
Grass, 18 oz. The produce per acre . .	196020 0	=12251 4 0
80 dr. of grass weigh when dry - 32 dr. The produce of the space, ditto - 115.0$\frac{1}{5}$	78408 0	= 4900 8 0
The weight lost by the produce of one acre in drying		7350 12 0
64 dr. of grass afford of nutritive matter 2.1 dr. The produce of the space, ditto . . 10.0$\frac{1}{2}$	6891 5	= 430 11 5
The weight of nutritive matter which is lost if the crop be left till the seed be ripe, exceeding one-tenth part of its value . . .		47 13 11

The proportional value which the grass at the time the seed is ripe, bears to that at the time of flowering, is as 9 to 15.

The produce of latter-math is—

	oz.	or lbs. per acre.
Grass, 6 oz. The produce per acre . .	65340 0	= 4083 12 0
64 dr. of grass afford of nutritive matter 1.1 dr.	1276 2	= 79 12 2

The proportional value which the grass of the latter-math bears to that at the time of flowering, is as 5 to 15; and to that at the time the seed is ripe, as 5 to 9.

This species is pretty generally cultivated in many parts of this kingdom; and it appears from the above details to be a valuable grass, though inferior to many others.

LXV. *Bromus sterilis.* Engl. Bot. 1030. Host. G. A. i. t. 16.

Barren brome-grass. Nat. of Britain.

At the time of flowering, the produce from a sandy soil is—

	oz.	or lbs. per acre.
Grass, 44 oz. The produce per acre . .	479160 0	=29947 8 0
80 dr. of grass weigh when dry . . 45 dr. The produce of the space ditto . . 396	269527 8	=16845 7 8
The weight lost by the produce of one acre in drying . .		13102 0 8
64 dr. of grass afford of nutritive matter 5 dr. The produce of the space, ditto . . 55	37434 6	= 2339 10 0

64 dr. of the flowers afford of nutritive matter 2.2 dr. The nutritive powers of the straws and leaves are, therefore, more than twice as great as those of the flowers. This species, being strictly annual, is of comparatively little value. The above particulars show that it has very considerable nutritive powers, more than its name would imply, if taken at the time of flowering; but if left till the seed be ripe, it is like all other annuals, comparatively of no value.

LXVI. *Holcus mollis.* Curt. Lond. Wither. B. ii. p. 134.

Creeping soft-grass. Nat. of Britain.

At the time of flowering, the produce from a sandy soil is—

	oz.	or lbs. per acre.
Grass, 50 oz. The produce per acre . .	544500 0	=34031 4 0
80 dr. of grass weigh when dry . . 32 dr. The produce of the space, ditto . . 320	217800 0	=13612 8 0

oz. or lbs. per acre.

The weight lost by the produce of one acre in drying . . . 20418 12 0

64 dr. of grass afford of nutritive matter 4.2 dr.
The produce of the space, ditto - - 56.1 } 38285 2= 2392 13 2

At the time the seed is ripe, the produce is—

Grass, 31 oz. The produce per acre - - 337590 0=21099 6 0

80 dr. of grass weigh when dry - - 32 dr.
The produce of the space, ditto - - $198.1\frac{3}{5}$ } 135036 0= 8439 12 0

The weight lost by the produce of one acre in drying - - - 12659 10 0

64 dr. of grass afford of nutritive matter 3.2 dr.
The produce of the space, ditto - - $27.0\frac{2}{5}$ } 18461 15= 1153 13 15

The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, being nearly one-half of its value - - - - 1238 15 3

64 dr. of the roots afford of nutritive matter 5.2 dr.

The proportional value which the grass at the time the seed is ripe, bears to that at the time of flowering, is as 14 to 18.

The above details prove this grass to have merits which, if compared with those of other species, rank it with some of the best grasses. The small loss of weight which it sustains in drying might be expected from the nature of the substance of the grass; and the loss of weight at each period is equal. The grass affords the greatest quantity of nutritive matter when in flower, which makes it rank as one of those best adapted for hay.

LXVII. *Poa fertilis.* Var. B. Host. G. A. The species.
Fertile meadow-grass. Variety 1. Nat. of Germany.

At the time of flowering, the produce from a brown sandy loam is—

Grass, 23 oz. The produce per acre - - 250470 0=15654 6 0

80 dr. of grass weigh when dry - - 34 dr.
The produce of the space, ditto - - $156\frac{3}{5}$ } 106448 0= 6653 8 0

The weight lost by the produce of one acre in drying - - - - 9000 14 0

64 dr. of grass afford of nutritive matter 3 dr.
The produce of the space, ditto - - 17.1 } 11740 12= 733 12 12

At the time the seed is ripe, the produce is—

Grass, 22 oz. The produce per acre . . 239580 0= 14978 12 0

80 dr. of grass weigh when dry . . 44 dr.
The produce of the space, ditto . 193.2 } 131769 0= 8235 9 0

The weight lost by the produce of one acre in drying . . 6738 3 0

64 dr. of grass afford of nutritive matter 5 dr.
The produce of the space, ditto . 27.2 } 18717 3= 1169 13 3

The weight of nutritive matter which is lost by taking the crop at the time of flowering, exceeding one-third part of its value, is . . . 436 1 3

The proportional value which the grass at the time of flowering bears to that at the time the seed is ripe, is as 12 to 20.

The produce of latter-math is—

oz. or lbs. per acre.

Grass, 7 oz. The produce per acre . . 76230 0= 4764 6 0

64 dr. of grass afford of nutritive matter 1.2 dr. 1786 10= 111 10 10

The proportional value which the grass of the latter-math bears to that at the time of flowering, is as 6 to 12; and to that at the time the seed is ripe, as 6 to 20.

LXVIII. *Cynosurus erucæformis.* Beckmannia erucæformis. Host. G. A. iii. t. 6.
Linear-spiked dog's-tail grass. Nat. of Germany.

At the time the seed is ripe, the produce is—

Grass, 18 oz. The produce per acre - - 196020 0=12251 4 0

80 dr. of grass weigh when dry - 36 dr.
The produce of the space, ditto - $129.2\frac{2}{5}$ } 88209 0= 5513 1 0

The weight lost by the produce of one acre in drying - - - 6738 3 0

64 dr. of grass afford of nutritive matter 3.1 dr.
The produce of the space, ditto - $14.2\frac{3}{4}$ } 9954 2= 622 2 2

LXIX. *Phleum nodosum.* With. B. ii. p. 118.
Bulbous-stalked cat's-tail grass. Nat. of Britain.

At the time of flowering, the produce from a clayey loam is—

Grass, 18 oz. The produce per acre - - 196020 0=12251 4 0

80 dr. of grass weigh when dry - - 38 dr.
The produce of the space, ditto - - $136\frac{1}{5}$ } 93109 8= 5819 5 8

The weight lost by the produce of one acre in drying - - - 6431 14 0

64 dr. of grass afford of nutritive matter 2.2 dr.
The produce of the space, ditto - - 11.1 } 7657 0= 478 9 0

This grass is inferior in many respects to the *Phleum pratense.* It is sparingly found in meadows. From the number of bulbs which grow out of the straws, a greater portion of nutritive matter might have been expected. This seems to prove that these bulbs do not form so valuable a part of the plant as the joints, which are so conspicuous in the *Phleum pratense,* the nutritive powers of which exceed those of the *P. nodosum,* as 8 to 28.

LXX. *Phleum pratense.* Wither. ii. p. 117.
Meadow cat's-tail grass. Nat. of Britain.

At the time of flowering, the produce from a clayey loam is—

Grass, 60 oz. The produce per acre - - 653400 0= 40837 8 0

80 dr. of grass weigh when dry - 34 dr.
The produce of the space, ditto - 408 } 277695 0= 17355 15 0

The weight lost by the produce of one acre in drying - - 23481 9 0 oz. or lbs. per acre.

65 dr. of grass afford of nutritive matter 2 2 dr. The produce of the space, ditto - 37.2 — 25523 7= 1595 3 0

The weight of nutritive matter which is lost by leaving the crop till the seed be ripe, exceeding one-half of its value — 2073 11 0

At the time the seed is ripe the produce is—

Grass, 60 oz. The produce per acre - - — 653400 0=40837 8 0

80 dr. of grass weigh when dry - 38 dr. The produce of the space, ditto - 456 — 310365 0=19397 13 0

The weight lost by the produce of one acre in drying - - — 21439 11 0

64 dr. of grass afford of nutritive matter 5.3 dr. The produce of the space, ditto - - 86.1 — 58703 14= 3668 15 14

The latter-math produce is—

Grass 14 oz. The produce per acre - - — 152460 0= 9528 12 0

64 dr. of grass afford of nutritive matter 2 dr. — 4764 6= 297 12 6

64 dr. of the straws afford of nutritive matter 7 dr. The nutritive powers of the straws simply, therefore, exceed those of the leaves, in proportion as 28 to 8; and the grass at the time of flowering, to that at the time the seed is ripe, as 10 to 23; and the latter-math, to the grass of the flowering crop, as 8 to 10.

The comparative merits of this grass will appear from the above particulars to be very great; to which may be added the abundance of fine foliage that it produces early in the spring. In this respect it is inferior to the *Poa fertilis* and *Poa angustifolia* only. The value of the straws at the time the seed is ripe exceeds that of the grass at the time of flowering, as 28 to 10; a circumstance which increases its value above many others; for, by this property, its valuable early foliage may be cropped to an advanced period of the season without injury to the crop of hay, which in other grasses which send forth their flowering straws early in the season would cause a loss of nearly one-half of the value of the crop, as is clearly proved by former examples; and this property of the straws makes the plant peculiarly valuable for the purpose of hay.

LXXI. *Phleum pratense.* Var. minor. Wither. B. ii. p. 118. Var. 1.
Meadow cat's-tail grass. Var. Smaller. Nat. of Britain.

At the time of ripening the seed, the produce from a clayey loam is—

Grass, 40 oz. The produce per acre - - — 435600 0=27225 0 0

80 dr. of grass weigh when dry - - - 34 dr. The produce of the space, ditto - - 272 — 185130 0=11570 10 0

The weight lost by the produce of one acre in drying - - - - - — 15654 6 0

64 dr. of grass afford of nutritive matter 2.3 dr. The produce of the space, ditto - 272 — 1817 3= 1169 13 3

The latter-math produce is—

oz. or lbs. per acre.

Grass, 14 oz. The produce per acre - - - — 152460 0= 9528 12 0

64 dr. of grass afford of nutritive matter 1.2 dr. - — 3573 4= 223 5 4

LXXII. *Elymus arenarius.* Engl. Bot. 1672.
Upright sea lyme-grass. Nat. of Brit.

At the time the seed is ripe, the produce from a clayey loam is—

Grass, 64 oz. The produce per acre - - - — 696960 0=43560 0 0

80 dr. of grass weigh when dry - - 45 dr. The produce of the space, ditto - - 576 — 392040 0=24502 8 0

The weight lost by the produce of one acre in drying - - - - - — 18957 8 0

64 dr. of grass afford of nutritive matter 5 dr. The produce of the space, ditto - - 80 — 54450 0= 3403 2 0

LXXIII. *Elymus geniculatus.* Pendulous lyme-grass. Engl. Bot. 1586.
Pendulous sea-lyme-grass. Nat. of England.

At the time of flowering, the produce from a sandy soil is—

Grass, 30 oz. The produce per acre - - - — 326700 0=20418 12 0

80 dr. of grass weigh when dry - - 32 dr. The produce of the space, ditto - - 192 — 130680 0= 8167 8 0

The weight lost by the produce of one acre in drying - - - - - — 12251 4 0

64 dr. of grass afford of nutritive matter 3.1 dr. The produce of the space, ditto - 24.1½ — 16590 3= 1036 14 3

LXXIV. *Bromus inermis.* Host. G. A. i. t. 9.
Awnless brome-grass. Nat. of Germany. Introduced by Mr. Hunneman in 1794.

At the time the seed is ripe, the produce from a black sandy soil is—

Grass, 18 oz. The produce per acre - - — 196020 0=12251 4 0

80 dr. of grass weigh when dry - - 35 dr. The produce of the space, ditto - - 126 — 85758 12= 5359 14 12

The weight lost by the produce of one acre in drying - - - - - — 6891 5 4

64 dr. of grass afford of nutritive matter 4.1 dr. The produce of the space, ditto - - 19.0⅗ — 13016 15= 813 8 15

The produce of the latter-math is—

Grass 13 oz. The produce per acre - - - — 141570 0= 8848 2 0

64 dr. of grass afford of nutritive matter 1.1 dr. - — 2765 0= 172 13 0

LXXV. *Agrostis vulgaris.* Wither. Bot. ii. 132. Hud. A. capilaris; Dr. Smith, A. arenaria.
Fine bent-grass. Nat. of Britain.

At the time the seed is ripe, the produce from a sandy soil is—

Grass, 14 oz. The produce per acre - - - — 152460 0= 9528 12 0

80 dr. of grass weigh when dry 40 dr. The produce of the space, ditto - - 112 — 76230 0 = 4764 6 0

	oz.	or lbs. per acre.
The weight lost by the produce of one acre in drying - - - - -		4764 6 0
64 dr. of grass afford of nutritive matter $1.2\frac{3}{16}$; The produce of the space, ditto - - $5.1\frac{1}{16}$	4019 15=	251 3 15

This is one of the most common of the bents, likewise the earliest; in these respects it is superior to all others of the same family, but inferior to several of them in produce and the quantity of nutritive matter it affords. As the species of this family are generally rejected by the cultivator on account of the lateness of their flowering, and this circumstance, as has already been observed, does not always imply a proportional lateness of foliage, their comparative merits in this respect may be better seen by bringing them into one view, as to the value of their early foliage.

	The apparent difference of time.	Their nutritive powers.
Agrostis vulgaris	Middle of April -	$1.2\frac{3}{4}$
palustris	One week later -	2.3
stolonifera	Two ditto - -	3.2
canina	Ditto, ditto - -	1.3
stricta	Ditto, ditto - -	1.2
nivea	Three weeks, ditto -	2
littoralis	Ditto, ditto -	3
repens	Ditto, ditto -	3
mexicana	Ditto, ditto -	2
fasicularis	Ditto, ditto -	2

LXXVI. *Agrostis palustris.* Wither. Bot. ii. p. 129. Var. 2, alba. Engl. Bot. 1189. A. alba.

Marsh bent-grass.

At the time of flowering, the produce from a bog earth is—

Grass, 15 oz. The produce per acre - -	163350 6=	10209 6 0
80 dr. of grass weigh when dry - - 36 dr.; The produce of the space, ditto - - 108	73507 8=	4594 3 8
The weight lost by the produce of one acre in drying - - - - -		5615 2 8
64 dr. of grass afford of nutritive matter 2.3 dr.; The produce of the space, ditto - $10.1\frac{1}{4}$	7018 15=	438 10 15

At the time the seed is ripe, the produce is—

Grass, 20 oz. The produce per acre - -	217800 0=	13612 8 0
80 dr. of grass weigh when dry - - 32 dr.; The produce of the space, ditto - - 128	87120 0=	5445 0 0
The weight lost by the produce of one acre in drying - - - - -		8167 8 0
64 dr. of grass afford of nutritive matter 2.3 dr.; The produce of the space, ditto - - 13.3	9358 9=	584 14 9
The weight of nutritive matter which is lost by taking the crop at the time of flowering, being one-fourth part of its value - - - - - - - -		146 3 10

The proportional value of grass in each crop is equal.

LXXVII. *Panicum dactylon.* Engl. Bot. 850. Host. G. A. ii. t. 18.

Creeping Panic grass. Nat. of Britain.

At the time of flowering, the produce from a sandy loam, with manure, is—

	oz.	or lbs. per acre.
Grass, 46 oz. The produce per acre - - -	500940 0=	31308 12 0
80 dr. of grass weigh when dry - - 36 dr.; The produce of the space, ditto - - $331.0\frac{1}{5}$	225423 0=	14088 15 0
The weight lost by the produce of one acre in drying - - - - -		17219 13 0
64 dr. of grass afford of nutritive matter 2 dr.; The produce of the space, ditto - - 23	15654 6=	9783 6 0

LXXVIII. *Agrostis stolonifera.* Engl. Bot. 1532. Wither. Bot. ii. 181. (Fiorin, Dr. Richardson.)

Creeping bent. Nat. of Britain.

At the time of flowering, the produce from a bog soil is—

Grass, 26 oz. The produce per acre - - -	283140 0=	17696 4 0
80 dr. of grass weigh when dry - - 35 dr.; The produce of the space, ditto - - 182	123873 12=	7742 1 12
The weight lost by the produce of one acre - - - - - - -		9732 15 0
64 dr. of grass afford of nutritive matter 3.2 dr.; The produce of the space, ditto - - 22.3	15484 3=	967 12 0

At the time the seed is ripe, the produce is—

Grass, 28 oz. The produce per acre - - -	304920 0=	19057 8 0
80 dr. of grass weigh when dry - - 36 dr.; The produce of the space, ditto - - $201.2\frac{2}{5}$	137214 0=	8575 14 0
The weight lost by the produce of one acre in drying - - - - -		10481 10 0
64 dr. of grass afford of nutritive matter 3.2 dr.; The produce of the space, ditto - 24.2	16675 0=	1042 3 5
The weight of nutritive matter which is lost by taking the crop at the time of flowering, being nearly one-fourteenth of its value - - - - -		74 7 2

LXXIX. *Agrostis stolonifera.* Var. angustifolia. Creeping bent, with narrow leaves. Nat. of Britain.

At the time the seed is ripe, the produce from a bog soil is—

Grass, 26 oz. The produce per acre - -	261360 0=	16335 0 0
80 dr. of grass weigh when dry - - 36 dr.; The produce of the space, ditto - - $172.3\frac{1}{5}$	117612 0=	7350 12 0
The weight lost by the produce of one acre in drying - - - -		8984 4 0
64 dr. of grass afford of nutritive matter 3 dr.; The produce of the space, ditto - - 18	12251 4=	765 11 4
The weight of nutritive matter afforded by the produce of one acre of the *Agrostis stolonifera* exceeding that of the variety in proportion, as 6 to 8 -		276 8 1

The above details will assist the farmer in deciding on the comparative value of this grass. From a careful examination it will doubtless appear to possess merits well worthy of attention, though perhaps not so great as has been supposed, if the natural place of its growth and habits be impartially taken into the account. From the couchant nature of this grass, it is denominated couch-grass by practical men; and from the length of time that it retains the vital power, after being taken out of the soil, is called squitch, quick, full of life, &c.

LXXX. *Agrostis canina.* Engl. Bot. 1856.
Brown-bent. Nat. of Britain.

At the time of flowering, the produce from a brown sandy loam is—

	oz.		or lbs. per acre.		
Grass, 9 oz. The produce per acre - -	98010	0=	6125	10	0
80 dr. of grass weigh when dry - - 34 dr. The produce of the space, ditto - - $63\frac{1}{5}$	43013	0=	2588	5	0
The weight lost by the produce of one acre in drying - - - - -			3437	5	0
64 dr. of grass afford of nutritive matter 2.2 dr. The produce of the space, ditto - - $52.1\frac{1}{2}$	3828	8=	239	4	8

LXXXI. *Agrostis canina.* Var. muticæ.
Awnless brown bent. Nat. of Britain.

At the time the seed is ripe, the produce from a sandy soil is—

Grass, 21 oz. The produce per acre - -	228690	0=	14293	2	0
80 dr. of grass weigh when dry - 24 dr. The produce of the space, ditto - $100.3\frac{1}{5}$	68607	0=	4287	15	0
The weight lost by the produce of one acre in drying - -			10005	3	0
64 dr. of grass afford of nutritive matter 1.3 dr. The produce of the space, ditto - $9.0\frac{3}{4}$	6253	3=	390	13	3
The weight of nutritive matter which the produce of one acre of the awnless variety exceeds that of the last mentioned species - -			151	8	11

LXXXII. *Agrostis stricta.* Curt. A. rubra.
Upright bent-grass. Nat. of Britain.

At the time the seed is ripe, the produce from a bog soil is—

Grass, 11 oz. The produce per acre - - -	119790	0=	7486	14	0
80 dr. of grass weigh when dry - 29 dr. The produce of the space, ditto - $63\frac{1}{5}$	43423	14=	2713	15	0
The weight lost by the produce of one acre in drying - - -			4772	15	0
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto - - $4.0\frac{5}{10}$	2807	9=	175	7	5

LXXXIII. *Agrostis nivea.*
Snowy bent-grass. Nat. of Britain.

At the time the seed is ripe, the produce from a sandy soil is—

	oz.		or lbs. per acre.		
Grass, 7 oz. The produce per acre - - -	76230	0=	4764	6	0
80 dr. of grass weigh when dry - - 22 dr. The produce of the space, ditto - - $30.3\frac{1}{5}$	20963	4=	1310	3	0
The weight lost by the produce of one acre in drying - -			2454	3	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto - - $3\frac{1}{2}$	2382	3=	148	14	3

LXXXIV. *Agrostis fascicularis.* Huds. Var. canina. Curt.
Tufted-leaved bent. Nat. of Britain.

At the time of flowering, the produce from a light sandy soil is—

Grass, 4 oz. The produce per acre - -	43560	0=	2722	8	0
80 dr. of grass weigh when dry - 20 dr. The produce of the space, ditto - 16	10890	0=	680	10	9
The weight lost by the produce of one acre in drying - -			2041	14	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto - 2	1361	4=	85	1	4

LXXXV. *Festuca pinnata.* Bromus pinnatus. Engl. Bot. 730.
Spiked fescue. Nat. of Britain.

At the time the seed is ripe, the produce from a light sandy soil, with manure, is—

Grass, 30 oz. The produce per acre - -	326700	0=	20418	12	0
80 dr. of grass weigh when dry - 32 dr. The produce of the space, ditto - 192	130680	0=	8167	8	0
The weight lost by the produce of one acre in drying - -			12251	4	0
64 dr. of grass afford of nutritive matter 1.1 dr. The produce of the space, ditto - $9.1\frac{3}{4}$	6380	13=	398	12	13

LXXXVI. *Panicum viride.* Curt. Lond. Engl. Bot. 875.
Green panic grass. Nat. of Britain.

At the time the seed is ripe, the produce from a light sandy soil is—

Grass, 8 oz. The produce per acre - -	87120	0=	5445	0	0
80 dr. of grass weigh when dry - - 32 dr. The produce of the space, ditto - $51\frac{1}{5}$	34848	0=	2178	0	0
The weight lost by the produce of one acre in drying - - -			3267	0	0
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto - - 3	241	14=	127	9	14

LXXXVII. *Panicum sanguinale.* Curt. Lond. Engl. Bot. 849.
Blood-colored panic grass. Nat. of Britain.

At the time the seed is ripe, the produce from a sandy soil is—

Grass 10 oz. The produce per acre - -	108900	0=	6806	4	0
64 dr. of grass afford of nutritive matter $1.0\frac{2}{16}$ dr.	1914	4=	119	10	4

This and the preceding species are strictly annual, and from the results of this trial their nutritive powers appear to be very inconsiderable. The seed of this species Mr. Schreber describes (in Beschreibung der Graser) as the manna grass. In Poland, Lithuania, &c., it is collected in great abundance, when, after being thoroughly separated from the husks, it is fit for use. When boiled with milk, or wine, it forms an extremely palatable food, and is most commonly made use of whole, in the manner of sago, to which it is in general preferred.

LXXXVIII. *Agrostis lobata.* Curtis, lobata et arenaria.
Lobed bent-grass.

At the time of flowering, the produce from a sandy soil is—

	oz.		or lbs. per acre.		
Grass, 10 oz. The produce per acre - -	108900	0=	6806	4	0
80 dr. of grass weigh when dry - - 40 dr. The produce of the space, ditto - - 80	54450	0=	3403	2	0
The weight lost by the produce of one acre in drying - - -			3403	2	0
64 dr. of grass afford of nutritive matter 3 dr. The produce of the space, ditto - 7.2	5104	11=	319	0	11

LXXXIX. *Agrostis repens.* Wither. Bot. A. nigra.
Creeping-rooted bent, black bent. Nat. of Britain.

At the time of flowering, the produce from a clayey loam is—

Grass, 9 oz. The produce per acre - - -	98010	0=	6125	10	0
80 dr. of grass weigh when dry - - 35 dr. The produce of the space, ditto - - 63	42879	6=	2679	15	6
The weight lost by the produce of one acre in drying - - - - -			3445	10	10
64 dr. of grass afford of nutritive matter 3 dr. The produce of the space, ditto - - 6.3	4594	3=	287	2	8

XC. *Agrostis mexicana.* Hort. Kew. i. p. 150.
Mexican bent-grass. Nat. of S. America. Introduced, 1780, by M. G. Alexander.

At the time of flowering, the produce from a black sandy soil is—

Grass, 28 oz. The produce per acre - -	304920	0=	19057	8	0
80 dr. of grass weigh when dry - - 28 dr. The produce of the space, ditto - 156.3⅕	106722	0=	6670	2	0
The weight lost by the produce of one acre in drying - - - - -			12387	6	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto - - 14	9528	12=	595	8	12

XCI. *Stipa pennata.* Engl. Bot. 1356.
Long-awned feather grass. Nat. of Britain.

At the time of flowering, the produce from a heath soil is—

	oz.		or lbs. per acre.		
Grass, 14 oz. The produce per acre - -	152460	0=	9528	12	0
80 dr. of grass weigh when dry - - 29 dr. The produce of the space, ditto - - 81⅕	55266	12=	3454	2	12
The weight lost by the produce of one acre in drying - - -			6074	9	4
64 dr. of grass afford of nutritive matter 1.3 dr. The produce of the space, ditto - - 9.2½	6551	0=	409	7	0

XCII. *Triticum repens.* Engl. Bot. 909.
Creeping-rooted wheat-grass. Nat. of Britain.

At the time of flowering, the produce from a light clayey loam is—

Grass, 18 oz. The produce per acre - -	196020	0=	12251	4	0
80 dr. of grass weigh when dry - 32 dr. The produce of the space, ditto - - 115⅕	78408	0=	4900	8	0
The weight lost by the produce of one acre in drying - - -			7350	12	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto - - 9	6125	10=	382	13	10

64 dr. of the roots afford of nutritive matter 5.3 dr. The proportional value of the roots is therefore to that of the grass, as 23 to 8.

XCIII. *Alopecurus agrestis.* Engl. Bot. 848. A. myosuroides.
Slender fox-tail grass. Nat. of Britain. Curt. Lond.

At the time of flowering, the produce from a light sandy loam is—

Grass, 12 oz. The produce per acre - - -	130680	0=	8167	8	0
80 dr. of grass weigh when dry - - 31 dr. The produce of the space, ditto - - 74.1⅗	50638	8=	3164	14	8
64 dr. of grass afford of nutritive matter 1.3 dr. The produce of the space, ditto - - 5.1	3573	4=	223	5	4

XCIV. *Bromus asper.* Engl. Bot. 1172. Curt. Lond. Bromus hirsutus. Huds. Bromus ramosus. B. sylvaticus, volger. B. altissimus.
Hairy-stalked brome-grass. Nat. of Britain.

At the time of flowering, the produce from a light sandy soil is—

Grass, 20 oz. The produce per acre - -	217800	0=	13612	8	0
80 dr. of grass weigh when dry - - 24 dr. The produce of the space, ditto - 96	65340	0=	4083	12	0
The weight lost by the produce of one acre in drying - - -			9528	12	0
64 dr. of grass afford of nutritive matter 2 dr. The produce of the space, ditto - - 10	6806	4=	425	6	4

XCV. *Phalaris canariensis.* Engl. Bot. 1310.
Common canary-grass. Nat. of Britain.

At the time of flowering, the produce from a clayey loam is—

	oz.	or lbs. per acre.		
Grass, 80 oz. The produce per acre - -	871200 0=	54450	0	0
80 dr. of grass weigh when dry - - 26 dr. The produce of the space, ditto - - 416	283177 8=	17697	9	8
The produce in weight lost by drying		36752	6	6
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto - 30	20418 12=	1876	2	12

XCVI. *Melica cærulea.* Curt. Lond. Engl. Bot. 750.

Purple melic grass. Nat. of Britain.

At the time of flowering, the produce from a light sandy soil is—

Grass, 11 oz. The produce per acre - -	119790 0=	7486	14	0
85 dr. of grass weigh when dry - 30 dr. The produce of the space, ditto - 66	44921 4=	2807	9	4
The weight lost by the produce of one acre in drying - - -		4679	4	2
64 dr. of grass afford of nutritive matter 1.2 dr. The produce of the space, ditto - 2.0¾	2756 8=	172	4	8

XCVII. *Dactylis cynosuroides.* Linn. fil. fasci. 1. p. 17.

American cock's-foot grass. Nat. of N. America.

At the time of flowering, the produce from a clayey loam is—

Grass, 102 oz. The produce per acre - -	111780 0=	69423	1	0
80 dr. of grass weigh when dry - 48 dr. The produce of the space, ditto - 979⅕	666468 0=	41654	4	0
The weight lost by the produce of one acre in drying - -		27769	8	0
64 dr. of grass afford of nutritive matter 1.3 dr. The produce of the space, ditto - 44.2¾	30372 0=	1898	4	0

Of the time in which different Grasses produce Flowers and Seeds.

To decide positively the exact period or season when a grass always comes into flower, and perfects its seed, will be found impracticable; for a variety of circumstances interfere. Each species seems to possess a peculiar life, in which various periods may be distinctly marked, according to the varieties of its age, of the seasons, soils, exposures, and mode of culture.

The following table, which shows the time of flowering, and the time of ripening the seed of those grasses growing at Woburn which are mentioned in the Experiments, must therefore only be considered as serving for a test of comparison, for the different grasses growing under the same circumstances.

Names.	Time of flowering.	Time of ripening the seed.
Anthoxanthum odoratum	April 29	June 21
Holcus odoratus	April 29	June 25
Cynosurus cæruleus	April 30	June 20
Alopecurus pratensis	May 20	June 24
Alopecurus alpinus	May 20	June 24
Poa alpina	May 30	June 30
Poa pratensis	May 30	July 14
Poa cærulea	May 30	July 14
Avena pubescens	June 13	July 8
Festuca hordiformis	June 13	July 10
Poa trivialis	June 13	July 10
Festuca glauca	June 13	July 10
Festuca glabra	June 16	July 10
Festuca rubra	June 20	July 10
Festuca ovina	June 24	July 10
Briza media	June 24	July 10
Dactylis glomerata	June 24	July 14
Bromus tectorum	June 24	July 16
Festuca cambrica	June 28	July 16
Bromus diandrus	June 28	July 16
Poa angustifolia	June 28	July 16
Avena elatior	June 28	July 16
Poa elatior	June 28	July 16
Festuca duriuscula	July 1	July 20
Milium effusum	July 1	July 20
Festuca pratensis	July 1	July 20
Lolium perenne	July 1	July 20
Cynosurus cristatus	July 6	July 28
Avena pratensis	July 6	July 20
Bromus multiflorus	July 6	July 28
Festuca loliacea	July 1	July 28
Poa cristata	July 4	July 28
Festuca myurus	July 6	July 28
Aira flexuosa	July 6	July 28
Hordeum bulbosum	July 10	July 28
Festuca calamaria	July 10	July 28
Bromus littoreus	July 12	Aug. 6
Festuca elatior	July 12	Aug. 6
Nardus stricta	July 12	Aug. 6
Triticum (species of)	July 12	Aug. 10
Festuca fluitans	July 14	Aug. 12
Festuca dumetorum	July 14	July 20
Holcus lanatus	July 14	July 26
Poa fertilis	July 14	July 28
Arundo colorata	July 16	July 28
Poa (species of)	July 16	July 30
Cynosurus erucæformis	July 16	July 30
Phleum nodosum	July 16	July 30
Phleum pratense	July 16	July 30
Elymus arenarius	July 16	July 30
Elymus geniculatus	July 18	July 30
Trifolium pratense	July 18	July 30
Trifolium machrorhizum	July 18	July 30
Sanguisorba canadensis	July 18	July 30
Bunias orientalis	July 18	July 30
Medicago sativa	July 18	Aug. 6
Hedysarum onobrychis	July 18	Aug. 8
Hordeum pratense	July 20	Aug. 8
Poa compressa	July 20	Aug. 8
Poa aquatica	July 20	Aug. 8
Bromus cristatus	July 24	Aug. 10
Elymus sibiricus	July 24	Aug. 10
Aira cæspitosa	July 24	Aug. 10
Avena flavescens	July 24	Aug. 15
Bromus sterilis	July 24	Aug. 20
Holcus mollis	July 24	Aug. 20
Bromus inermis	July 24	Aug. 20
Agrostis vulgaris	July 24	Aug. 20
Agrostis palustris	July 28	Aug. 28

Names.	Time of flowering.	Time of ripening the seed.
Panicum dactylon	July 28	Aug. 28
Agrostis stolonifera	July 28	Aug. 28
Agrostis stolonifera (var.)	July 28	Aug. 28
Agrostis canina	July 28	Aug. 28
Agrostis stricta	July 28	Aug. 30
Festuca pennata	July 28	Aug. 30
Panicum viride	Aug. 2	Aug. 15
Panicum sanguinale	Aug. 6	Aug. 20
Agrostis lobata	Aug. 6	Aug. 20
Agrostis repens	Aug. 8	Aug. 25
Agrostis fascicularis	Aug. 10	Aug. 30
Agrostis nivea	Aug. 10	Aug. 30
Triticum repens	Aug. 10	Aug. 30
Alopecurus agrestis	Aug. 10	Sept. 8
Bromus asper	Aug. 10	Sept. 10
Agrostis mexicana	Aug. 15	Sept. 25
Stipa pennata	Aug. 15	Sept. 25
Melica cærulea	Aug. 20	Sept. 30
Phalaris canariensis	Aug. 50	Sept. 30
Dactylis cynosuroides*	Aug. 30	Oct. 20

Of the different Soils referred to in the Appendix.

In books on agriculture and gardening much uncertainty and confusion arise from the want of regular definitions of the various soils, to distinguish them specifically by the names generally used: thus the term "bog-earth" is almost constantly confounded with peat-moss, and heath-soil; also the terms "light loam," "heavy soil," &c. are given without distinguishing whether that be "light" from sand, or this "heavy" from clay. In minute experiments, it is doubtless of consequence to be as explicit as possible in those particulars. The following short descriptions of such soils as are mentioned in the details of the experiment are here given for the above purpose:—

1st. By "loam" is meant any of the earths combined with decayed animal or vegetable matter.

2d. "Clayey-loam," when the greatest proportion is clay.

3d. "Sandy-loam," when the greatest proportion is sand.

4th. "Brown-loam," when the greatest proportion consists of decayed vegetable matter.

5th "Rich black loam," when sand, clay, animal and vegetable matters are combined in unequal proportions, the clay greatly divided, being in the least proportion, and the sand and vegetable matter in the greatest.

The terms "light sandy soil," "light brown loam," &c. are varieties of the above, as expressed.

Observations on the Chemical Composition of the Nutritive Matter afforded by the Grasses in their different states.—By Sir H. Davy.

I have made experiments on most of the soluble products supposed to contain the nutritive matter of the grasses, obtained by Mr. Sinclair; and I have analyzed a few of them. Minute details on this subject would be little interesting to the agriculturist, and would occupy a considerable space; I shall therefore content myself with mentioning some particular facts, and some general conclusions, which may tend to elucidate the inquiry respecting the fitness of the different grasses for permanent pasture, or for alternation as green crops with grain.

The only substances which I have detected in the soluble matters procured from the grasses are mucilage, sugar, bitter extract, a substance analogous to albumen, and different saline matters. Some of the products from the after-math crops gave feeble indications of the tanning principle.

The order in which these are nutritive has been mentioned in the first lecture: the albumen, sugar, and mucilage, probably when cattle feed on grass or hay, are for the most part retained in the body of the animal; and the bitter principle, extract, saline matter, and tannin, when any exist, probably for the most part are voided in the excrement with the woody fibre. The extractive matter obtained by boiling the fresh dung of cows is extremely similar in chemical characters to that existing in the soluble products from the grasses. And some extract, obtained by Mr. Sinclair from the dung of sheep and of deer, which had been feeding upon the Lolium perenne, Dactylis glomerata, and Trifolium repens, had qualities so analogous to those of the extractive matters obtained from the leaves of the grasses, that they might be mistaken for each other. The extract of the dung, after being kept for some weeks, had still the odor of hay. Suspecting that some undigested grass might have remained in the dung, which might have furnished mucilage and sugar as well as bitter extract, I examined the soluble matter very carefully for these substances. It did not yield an atom of sugar, and scarcely a sensible quantity of mucilage.

Mr. Sinclair, in comparing the quantities of soluble matter afforded by the mixed leaves of the Lolium perenne, Dactylis glomerata, and Trifolium repens, and that obtained from the dung of cattle fed upon them, found their relative proportions as 50 to 13.

It appears probable from these facts that the bitter extract, though soluble in a large quantity of water, is very little nutritive; but probably it serves the purpose of preventing to a certain extent, the fermentation of the other vegetable matters, or in modifying or assisting the function of digestion, and may thus be of considerable use in forming a constituent part of the food of cattle. A small quantity of bitter extract and saline matter is probably all that is needed; and beyond this quantity the soluble matters must be more nutritive in proportion as they contain more albumen, sugar, and mucilage, and less nutritive in proportion as they contain other substances.

In comparing the composition of the soluble products afforded by different crops from the same grass, I found, in all trials I made, the largest quantity of truly nutritive matter in the crop cut when the seed was ripe, and least bitter extract and saline matter; most extract and saline matter in the autumnal crop; and most saccharine matter, in proportion to the other ingredients, in the crop cut at the time of flowering. I shall give one instance—

100 parts of the soluble matter obtained from the Dactylis glomerata, cut in flower, afforded

* In the experiments made on the quantity of nutritive matter in the grasses cut at the time the seed was ripe, the seeds were always separated; and the calculations for nutritive matter, as is evident from the details, made for grass and not hay.

of sugar - - - 18 parts.
of mucilage - - - 67
of colored extract, and saline matters with some matter rendered insoluble by evaporation 15

100 parts of the soluble matter from the seed crop afforded—

of sugar - - - - 9 parts,
of mucilage - - - 85
of extract, insoluble and saline matter - - - 6

100 parts of the soluble matter from the aftermath crop give—

of sugar - - - 11 parts.
of mucilage - - 59
of extract, insoluble and saline matters - - - 30

The greater proportion of leaves in the spring, and particularly in the late autumnal crop, accounts for the difference in the quantity of extract; and the inferiority of the comparative quantity of sugar in the summer crop probably depends upon the agency of light, which tends always in plants to convert saccharine matter into mucilage or starch.

Amongst the soluble matters afforded by the different grasses, that of the Elymus arenarius was remarkable for the quantity of saccharine matter it contained, amounting to more than one-third of its weight. The soluble matters from the different species of Festuca, in general, afforded more bitter extractive matter than those from the different species of Poa. The nutritive matter from the seed crop of the Poa compressa was almost pure mucilage. The soluble matter of the seed crop of Phleum pratense, or meadow cat's-tail, afforded more sugar than any of the Poa or Festuca species.

The soluble parts of the seed crop of the Holcus mollis and Holcus lanatus contained no bitter extract, and consisted entirely of mucilage and sugar. Those of the Holcus odoratus afforded bitter extract and a peculiar substance having an acrid taste more soluble in alcohol than in water. All the soluble extracts of those grasses that are most liked by cattle have either a saline or subacid taste; that of the Holcus lanatus is similar in taste to gum arabic. Probably the Holcus lanatus, which is so common a grass in meadows, might be made palatable to cattle by being sprinkled over with salt.

I have found no differences in the nutritive produce of the crops of the different grasses cut at the same season, which would render it possible to establish a scale of their nutritive powers; but probably the soluble matters of the after-math crop are always from one-sixth to one-third less nutritive than those from the flower or seed crop. In the after-math the extractive and saline matters are certainly usually in excess; but the after-math hay mixed with summer hay, particularly that in which the fox-tail and soft grasses are abundant, would produce an excellent food.

Of the clovers, the soluble matter from the Dutch clover contains most mucilage, and most matter analogous to albumen: all the clovers contain more bitter extract and saline matter than the common proper grasses. When pure clover is to be mixed as fodder, it should be with summer hay, rather than after-math hay.

From the Genesee Farmer.

REMARKS ON THE CULTURE OF PEAS.

Crops of secondary importance are of course deserving of less attention than those which are primary; such as, in consequence of a limited market, do not readily command cash, are not so valuable to the farmer as those at all times in extensive demand. Thus, for instance, the culture of buckwheat and rye are not worthy of so much attention as that of wheat. But when a crop of secondary importance *in itself*, becomes a very useful auxiliary in the cultivation of the most important, it immediately assumes a rank of the first consequence. It is this which renders the cultivation of peas highly deserving the attention of farmers.

It has been long since satisfactorily determined that attemps to make money rapidly from land by close cropping, is the worst economy; and that on the contrary a proper system of rotation, calculated to effect a constant improvement in the soil, is, in consequence of the full and regular crops thus obtained, the best policy even for the time being. Thus an abundant crop of peas followed by one of wheat, would be more advantageous than two successive and inferior crops of wheat, independently of the effect on the land.

The peculiar excellence of peas as a preparation for wheat, is becoming well known. Their additional value as food for fattening domestic animals, especially hogs, renders the knowledge of their proper culture of much importance, and any suggestions therefore upon this subject it is presumed may not be wholly useless.

With regard to the proper soil for peas, it is commonly believed that a poor, or but moderately fertile one, is best; and that the great growth of stalk produced by very rich land, is adverse to the copious production of seed. This is doubtless generally the case, when the larger and taller varieties are sown; in these there is already a strong tendency to the growth of leaf and stalk, which is increased by a fertile soil. But this may doubtless be in a great degree if not entirely remedied, by the substitution for the taller kind, of the early and dwarf varieties, such as Bishop's dwarf prolific and the early Washington. Indeed it is not improbable that much larger crops than have been hitherto obtained, may be raised by dwarf peas thickly sown on fertile ground. Analogous proof is furnished by the fact that much larger crops of Indian corn have been raised in the northern states from the small-stalked varieties, than in the fertile land of the south and west where this plant grows of gigantic size.

An additional advantage from the use of dwarf kinds is early maturity, which is always a very desirable quality in all farm crops, if not at the expense of quantity.

What further experiments are needed and further discoveries are yet to be made in the cultivation of peas on fertile and even on highly manured soils by the use of *lime*, will be evident from the following extract from Dickson's Farmers' Companion:

"It is observed, that the common pea, whether white or gray, cannot be reared to perfection in any field which has not been either naturally or artificially impregnated with some calcareous matter. But it is remarkable, that a soil that could scarcely have brought one pea to perfection, although richly manured with dung, from their running too much to haum, and after blossoming dying away without becoming ripe, if it has had lime applied upon it, is capable, when properly prepared in other respects, of producing plentiful crops of peas ever after."

The best *time* for sowing peas is as early in the spring as practicable. It is not an uncommon practice among gardeners who cultivate peas for the table, to sow them late in autumn, and the first warm weather in the spring brings them up. The chief objection to this practice is the danger of their being destroyed by mice during winter; but this danger would be small in a clean ploughed field, and an experiment in fall sowing may be well worthy of trial, especially as it is an object to do as much of the work of the farm in autumn as practicable, in order to avoid the hurry of spring. The present is the time for such an experiment.

The *pea-bug* has always been found a serious difficulty in the culture of this crop; and as inquiries have been recently made in this paper for a description, the following is given. The insect, (*Bruchus pisi*) is of an ovate form and brownish color, particularly the elytra (or wing-sheaths) which are uniformly besprinkled with specks and lines of a light color, as well as the upper part of the thorax near the joint. The mouth is armed with a pair of serrated forceps, the under part and legs are of a very dark dusky color, and the whole insect covered with fine hair. When the pods of the pea have arrived at the state of maturity sufficient to show the small peas within them, the female deposits her eggs in the evening or on a cloudy day. These soon hatch, and the young larva eats directly into the young pea, and remains feeding on its contents until it changes into a chrysalis, which takes place before the ensuing spring. The perfect insect emerges during the warm weather, generally about the time of sowing peas. They do not generally leave their habitations until after the peas are planted, (unless purposely exposed to the hot sunbeams,) when they creep out and remain until new crops invite them; after they have deposited their eggs they perish. When the peas are green and scarcely full grown, the presence of the worm is scarcely discernible, and does not affect the taste; but when they are quite ripe, there is nothing but a shell enveloping a fat chrysalis. A most remarkable fact is that they never injure the plumula or sprout, for almost every pea occupied by the insect, grows and thrives vigorously notwithstanding nearly the whole of the internal part appears to be consumed. This remarkable instinct is necessary for their existence; for if the seed were destroyed, it would end in the extermination of their race.

Several methods have been proposed for destroying this insect or eluding its depredations. Soaking them for a minute in boiling water, which does not destroy their vitality, has been repeatedly and confidently recommended as an effectual mode for their destruction. But a correspondent in the second number, current volume, of this paper says, "I poured boiling water upon the peas and let them stand till the water cooled. I then poured off the water and commenced sowing my peas, when to my astonishment the bugs were crawling about as lively as ever." He adds that the vitality of the seed was greatly injured, as not one-half of them came up. A better remedy appears to be in always sowing clean seed. But where, it is asked, is this to be obtained? Clean seed may be procured from Canada; or it may be had by sowing a portion of the field very late, or with old peas, for this particular purpose. It appears that this insect disappears from the seed before the middle of the sixth month (June) and consequently sowing later than this time, or not until the following spring, for the purpose of obtaining seed, would be effectual. Of these two methods, however, sowing seed 2 years old is on the whole undoubtedly the best. By this time, the insect has lived out its period, and no danger from it is to be apprehended.

Peas fed to hogs immediately after harvesting are not hurt for that purpose by the bug.

A very convenient way of raising and feeding peas to hogs is to plant successive crops in different fields, and to allow them to be eaten on the ground. At the time the peas are beginning to harden, they will eat the leaves and stalks as well as the seed. This method is particularly applicable to the fattening of large herds upon land which is cheap and where labor is expensive.

As it is desirable to procure the best varieties of the pea for seed, so it is requisite that care be taken to prevent their deterioration. They seem to be peculiarly liable to change—to improvement by proper care, as well as degeneracy by neglect. It has been observed in the culture of the early Washington, that seed from the same origin differs greatly, merely from the management it receives. Genuine seed of this variety may be obtained, which will ripen a week or two later than other seed, also genuine. The quality of early maturity may be greatly increased or lessened, by always selecting the portion first ripe for sowing, or by picking the earliest for the table, and using the remainder for seed. The following statement in the third volume of the Genesee Farmer, by L. Couch, is well deserving of attention:—

"There is no seed that I am acquainted with that will degenerate more rapidly than peas. The process that I have pursued for *two years* with my seed peas, is simply sifting them in a sieve that will let through the small peas and the small seeds of every description, and leave the largest and the best of the peas to sow. By this means my peas have improved *at least twenty-five per cent. in quality.* I think it answers all the purpose of scalding to clean them of the bugs. By sifting them the bug or nit is shaken out of the peas and left with the rubbish, which is given to hogs."

With regard to other points in the culture of this crop, it may be briefly observed—that plaster, as on clover, operates to the most decided advantage; that a clover sod turned over late in the fall, is an excellent preparation for sowing the following spring; that as deep planting is less liable to prevent vegetation than in most seed, when sown upon a light or dry soil, they should always be buried by a shallow furrow of the plough; that when fed upon the ground to hogs, two or three quarts of oats to the acre intermixed, will afford an excellent support for them during their growth; and that by far the best and most expeditious method of harvesting them is by means of a common horse rake. J. J. T.

From the Southern Agriculturist.

ON THE IMPROVEMENT OF SOILS IN SOUTH CAROLINA BY MARL.

Mr. Editor,—I take great pleasure in handing for publication, a communication submitted to the South Carolina Agricultural Society, by Dr. Joseph Johnson, on the subject of marl as a manure. It is one fraught with valuable consequences to the whole state, and particularly the lower sections. All lands in the vicinity of a metropolis become more valuable from proximity to a market, and whatever can restore its fertility, demands great consideration. The community therefore are indebted to individuals who offer the means of effecting such a purpose, and when suggestions emanate from so philosophic and practical a mind as Dr. Johnson's, they demand attention and patient experiment. Many sections of country in the vicinity of Charleston, and particularly along the rivers, contain large beds of marl, and the suggestions thrown out may easily be tested. The fertile soil may be sought (as familiary entitled) to the far west, yet even there its properties are not more enduring that at home, and when we consider the privations of possession, of separation from kindred, early association broken, and loss of polished society, which must be all forgone in seeking a due return for labor, it surely becomes us to secure advantages nature presents at home. Let us listen to those then who lure her treasures from her, and avail ourselves of the blessings she tenders. Let us ascertain and estimate the advantages we enjoy. We will then revel under the shade of our own vine and our own fig tree, and our hearts will rejoice with the endearing recollections of home, around the cherished hearths of our ancestors.

The concurrence of Dr. Johnson in publishing his remarks, was politely granted to the corresponding secretary.

R. W. ROPER.

Communication of DR. JOS. JOHNSON, *to the Agricultural Society of South-Carolina, on the Improvement of Soils by Marl and Lime, &c.*

Charleston, 20*th August*, 1838.

Gentlemen,—Most of you have seen the papers occasionally published in the Southern Agriculturist and other periodicals, on the uses of marl and lime as manures for sandy sour, and exhausted lands. Ruffin's Essay on Calcareous Manures, has no doubt been read, by most of you; but you may not be as well informed, that these valuable manures are found in almost every part of our middle and low country; and on the banks of the Savannah, Edisto, Ashley, Cooper, Santee and Pedee rivers, and on many of the intermediate inferior water-courses.

Mr. Wm. Scarborough, who lived 15 or 20 years ago, on the Lower-Three-Runs in Barnwell District, told me that he had accidentally discovered a bed of marl in digging a ditch, and applied it to his very poor high land, in the proportion recommended by agriculturists. Even in the first year, the benefit was very evident; in the second it was greately increased, and in the third year, the produce of his marled land was threefold greater than it ever had been previous to the addition of marl.

Mr. Morton A. Waring tried it one year only, on a piece of land which he then owned on Ashly river. The produce was increased even in that first year about 50 per cent., but as he then sold the place he did not know whether it had been cultivated in the succeeding years or not.

Mr. James B. Richardson, the present representative from Sumter district in our state legislature, told me that he had procured some fossil shells from Santee river, made lime of them, and applied the lime to some of his old fields, which had once been first rate land. The consequence was, that they became more productive than they ever had been, even when first cleared. Some of you may know of other instances of success, I never heard of a failure where the cultivation was continued.

But practical knowledge is much wanted on this subject; and even if the proportion of marl to each acre recommended by the most approved writers on this subject, be applied to our lands, some difference may be discovered in our soils, or in our marls, or in some other respect.

It is first of all desirable to know whether the marl within our reach, is composed of lime, clay and sand, in proportions which would encourage us to dig and cart it to our old fields. This question will be readily answered by any gentleman acquainted with chemistry. I have analyzed several specimens, and will cheerfully continue to afford every information in my power. All marls effervesce if vinegar be poured on them, and this test is within the reach of every inhabitant, however distant he may be from those who can give more certain and correct information.

It is next desirable to know at what time, and in what quantities, marl should be laid on the fields. These questions I request of your society to have ascertained by the experiments of practical men. I suggest that the time which can be best spared for such works, is the best time. When the crop is laid by in the summer, the marl may be dug out and left to dry in heaps. In the winter it may be carted into the fields, and scattered in the trenches to moulder until the spring, when the plough can do all that is farther necessary. Mr. Ruffin thinks that the best way is to keep one man constantly employed with a horse and cart, all through the year, and that 60 acres may be thus effectually manured in one year, requiring no other or additional manure for 7 or 8 years.*

The quantity required varies from 200 to 300 bushels per acre, according to the quality of the marl and the nature of the land. The cost of manuring would therefore be from $2 to $5 per acre, which I suppose to be cheaper than clearing land, where the wood cannot be sent down to a market. If the returns for this expenditure, equal those reported in Virginia and New-Jersey, the crop will be increased three-fold, say from 10 to 30 bushels per acre. The profit would therefore be increased not only $20 per acre for one year, but as no other manuring is required for 7 or 8 years, it would be at least $120 per acre, returned for $5 expended. If 20 acres be cultivated in corn by one boy and horse, he will make for his owner $500 or $600

* The last words of this passage do not correctly convey the opinions of the work intended to have been quoted. Marl is there considered as a *permanent* manure.—ED. FARM. REG.

per annum, corn being supposed to sell at $1 per bushel. In affording this profit, he would only work at the crop three or four months, all the rest of the year, he might be employed in marling other lands.

So many laborers have been taken off from the cultivation of provisions in the United States, to become the consumers of provisions, while laboring in the construction of Rail-Roads and other public works, that provisions cannot be otherwise than dear, for many years to come. The planter who most successfully cultivates provisions, will therefore be best rewarded, while cotton is at the present moderate rates.

But, gentlemen, there are other considerations of great importance to most of us. Most of us have children, relatives and friends, who have left the state and gone westwardly, to seek for new lands. Many more, distinguished for talents and enterprise and public spirit, may be expected to follow, unless something can be done at home to afford them profitable occupation. The rank of South-Carolina among her sister states, will be diminished in proportion to her diminished population and productions. I trust that something may yet be done, not only to arrest this emigration, and render agriculture more profitable, but to render the number of persons engaged in agriculture, much more numerous than has ever been known, at least in the middle and lower portions of the state. Are not the most of you, gentlemen, owners of uncultivated lands in this portion of the state, for which there has hitherto been no demand, nor any prospect of their being wanted, for cultivation? If by the successful use of marl and shells, the old fields in their vicinity can be increased in their productions, from 10 to 30 bushels per acre, would not the value of such lands be increased in proportion, and would not you, the proprietors, find your property doubled in value by the discovery? Would not all other lands in the vicinity of the marl and shells, although never settled, be improved in proportion with the old fields, and will not the proprietors reap the benefit, whatever that may be?

If you can make it appear to a farmer that he can live with his family in a pine land settlement, enjoying health and every other comfort in life, while he can lay up $400 or $500 per annum, from the work of every one of his family who can plough a neighboring field; are not such men likely to become settlers on these vacant lands, and increase their value? Are they not more likely to settle on these lands, when they ascertain that they may cultivate both a winter and a summer crop in the same year? If these advantages be made known in Europe, are not the skilful experienced peasantry in the north of Italy, in Switzerland, Germany, Holland, Poland, and other parts of Europe, likely to collect in this part of our state, and form a population of hardy yeomen, who would quiet all apprehensions of a domestic nature? With such prospects and probabilities, is it not worth our while, to set on foot a series of experiments, for the purpose of ascertaining how far the marl and shells found in South-Carolina, may be made to increase the agricultural productions of the country?

Lime and marl are the most durable of all manures; but the latter, in particular, requires about three years to perfect its influence over the land. It will therefore be necessary to continue the experiment at least three years in succession; it may also be expedient to manure and cultivate a new piece of adjacent ground each year, by way of testing what had preceded.

With much deference, I propose that your society offer a premium for the best series of experiments with marl found in South-Carolina, on a stated quantity of sandy land, and continued three years—the quantity of marl applied to each acre, and the productions of each acre being distinctly reported to the society, with any other circumstance deemed important by you.

The same premium for the same experiments on clay land.

The same premium for the same experiments with unburnt, pulverized or mouldering shells, or loose limestone, both on sandy and clay lands.

The same premium for the same experiments with lime burnt from shells, or from loose limestone, both on sandy and clay lands.

I beg leave to submit these suggestions for the consideration of the Agricultural Society, subject, of course, to any amendments or alterations that they may think expedient. Their greater knowledge and experience must dictate.

I am, very respectfully,
Your most obedient servant,
Jos. Johnson.

To the President and Members of the Agricultural Society.

From the Southern Agriculturist.

GRASSES, ETC. FOR SHEEP.

Mr. Editor,—As your valuable work is open to all subjects connected with the husbandry of our country, and more particularly this southern portion of it, I beg leave to occupy a small space. The growing of wool does not much interest us at present, but the time is coming when it may be necessary for us to make every edge cut. Whether so or not, there are always among us those who are found of good and sound mutton, and many who are deterred from raising sheep by fear of the rot, and other disorders. My experience may remove a portion of that fear. I take no more than ordinary care of mine in winter, but I observe in the pine barren where they pasture, a species of creeping pepper grass of which they are very fond. It comes up early in February, and dies in the summer. The stimulating warmth of this food, preserves them in health, and keeps them free of the rot, and other diseases so fatal to sheep, in cold rainy seasons. Those who have the pepper grass, and desire to raise sheep, should encourage the growth of it. There are other plants and grasses, which being pungent, will answer eqally well, and of which sheep are fond. Among them are mint, penny-royal, and parsley. Satisfied with my spontaneous growth of pepper grass, I have not cultivated either of the last mentioned aromatics, but I think their having a good effect on sheep cannot be doubted. I would advise cultivation of the pepper grass however, in preference, but only because it is more proper and natural to recommend more highly what I *know*, than what I only believe, no matter how confidently. It is certain however that sheep take freely all the plants I have named. If this communication instructs but one individual, I shall be happy in having done some little, towards advancing the husbandry of my native state.

Edgefield. A FARMER.

For the Farmers' Register.

ROUGH FIELD NOTES.

No. II.

Philadelphia and Reading Rail-Road.

There is no work in Pennsylvania more interesting, or, as far as finished, better executed than this. For several months the navigation of the Schuylkill improvement is closed by ice, and great difficulty is experienced in transporting coal from the extensive coal region of Pottsville, and that section of the state, to market. To remedy this evil was the Philadelphia and Reading railway projected. When completed, it will not stop, as its name would indicate, at Reading, but will extend to Pottsville, a distance of 93 miles, and will there connect with the rail-road from that place to Sunbury, and also with the numerous little roads radiating from Pottsville to every coal mine in the neighborhood. When this road shall have been finished to the coal region, the amount of transportation it will do will be immense.

From Philadelphia, to a point opposite Norristown, 18 miles, the road is yet unfinished. The traveller, for the present, leaves Philadelphia on the Norristown rail-road, and, at its termination, crosses over to the Reading road, which is completed from that point to Reading, a distance of forty miles. Between Reading and Pottsville, ground has just been broken; but, from the energy and success with which this great work has heretofore been prosecuted, there is no doubt but that it will steadily progress till completed.

This road all the way pursues the valley of the Schuylkill, being located on the southern side for thirty miles from Philadelphia, and then crossing to the northern. With a few exceptions, it conforms to all the windings of the river, and its location partakes of the same general nature as that of the Baltimore and Ohio rail-road along the valley of the Patapsco, except that the bends of the Schuylkill being generally less sudden and the valley wider, more gentle curves have been obtained throughout. There is no curve between Philadelphia and Reading with a radius less than 950 feet, and, with one or two exceptions, the curves have radii as much as 2000 feet, or more. The hills sometimes encroach on the river, confining the roadway, and causing either deep side-cutting, oftentimes through rock, or expensive walling on the river side. Near Phœnixville, the Schuylkill makes a circuitous bend of three miles, and returns to within half a mile of the place from which it set out, forming a bold promontory one and a half miles long, and only half a mile across the neck. To save the three miles of distance, and, at the same time, to avoid much bold curvature, it was determined to tunnel under this neck of land, which is a spur from the main ridge. This tunnel was commenced in 1835, and has been successfully carried through. It is the greatest work of the kind in America, and no man ought to visit Philadelphia without going to see this triumph of art. It is 1932 feet long, 19 feet wide, and 17 feet high, with an elliptical arch. It is cut through a dark-colored graywacke slate, from which it derives its name of "Black Rock tunnel." It was excavated from both ends as well as from six vertical shafts. These shafts are eight feet in diameter, and were sunk in pairs to enable the miners the better to keep the true line of direction. The deepest shaft is 140 feet deep. A true and accurate line has been obtained through the tunnel for the rail-road, showing the accuracy with which it was excavated, and the greatest care and attention on the part of the resident engineer. The cost of the shafts, per cubic yard, was $20, and of the tunnel itself, $5. The whole cost of this tunnel was about $170,000. On the first division of this road, there is also another tunnel, about 900 feet long, not yet completed: and it is more than probable that there will be another near Port Clinton.

Immediately at the far end of Black Rock tunnel, and on a line with it, is a handsome bridge of hewn sandstone, across the Schuylkill, by means of which the rail-road crosses to the northern side of the river. This viaduct has four arches, each with a span of 72 feet, and a rise of $16\frac{1}{2}$ feet. Each arch is the arc of a circle, and contains 53 ring-stones, which measure 30 inches in depth. The road-way is $16\frac{1}{2}$ feet in the clear between the parapets, which are of sandstone, 2 feet wide, and project two feet above the road-way. The piers are not what are termed abutment piers, being only eight feet thick. The wings of the abutments have a radius of $18\frac{1}{2}$ feet, and terminate by steps descending to the surface of the ground. The execution of this costly bridge is good, but the architectural effect is not pleasing. The very slight projection of the pilasters which go up from the piers, and the nicety with which the material has been cut, give a delicacy of appearance altogether unbecoming a structure of this nature. The arches, too, springing at an elevation of only six feet above ordinary water, would have looked better had they been elliptical, instead of circular, particularly if the faces of the piers had also been slightly curved. The Thomas viaduct across the Patapsco on the Washington branch rail-road, produces a much finer effect, and is not surpassed by any similar work in our country. The Thomas viaduct is built of unhewn granite of the best quality. It is 660 feet long, 66 feet above the surface of the water, and consists of 8 circular arches of 60 feet span each. Each abutment is 60 feet long, and terminated by strong buttresses on each side. Heavy pilasters also go up from every pier. The road-way is 22 feet wide, and is confined on either side by a heavy iron railing, $3\frac{1}{2}$ feet high on the top of the parapet, which is $2\frac{1}{2}$ feet wide. The whole work presents the appearance of great strength and stability. The cost of this bridge was $120,000. It is worthy of note, that this immense bridge is built on a curve, with a radius, to judge by the eye, of 2800 feet.

In the construction of the bridge across the Schuylkill, the necessary precautions were not taken to guard against ice, which frequently comes down that river in great quantities. The piers below high-water-mark should have been built on the upper side circular, and with a slope of at least 45°, like the piers of the Alexandria aqueduct. Instead of which, however, the piers are built perfectly perpendicular. Since the bridge was finished, they have placed just above each pier what they call ice-breakers, (of wood,) but which forcibly remind one of chicken-coops of the present day, and which I have no doubt equalled in expense, the additional cost of the piers, had they been constructed in the proper manner in the beginning.

At the east end of Black Rock tunnel, is a long rock cut, 30 feet deep. The effect of passing rapidly in the train through this cut, the walls of which stand almost vertical, then through the tunnel, which, notwithstanding its 6 shafts, is as dark within as midnight, and dashing across the bridge to the opposite side of the river, with the sudden transition from darkness to light, all in a moment, can hardly be conceived.

As is generally the case with all roads located in the valleys of rivers, on this a great number of bridges of various sizes are necessary for crossing the many tributaries of the Schuylkill. The principal stone structure has been already described. With that exception, for all spans exceeding forty feet, the lattice bridge is used. It is worthy of note, that all the bridges of this kind, notwithstanding the short time the road has been in operation, have settled between the piers. This is owing, I think, to the fact, that they are built for a double track, and that only one has been put down and is in use. The consequence is, that every time a train passes, at least three-fourths of the whole weight is thrown on one side of the bridge, or one set of lattice. This evil may be remedied by a third set of lattice between the two tracks, thus making, as it were, a separate and independent bridge for each track. This additional lattice may be put in, at not much additional cost; and that it is necessary when two tracks are required, is sufficiently proven by the lattice bridges, not only on this road, but throughout the state. This settling has taken place to so great an extent on the Danville and Pottsville railroad, that they are now putting wooden supports between their regular piers.

The Reading railroad was graded throughout for two tracks, but only one has been as yet laid. The superstructure consists of wooden sills, (principally of oak,) 7 × 8 inches, bedded 3 feet 3 inches apart, on beds of broken stone 14 inches deep. Trenches are first dug at the proper distances apart and well rammed. The broken stone is then put in, in three different layers, each layer also being well rammed. On the sills is fastened the T rail, weighing 45 lbs. to the running yard. The rails are 19 feet long, and only rest on cast-iron chains at their extremities. To the intermediate sills they are merely fastened by spikes with *catch* heads. The superstructure was not laid till the banks had had a winter to settle, and is now in admirable adjustment.

There is no grade between Philadelphia and Reading over 18 feet to the mile. This is a most striking feature in this road. An engine without difficulty, will carry 200 tons down to Philadelphia. The fuel used is *coke*, obtained from the gas works. It is found to answer very well. On the Baltimore and Ohio road, anthracite coal is used. Two tons are found necessary to go from Baltimore to Harper's Ferry. An experiment or two had been tried with bituminous coal, and 1 ton 14 cwt. were found to do the same work.

The Philadelphia and Reading railroad passes through a highly interesting country. The scenery of the Schuylkill is not so picturesque as that of the Potomac, but the neat farms and farmhouses, and frequent villages, furnish employment for the eye of the traveller. Just below Reading, the river breaks through the first ridge of hills, under the name of "Never-Sink Mountain."

The cost of this railroad and all its fixtures will be $45,000 per mile.

Danville and Pottsville Railroad.

This road extends from Pottsville, at the head of the Schuylkill improvement, 40 miles to Sunbury, on the Susquehannah. Its object was to transport coal from the anthracite coal region, through which it passes in either direction, to the Schuylkill, or to the Susquehannah. The construction of this road was premature, and the consequence is, that the 12 miles next to Pottsville are not in use, that the next 8 miles have never been finished, and that only 20 miles of it from Shamokin to Sunbury are now used. It is supposed, however, that by the time the Reading railroad is completed to Pottsville, that the completion of this work will be loudly called for.

This road necessarily crosses the dividing ridge between the Schuylkill and Susquehannah, and the inclined planes by which it rises and falls from the summit of the Broad Mountain constitute the most remarkable and interesting feature in this work. Between Pottsville and Girardsville, a distance of only 12 miles, there are not less than six inclined planes, 4 ascending and two descending.

Plane	No.	1	rises	176	feet	in	600	feet
"	"	2	"	200	"	"	850	"
"	"	3	"	130	"	"	600	"
"	"	4	"	130	"	"	800	"
"	"	5	falls	345	"	"	1600	"
"	"	6	"	150	"	"	900	"

In passing over these planes on horseback it is with difficulty that the horse can be led up and down them. All these planes except No. 5 have the same angle of inclination throughout. No. 5 is gradually curved, beginning very precipitously at top, and by degrees becoming more and more gentle towards the bottom. They all have curves approaching within a short distance of their foot, which is decidedly objectionable. The planes have double tracks, and the same sills extend under both. Friction rollers are placed every 25 feet. At the head of plane No. 5, which has a most imposing appearance, is a stationary engine. From Pottsville the road follows the western side of a rugged and precipitous ravine for eight miles. There is much heavy rock cutting and stone walling. Plane No. 4 brings you to the top of Broad Mountain, a bleak and inhospitable region. The eye in vain looks around for any trace of cultivation. For two miles the road keeps on this mountain and descends by plane No. 5 into the valley of the Mahanoy. Between Girardville and Shamokin, the link yet incomplete, one or two inclined planes will be required.

Shamokin is a small and new village, situated at the head of a creek of the same name, which empties into the Susquehannah just below Sunbury. Its origin was the coal trade, and all its inhabitants are colliers and miners. From this place to Sunbury 20 miles, the rail-road winds down the valley of the Shamokin with generally easy curves through a country, the last half of which is highly cultivated. Grading on this portion is remarkably light, for a road in the midst of mountains. As the road approaches Sunbury it crosses the Shamokin three times by handsome lattice bridges, which, however, have settled very much. I have rarely passed through a region so wild and dreary as that between Pottsville and Shamokin. I was particularly struck with the beauty and grandeur of the hemlock tree, which abounds along the road. When young it contrasts well with, and when old seems well suited to, the rugged cliffs it overshadows.

Just at the head of inclined plane No. 1, is a small tunnel 800 feet long, 10 feet wide and 11 feet high, with a circular arch. It was excavated entirely from the two ends. The material excavated was earth with a small quantity of coal. The sides are walled with stone, and the top arched with brick. The whole cost was $26,000.

This road has been graded for two tracks, but only one has been laid. The superstructure consists of heavy sills bedded every five feet on broken stone, into which is keyed a wooden rail 9×5 inches. The iron plate measures 2 by $\frac{5}{8}$ inch.

From Pottsville to Girardville, 12 miles, cost $400,000. From Shamokin to Sunbury, 19 miles, cost $180,000.

PROCEEDINGS OF THE FREDERICKSBURG AGRICULTURAL SOCIETY.

[Published by request of the Society.]

Tuesday, Nov. 8, 1838.

At 12, M., the society was called to order—James M. Garnett in the chair, and Robert B. Semple, Secretary.

This was a called meeting, for the purpose of reviewing the report of the revising committee on the constitution and by-laws. Report was made through the chairman, Wm. P. Taylor, asking (for reasons therein stated) further time for the committee to discharge its duties, which report was accepted, and the society adjourned.

Annual Meeting—Nov. 9.

The society was called to order by the late secretary, when, on motion, the rule requiring the election of officers by ballot, was suspended, and the society proceeded to the election of their officers for the ensuing year.

On motion of James Richards, James M. Garnett was unanimously re-elected president. George Hamilton having declined a re-election, Francis W. Taliaferro was elected 1st vice president, and Wm. P. Taylor, 2d vice president.

Robert B. Semple (the late secretary) asked to be excused from the further duties of secretary and treasurer, when, at his consent, he was on motion, appointed secretary and treasurer, *pro tem.*

The society then proceeded to vote upon the admission of new members, and the selection of committees, preparatory to the show and fair, and at 12, M., adjourned to witness the exhibition.

Afternoon session.

James M. Garnett in the chair, when the several committees reported.

The committee on stallions, jacks and mules, report—that they examined two stallions, one owned by Mr. Taylor, and the other by Mr. Alcocke. Both horses were in bad condition, but they award the premium to Mr. Alcocke's horse, Corsair, as they consider him the best looking horse of the two.

They also report—that they examined a jack, the property of Mr. Thomas Rowe, of Caroline, to whom they awarded a premium of $10.

They also report—they examined a very fine mule colt of Mr. John C. Browne, two years old, for which they award a premium of $5.

John H. Lee, *Chairman.*

The committee on mares, colts, fillies and riding horses, have performed the duties assigned them, and beg leave to submit the following report: They award the premium for the best colt to Mr. George Morton's Truffle, two years old last spring. They award a premium for the best brood mare to Mr. Robert Wallace's mare, by———, which had a fine colt at her foot, by Priam. They award to Thomas Chandler a premium for the finest riding horse, though this was not a bloodless victory—it being hard to decide between his horse and a fine sorrel owned by Mr. P. B. Winston, of Louisa—all of which is respectfully submitted.

James Richards, *Chairman.*

The committee on beef, sheep and mutton, beg leave to report—that they award the premium on mutton to John B. Gray, of Stafford, and for the best grass-fatted beef, being the only one exhibited, (although a very fine one) to Zephaniah Turner, of Rappahannock county. For the best fatted work ox, to Lewis Shumate, of Fauquier county.

George Rowe.

The committee on bulls and milch cows, award the premium for the best bull, (half Devonshire,) to Mr. Hay Taliaferro, of King George. Mr. Green exhibited a fine milch cow, but having no pedigree, the committee did not award a premium.

R. T. Willis, *Chairman.*

The committee of agricultural implements, report—that the implements exhibited were a cultivator, an ox-yoke, a hand-drill, and a cutting-box. The three first, by Mr. James M. Garnett, and the last, an instrument made at the Fredericksburg foundry. These implements were not offered for premiums, and were not tested by actual trial, and therefore none is recommended; but they think proper to say that they appear to be well adapted for the purposes intended. The cultivator is stated to be a good instrument for opening a furrow, for planting, as well as for the culture of corn, the ox-yoke is reported to be the one always used in Spain; and the hand-drill seems to be well calculated for sowing almost any kind of seed or grain upon land nicely prepared and pulverized. They recommend the trial of these instruments, and also of the cutting-box. The model of a coulter was also exhibited by Mr. Taliaferro, which seems to deserve a trial; but, in this case, as well as the others, the committee had no opportunity of testing its value.

WM. P. TAYLOR, *Chairman.*

The committee on flour, report—that they have examined the flour exhibited to them, and award the premium to R. T. Willis, of Orange.

HUGH SCOTT, *Chairman.*

Essays on agriculture were read by Dr. Wm. Browne, Wm. P. Taylor, and Robert B. Semple: when the society adjourned, to meet to-morrow at 10, A. M.

Saturday morning, Nov. 10.

At 10, A. M. the president took the chair. On motion of Wm. P. Taylor, JOHN S. CALDWELL was unanimously elected secretary and treasurer of this society. The following resolution was adopted: Whereas large amounts still remain due upon the books of this society—

Resolved, That the treasurer be directed to draw off the accounts of delinquent subscribers, and forward them to the deputy sheriffs of the counties in which they respectively reside for collection, allowing such commission as he may deem proper, not exceeding 20 per cent.

After the adoption of other resolutions of a private character, the society adjourned to the town hall to witness the exhibition of domestic manufactures, and to hear the president's annual address.

Afternoon session.

The society met at 3 P. M., the president in the chair, when the report of the committee appointed to examine domestic manufactures was read.

The committee reported that they had discharged the duties assigned them. They regret that the exhibition has been more indifferent than they have ever before seen it. There were fewer articles exhibited, though those that were shown, were of very superior quality. Among those deserving a premium, were the following:

For the best yarn counterpane, L. V. Stevens,	$3
For the best cotton ditto, Mrs. Wm. Rothrock,	3
For the best yarn stockings, Miss Tally,	1
A discretionary premium was awarded to Mrs. Hunter, for sewing silk and a pair of silk stockings, manufactured by herself, of	5
A discretionary premium to Miss A. E. Eliason, for silk stockings,	2
For rug, to Mrs. Wm. Pollock,	3
Mrs. Stevens, for Scotch plaid,	3

The committee examined a specimen of brooms, from the factory of Hunt & Browne, and think them superior to any thing of the kind they have ever seen, and justly entitled to a premium.

The domestics exhibited by the woollens factory of Fredericksburg are recommended as a useful and superior article for servants' clothing.

A carpet was exhibited by Mrs. John Hart, of Fauquier, manufactured of cotton. It was very superior of its kind; but as it was not exhibited for a premium, the committee therefore declined to award one.

The committee further report—that they have examined three suits of clothes; all of which were of superior quality, and displayed great skill in their manufacture. Whilst the suit worn by Mr. Eliason commanded the admiration of the committee, yet, they being dyed and dressed at the fulling mill, placed them in the esteem of the committee out of the rules of the society. The committee, therefore, award the premium to Joseph Sanford.

WM. C. J. ROTHROCK, *Chairman.*

The committee on butter, award the premium to Miss Nelly Lee, of Orange.

WM. JACKSON, *Chairman.*

A communication was read from Turner H. Ramsey, tendering an annuity of $15 towards the payment of premiums, additional to his annual fee as member of this society. The offer of Mr. Ramsey, was accepted, and the thanks of the society tendered him.

On motion of George Hamilton,

Resolved, That the secretary cause to be procured, a book, in which each individual now a member, or who hereafter may become one, shall register his own name, the date of his becoming a member, and the county in which he resides.

On motion of Wm. P. Taylor,

Resolved, That the annual subscription of each member of this society, on and after the next fall meeting, be $3.

On motion of James M. Garnett,

Resolved, That the Agricultural Essays of Messrs. Browne, Taylor, and Semple, read to this society yesterday, be forwarded to the Farmers' Register, with the request of the society that they be published in that journal.

Resolved, That the proceedings of this society, with the president's address, be published in the Herald and Arena, of Fredericksburg, and the Farmers' Register.

The thanks of the society were, on motion, tendered to the president and secretary—and the society adjourned.

JAMES M. GARNETT, *Pres't.*

R. B. SEMPLE,
Sec'ry. & Treas'r. pro tem.

From a Foreign Journal.

THE MOON.

In the last number of the Monthly Chronicle, we find some statements drawn from astronomical observations, which must be quite new to those who have hitherto supposed this planet to be inhabited by animal beings. The most powerful telescope ever yet constructed does not enable us to see distinctly an object whose visual magnitude is so small as one second, corresponding to a mile on the surface of the moon. It therefore follows that an object, say a town on the moon, measuring a mile across in each direction, would be too small to be discerned by any aid which telescopes have yet supplied. "If the moon be examined," says the writer, "for any length of time with the aid of the most ordinary telescopes, the observer cannot fail to be struck with the unalterable character of the outlines of light and shade upon the surface. These are distinct and well defined, that they may be delineated with great exactness;

and a map exhibiting their appearance at any one time will continue at all times to exhibit that appearance with the same fidelity and precision."

The first inference which he draws from this circumstance is, that the same side of the moon is always turned toward us, and as she turns round on her own axis, in about twenty-seven days and eight hours, the Selenites, or inhabitants of the moon, as denominated from the Greek word 'moon,' must have 328 hours daylight, followed by 328 hours night. The next is, that there are no clouds suspended around her; and a third inference, drawn from other data, is, that there are no indications whatever of seas and water in the moon; and if there is any atmosphere at all, it must be a thousand times less dense than that of the earth. It would require a perfect air pump to produce such a degree of rarefaction under a receiver, and such an atmosphere would, as far as regards all the phenomena of animal and vegetable life, be a vacuum. The following description gives a frightful picture of this silvery orb of night:

"The character of the entire surface of the moon, so far as telescopic power has made it known to us, is just what might have been expected in a world deprived of air and water, and of the tribe of beings to whose life these are necessary. This most inhospitable planet exhibits a wide waste of surface, diversified by nothing but its lofty mountains and cavernous valleys. Chains of mountains and insulated hills are spread over every part of the surface, and lift their menacing and precipitous sides frequently to the height of five perpendicular miles. In many places huge masses of earth spring directly from the plain and carry their peaked summits to the altitude of twenty thousand feet. Nor is the extent of the base of these stupendous eminences less astounding that their heights. The diameters of the bases of several detached hills of this kind, which measure five miles in height, vary from twenty-four to forty-six miles.

"But the circumstance which deprives the moon's surface of every trace of analogy with that of the earth, is the enormous circular cavities which are found in almost every part of it. Some of these caverns are four miles in depth and forty miles in diameter. Their edge is generally defended by a high natural wall. Frequently a conical mountain rises to a considerable height from the bottom of this dark circular hole. The top of this cone is rendered visible when the rays of the sun fall directly into the cavern. This internal conicle mountain has sometimes a circular cavity in its apex like the crater of a volcano.

"The provision which gives to the several planets the grateful returns of the seasons is denied to the moon, and accordingly not a trace can be discovered on her surface of the slightest variation which can be ascribed to change of season.

"If, then, the moon be the habitation of living things, they must be constituted with functions very different from all those which characterize the animal and vegetable kingdoms of the earth. In the absence of atmosphere, the Selenites cannot of course be respiratory animals. Sound, which depends on air for its production and conveyance, there can be none. Speech and hearing would therefore be useless faculties.

"No azure firmament offers its mild tint to the eye of the Selenite. The blue of our sky is the proper color of our atmosphere. In the absence of an atmosphere, the firmament of the moon is one eternal and unvaried black, through which the glowing orb of the sun holds its solitary way, vainly endeavoring to diffuse brightness beyond the edge of his own disc. On the arid and ungrateful waste beneath, his genial rays fall in vain —no atmosphere is present to collect, retain, and diffuse their warmth; and if they fail to sustain animal and vegetable life on the summits of our Alps and Andes, merely because of the rarefied state of the atmosphere at those heights, how much more ineffectual must they be in the absence of any atmosphere whatever.

"Seeng, then, that while we find on all the planets the same provisions to fit them for the dwelling places of creatures like ourselves, and those provisions supplied in the same manner, and to the same extent; and, on the contrary, finding all of those arrangements, without one exception, denied to the moon, we must, in the absence of any direct evidence on this question, come to the conclusion that our satellite is a barren uninhabited waste, playing doubtless some necessary part in the creation, but not the higher one assigned to the earth and planets; that it is, in fine, a desert rock, resting its head in the wide ocean of space, unappropriated to and unfitted for the resting place of any living thing.

For the Farmers' Register.

LEGISLATIVE AID TO AGRICULTURE.

No. I.

Two years have now nearly passed since the advocates for legislative aid being given to agricultural improvement have ceased their previous and earnest efforts for that great object. It was not that the object sought had lost any value in their estimation; or that they did not still think that its attainment was imperiously required for the resuscitation and continued prosperity of the great and general interests of Virginia. But their arguments and petitions had met with no favor from the legislature; and, indeed, scarcely any response, or appearance of hearty concurrence, from the great body of the agriculturists of the country. Under such discouraging circumstances, the most ardent and zealous advocates for governmental aid to agriculture, had no choice but to cease their efforts.

But circumstances of recent occurrence have served to rekindle hope, and to urge to renewed efforts. The commercial convention, which lately held its session in Norfolk, included this subject among the necessary elements of the commercial prosperity of the commonwealth; and *unanimously* approved the report and resolution of the committee on this subject, (which was published in the last No. of the Farmers' Register, p. 570,) and directed committees to present and sustain those views before the then approaching sessions of the legislatures of Virginia and North Carolina. The highly respectable body which directed there proceedings, though called together, and acting mainly, to aid the resuscitation of commerce, was nevertheless composed principally of delegates from the country, who belonged exclusively to the agricultural interest. And the delegates from the towns, even if not directly or exclusively members of the agricultural interest, were sufficiently identified with it to render their unanimous decision on this question a strong indication of the opinion of the intelligent community.

Under these favorable auspices, then, this all-important subject will again be brought before the legislature of Virginia; and all private individuals who have heretofore labored for the object, and all who heartily wish its promotion, are called upon to lend their countenance and aid to the recommendation of the convention. For the purpose of aiding in this work, it is the design of the writer to present his views at some length, on the proper subjects for legislative action, in aid of agricultural improvement. In these views, there may, perhaps, be nothing which has not already been stated in the earlier volumes of this work. But without claiming the merit of originality, for the present article, he hopes to be useful if merely confining his labor to digesting, and presenting at one view, the opinions and arguments which are scattered so widely, that no reader, perhaps, remembers, or will take the trouble to refer to them elsewhere.

Before entering upon the consideration of any particular means of aid to agricultural improvement, it is proper to premise that all which are sought, all which are considered legitimate and proper, to be afforded by government, will come under a single head—that of INSTRUCTION, or the collecting and communicating knowledge on agriculture. All means which will aid instruction are good, however they may differ in their degrees of value; and all which will not aid instruction, will be either useless or injurious.

First, let us consider the *right* of the legislature of Virginia, to aid agricultural instruction, and the *expediency* of the exercise.

It is not the legal or constitutional right or power of the legislature, that any one will question. On that head, there is no doubt. The denial of right will only be made on the ground of its being an unsuitable, improper, and unnecessary exercise of legislation. It is on this more extended ground that the question of right will be considered.

Adam Smith, the great head of the free-trade school of political economists, the highest, and deservedly the most venerated authority for restraining (on the score of policy,) all useless legislation, limits the proper action of government to three subjects only. These are 1st. the maintaining of justice between the individuals of the nation governed, and between the nation and foreign powers; 2ndly, the construction or facilitating of great works of acknowledged value, but which are too extensive or costly, for private individuals to execute, either singly, or by agreement between many; 3rdly, the providing for necessary education of the people, in such cases as there are either no sufficient means, or no sufficient demand on the part of the people to secure the supply. It will be admitted that these limitations are abundantly close, to cut off all improper subjects of legislation; though neither these, nor any general limitations, can prevent the improper treatment of legitimate and proper subjects. In the propriety of these close restrictions we fully concur, and claim nothing for agriculture which cannot be clearly deduced from, and be found authorized by these strict rules.

Few, if any, legislators, or private individuals, will deny that it is a right and duty of government to give proper and judicious aid to the general, or literary education of the people, in such cases as the object cannot be attained without the interference of government. Where private and general demand and supply are so established, that such interference or aid is not wanted, then, as in all other cases, the free-trade doctrine correctly and fully applies, and any interference of government would not only be useless, but absolutely hurtful to the cause of education. Thus, the advantages of ordinary schools for teaching the English and even the Latin and Greek languages, are sufficiently appreciated in this country to insure a supply of schools and of teachers; and the government is not only, therefore, not required to furnish such schools, and to pay their teachers, but would certainly do harm to education by every such attempt. But for the highest branches of scientific instruction for those who have by their own efforts gained the necessary previous knowledge, there is not sufficient appreciation, or demand, to ensure a supply of instruction, or of persons competent to instruct; and neither do the most ignorant (in this or any country,) enough prize the elements of the lowest instruction to be willing to pay the smallest pittance for having their children taught. Therefore our government properly and wisely (in design at least, if not in the mode of execution,) interferes in both these cases, and aids, or attempts to aid, both the highest and the lowest branches of education and learning. The necessity of education to all classes is justly considered in regard to the general weal, and not as conferring a boon or benefit on each individual aided. It is highly important to the public interest and public morals, that no citizen should be entirely ignorant of letters; and the state endeavors (though but to little purpose,) by an enormous annual expenditure, to prevent as much as possible that great national evil. It is also highly important that there should be the means afforded within the borders of Virginia, for acquiring the higher branches of scientific education—without any benefit of which a community would soon sink into brutish ignorance—and which, without such means at home, would be gained but by very few, and those, at great expense, and by going abroad. To prevent this great evil, this incalculable waste of money and of intellectual value, the state wisely offers to all those who will prepare themselves at a great previous expense of their own, the means of making themselves still more useful and valuable as members of the commonwealth. These are the true principles and proper grounds for the aid of education by the government. The education conferred may operate very beneficially and profitably to the individual so instructed; but it is not with that view, that it is, or ought to be given, but to render the individual of greater value to his country.

These views are as correctly applied to agriculture as to literary and scientific education; but in a far stronger manner, both as to the existing deficiency of means for gaining knowledge, the great necessity for such means, and the certainty that every gain of profit and income made in consequence of such aid, will also be a gain and profit to the commonwealth. Before proceeding to the consideration of the proper and best means of furnishing agricultural instruction and knowledge, we beg leave to offer an illustration of the particular position just mentioned. The subject taken for illustration, is chosen, not by any means because it is one of the most important to agriculture, and the commonwealth's interests, but, because it is one which now excites much curiosity, and is one on which there is as yet among us but little knowledge, and no practical experience.

Thousands of the cultivators of Virginia have been recently and violently excited by the speculating mania which has raised the price of mulberry twigs to more than their weight in silver, and design next year to commence the cultivation of the mulberry tree, as largely as circumstances permit, with a view to profit from the expected and extensive culture of silk in this country. Many of these persons are directed by sound views, and design to begin and prosecute a regular, and, as we fully believe, when understood, a profitable business. Many others, it is feared, are impelled merely by a wild and groundless spirit of speculation, in sales of plants. But whatever may be the motives, and whether the wise or the unwise may preponderate, and whatever may be the amount of ultimate profit from the new business of silk culture, *this is certain*, that many thousands of dollars, perhaps hundreds of thousands, will be risked, and wasted, in untried experiments and processes, of which all engaged are entirely ignorant; and it will follow, of course, even though the final results may be profitable to individuals, and highly valuable to the state, still, that a large proportion of all the first enormous outlay of expense, will be sacrificed and lost, because of the inexperience and ignorance of the adventurers. Now, if the state had paid the expense of the first experiment, and had spared no pains and cost to have the trial fairly and fully made, by putting to work the best knowledge and skill in the business, with the best means to operate with, then this expenditure would have served to prevent a hundred fold greater by individuals, and have turned to profit all that will now run to loss. If a mulberry nursery and cocoonry had been established at the public expense, upon the best known plan, and making trial of every supposed improvement, then the problem of the amount of products and of profits would have been already placed beyond question. Such an establishment would also have furnished the best possible school of practical instruction in the business. Every individual who was inclined to commence it, would visit it, and see, not the mere first trials of novices, but all the processes, and the general procedure, of the best and oldest establishments of Europe, as well as trials of every newly proposed improvement. The income of the cocoonry, perhaps, would have paid the greater part of the expense—possibly the whole; but even if the excess of expenditure over income had been $10,000, it would still have operated as a great pecuniary gain to the whole commonwealth, as well as to the numerous individual adventurers. And though this subject, taken for illustration, is a novel and peculiarly strong case of general ignorance, great risks, and consequently great losses, which the state might have prevented at little cost, and to great ultimate profit, yet the like application might be made to various separate and important branches of agricultural industry, as well as to general instruction and diffusion of knowledge on the whole subject.

If it may be permitted to pursue this illustration still farther, it may be affirmed, that if such a silk business and school had been established in Virginia three years ago, among the other lights derived, the peculiar value of the morus multicaulis, or Chinese mulberry, would have been fully ascertained, and its culture generally diffused throughout the state; and consequently the great enhancement of its market price, and the mad speculations founded thereon, either would never have existed, or, if so enhanced, the sales would have brought millions of dollars to the state, for products which cost almost nothing, instead of draining a vast amount from this state to cultivators abroad.

So far, as to the need for agricultural instruction in general, and its value to all who will profit by its being provided. But even if all this be fully admitted, there will then still be opposed the objection of demagogues and popularity-seekers, "that it is unjust to tax the whole population, for the benefit of a part." Though this miserable substitute for argument is brought to oppose every new proposition for beneficial improvement, it never raises its head in the same cause after being once successfully resisted. In truth, there is scarcely a legislative act of any kind, or tax or requisition, which may not as much be said to be a charge to the many for the use or benefit, or demand, of a few, as would be pecuniary grants for the improvement of agriculture in an agricultural community. The complaint is as absurd and as groundless, as if an individual complained of the injustice of his being taxed to support criminal justice, because he was neither a judge to be honored and paid, nor a felon to be hung. But of all such charges of injustice, that against agricultural aids would have the least color. The agricultural interest in Virginia is so extended as almost to be identified with the community in general—and it is certain, that the former cannot possibly be benefited, except to the benefit of the whole commonwealth. The few, who have no direct or immediate interest in agriculture, are indirectly and remotely, but yet considerably interested; and any burden imposed on them in common with all other citizens, for improving agricultural products, would in a far greater degree improve their interest in agriculture, indirect or remote as it may be.

It still might be contended, (at least by court-yard and muster-ground orators, and office-seekers,) that some agriculturists would derive all the benefits, while others would merely share in bearing the cost of the system. This could scarcely happen upon a proper system of instruction, except to those who would blindly and obstinately continue to reject all light and knowledge; and for such cases it would be waste of all effort to attempt to furnish either aid or remedy.

Next, let us consider the peculiar deficiency and want of agricultural education or instruction.

Agriculture, as a science, has been less investigated by competent inquirers, and is less understood, than any others in general use, and deemed important. As an art, it stands still lower; as the necessary processes, even when judiciously planned and directed, are never *all* executed properly on the farm of the most skilful cultivator; and in most cases, *none* are executed well, and generally all very imperfectly. What would have been the condition of the now admirable and profitable cotton factories of Virginia, if few of their processes were planned, and none executed correctly—if none of the machinery was of the best kind, or in good order, and none of the laborers had skill in their departments? Add to this supposition, that the proprietors, constructors, superintendents and operatives had never seen any better works, and the supposed case is then precisely parallel to agricultural operations in general, and especially to those of Virginia. Every one knows that in the manufacturing business, it is essential to profitable results, that every material element, of general plan, of construction, and of all the daily operations, should be of the best kind known; and no persons would be so foolish and regardless of their interest, as to attempt the business without first buying, at any price, all the benefit of the experience and acquired knowledge of others on the subject, and endeavoring to employ agents and operatives who should be as skilful as those of any other factories. And without such precaution and measures of security, every one would predict that the business would soon come to ruin. Yet the course which all would condemn in this case, as absurd and hopeless, and which would not be adopted by the most careless and improvident proprietors, is precisely like the general, almost universal, condition of agricultural operations. How can it be otherwise? The proprietor usually has either wrong rules of action, or none—the superintendent, or immediate director, is seldom otherwise than profoundly ignorant of the science, if not also of the art of agriculture—the implements are defective—and the laborers unskilful in their use. Yet, under all such defects, which would speedily make any other business bankrupt, agriculture in Virginia, in general, is as safe and profitable an employment of capital and labor, as any other; which alone suffices to prove that it would be very far more profitable and productive of wealth, both to the undertakers and to the commonwealth, if it were possible to add to the productive power all that is offered by knowledge, and all the lights of the experience of the better instructed.

According to the wretchedly defective mode of education in this country, even the sons of the best farmers, and who may be designed to pursue their fathers' business, are debarred from all knowledge of it, until they commence, as proprietors, to bear the customary losses of ignorance and inexperience. If the father is wealthy, the son is kept at school and college until arrived at manhood; and then if he becomes a farmer, he is almost as ignorant of the business as if he had never seen it in operation. Every one, rich or poor, alike commences farming as head of the establishment, utterly ignorant; and the far greater number remain through life, without being much more enlightened. The first losses, of course, fall on the particular individuals who are so illy qualified as farmers; but their loss is also the loss of the whole community; and indeed no other individual, however little connected with agriculture, can miss paying some share of so enormous and permanent a drain from the wealth of the nation.

Having attempted to depict and expose the existing evil, we will now proceed to consider the different means for remedy; the means by which, it is believed, the knowledge of agriculture would be widely diffused and greatly augmented, and its improvement and its profits be proportionately advanced. The institutions which are deemed the best to advance the great object in view would be the following; which might be adopted altogether, or but in part, according to the intention of the legislature to operate either on a large or a small scale.

1. A state Board of Agriculture.
2. County or district Agricultural Societies, to be represented either in the Board of Agriculture, or in a general or State Agricultural Society.
3. A farm for experiments, which will also be a school for practical instruction in agriculture, in each of the four grand divisions of Virginia.
4. Surveys and reports of the actual agricultural condition of the different districts of Virginia.
5. A professorship of scientific agriculture, and its kindred sciences.
6. The establishment of cheap periodical or other publications on agriculture, for general circulation; and cheap school books to supply every pupil reading English; and of which the subjects should relate to agriculture, the mechanic arts, or something useful and instructive in domestic economy, or the ordinary business of the future lives of the pupils.
7. The facilitating and encouragement of agricultural apprenticeships, or practical and manual instruction, on the farms and under the direction of some of the most intelligent and successful cultivators.

Let not the reader, even if a legislator, be startled at the length of this list. It may be limited as closely as may be desired; and one measure alone, and that the cheapest of all, may be carried into useful operation, even if all the others be postponed or rejected. But as we are not legislating, but merely suggesting subjects for legislation, each and all of the measures most likely to aid the improvement of agriculture will be here considered, at more or less length, in proportion to their supposed relative value and efficiency.

Board of Agriculture.

The institution and proper working of a board of agriculture would be the most simple, cheap, and at the same time the most certainly efficacious, of all the means proposed in aid of agricultural improvement. If operating alone, it might produce results much less important than other means; but it could not fail to do some good, and could not possibly do any harm, beyond the small annual cost of the institution.

The best manner of constituting the board, or of selecting the members, would depend upon whether this measure stood alone, or in connexion with agricultural societies. In the former case, the appointment should be by the executive branch of the government; in the latter case, it might be well to give the societies, or their delegates, the power of appointing some of the members of the board. In either case the number of members need not exceed two or at most three, from each of the four grand divisions of the state, or from eight to twelve members in all; and also, howsoever chosen, it may be presumed that the members would be among the most intelligent and best farmers of the state.

A body thus constituted, could, by proper inquiry and examination, draw forth from every region, reports of the condition, the existing advantages and good practices, and improvements in agriculture, the knowledge of which is confined to the narrow limits of their respective small neighborhoods, and which therefore, in each particular case, is hidden from, unknown, and useless to the country in general. Though information so gathered might be but general, loose, and but little satisfactory, compared to what better means might elicit, still, what was gained would serve to sharpen curiosity, and direct inquiry to the sources of more full explanation and instruction.

But a more important operation of such a board would be to examine well and learn the wants of agriculture, which legislative aid could provide for, and remedy; and to report the evils found, and recommend the specific means for relief. The opinions and recommendations of such a body, could not fail to be heard with respect; and there would be ground for hope, that thus, cautiously and gradually, the best of other means would be devised for doing the greatest possible service to agriculture, and consequently to the country at large. The investigations, the experience, the judgment, of the members of a board of agriculture would serve to settle, in the most satisfactory manner, the comparative claims and merits of all other means for aid and improvement, such as the remaining subjects which it is proposed here to examine in succession.

The board should have permission to recommend any thing, but power to enact or establish nothing, unless by special order of the government. Thus it might induce much future good to be done, and it could, directly, do no harm, nor commit the legislature to any undertaking whatever.

The main recommendation (as we fear it may be deemed) of a board of agriculture must not be forgotten—the *cheapness* of the establishment. The annual sessions need not exceed two weeks in length; and the whole cost need not exceed fifteen hundred or at most two thousand dollars.

COMMERCIAL CONVENTION.—CONTINUED.

Report on Direct Trade and Internal Police.

The committee, appointed to report on the subject of a direct trade with foreign nations; and to suggest what legislation may be necessary on the subject, beg leave to report:—

That they find it difficult to illustrate the magnitude of the evils resulting from a system of indirect trade, and will remark, that a full review of the past history of Virginia would better elucidate the subject, than any argument which could be urged by them; but the time of the committee will not allow them to treat this topic as it deserves.

That Virginia has once enjoyed a direct trade, and all the benefits attendant upon it, all will admit. Scarcely a town in the tide-water region but shared the direct trade to a considerable extent, while at present our most important marts are tributaries to the north to nearly their whole amount of business. When they enjoyed the direct trade, our cities, towns, and country were alike prosperous, and emigration did not desolate our land. With the loss of that trade, our small towns fell to ruin, our cities were made desolate, and our population have been fleeing from our borders; while those towns which have obtained our business in other states have grown rich upon our resources, and have increased in wealth, and numbers proportionate to our decline. During the state of colonial dependence, the several colonies were prosperous in proportion to the amount of their surplus production, and their means of consumption, but the reverse is now the case, those who raise the greater portion of the exports and consume most of the imports deriving no profit, but sustaining a heavy loss from the operation.

In spite of the loss and injury sustained by emigration and our perverted system of trade, agriculture has advanced very considerably, and even the tide-water section yields a greater surplus than in the season of the greatest commercial prosperity. But even in this respect, we are not as prosperous as those states that enjoy a direct trade, although their natural advantages are far inferior to ours. This is painfully manifest from the fact that in 1836 the whole assessment value of the lands, houses, &c. &c. of Virginia was but $207,000,-000, a sum less than the assessment value of the real estate in the single city of New York for the same year. Your committee are unable to state the value of the personal estate of Virginia for that year, but perceive that the real and personal estate of the city of New York was over $309,-000,000! The humiliating fact also occurs to your committee, that the value of all our lands and improvements, including valuable city lots, &c. does not exceed on an average, five dollars and ten cents per acre, a price which it is confidently believed might be realised to the United States, were Virginia a territory, and a wilderness, and her lands offered at auction on a liberal credit! Now, if it be considered, that the citizens of other states enjoy almost the entire benefit derived from all the profitable branches of our business, we see strong inducements for our most enterprising citizens to leave us and locate in other states with a view of reaping the profits of that business which ought to be enjoyed at home, and thus to lend their unwilling aid to our farther impoverishment. Experience too clearly proves that there is nothing in our agricultural prospects to stay the progress of emigration in the present state of things; for in all the states, north and west of Virginia, and in all the countries of Europe, the labor bestowed on lands in the way of improvements, adds to their value, and to the general wealth of a state, while with us, if such a hope were entertained, the past would afford a melancholy refutation of its justice. If we look to Virginia and the southern states, and then to the states of Europe, the contrast will be striking. All foreign states enjoy a direct trade, and furnish their retail dealers within their own borders, thereby giving to their own cities and people all the profits arising from negotiating exchanges and furnishing supplies—which is a main source of commercial power placed beyond our reach, so long as we allow those foreign to the jurisdiction of Virginia to pocket the profits of our trade. It is believed that, if Virginia were to convey to the northern ports the value of $5,-000,000, as a gratuity, to be substracted from her means and added to the capital of the north, and yet prosecute a direct trade in foreign and domestic supplies through the medium of our own ports to the extent of the remainder of her resources, she could be far more prosperous than at present. It is evident, that the loss of Virginia, in consequence of the indirect trade, exceeds the profit of the northern merchants who monopolize our business, inasmuch as not only the same profit, which would accrue to the southern importer, must be paid abroad, but the incidental expenses of freight, insurance, travel, &c. must also be added to our detriment.

It appears to your committee, from the best evidences in their possession, that the profits paid to northern cities on merchandise by Virginia, North Carolina, South Carolina, and Georgia, from 1816 to 1836, a period of twenty years, were greater in amount than the public debt of the United States which was liquidated in that time, amounting to $170,000,000, with interest thereon; and had the south retained the direct trade, they believe that the increased value of property in her cities and towns for that period would have nearly reached a similar amount; and, as it is obvious that rich and flourishing cities enhance the value of the property of the entire states to which they belong, every foot of southern soil would have been enriched by that process. It may here be stated, that Virginia and North Carolina do not even enjoy a direct trade with New England, as the greater part of the manufactures and products of that section, which are consumed in the South, are obtained from New York, Philadelphia, or Baltimore, and come to us well laden with the charges of the indirect route. Looking at our present commercial policy in all its results, your committee are constrained to adopt the opinion, that such another instance of self-immolation is not to be found in the annals of the world.

They beg leave further to illustrate the benefit of a direct trade, by stating the fact, that in all civilized states, which enjoy their own business to a respectable amount, compared with their resources, more than a moiety of the wealth will be found to be located in their marts of commerce and business. In all the states north of us this principle will apply with full force. It is true that the trade of many of them is of late becoming indirect, and their present ratio of increase of capital is not as uniform as formerly; yet at this time in Maine, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware and Maryland, either under a system of fair taxation may draw more revenue from its marts of commerce and business than from all other portions of its territory. But this is not the case with Virginia, as the assessment value in her four principal seaports is but about $19,000,000, which is but about one-eleventh part of the value of real property in the state, which is as follows:

	Value of Houses.	*Val. of Lands.*	*Aggregate.*
Richmond,	2,639,344	8,001,540 82	10,640,884 82
Norfolk,	2,188,625	2,704,430	4,893,055
Petersburg,	1,921,494	866,011	2,787,505
Fredericksburg,	233,221	832,897	1,066,118
	$6,982,674	12,404,878	19,387,563 82

We find again that in many of the states of Europe from one third to one half of the population draw their subsistence from the business marts; and in the Atlantic states about one-fifth of the population are thus located; but Virginia is very deficient in her quota, she having but about 49,000 souls in all her towns which have over 5,000 each, (which includes the enterprising but neglected towns of Portsmouth and Wheeling,) our whole population being estimated at 1,300,000 souls; and therefore, whilst the Atlantic states, as a whole, have a business population in the proportion of one to four, Virginia has but about one to twenty-five, and while our agricultural business is capable of sustaining by this ratio, a population in our marts of business of over three hundred thousand souls! It is therefore very manifest that we sustain a much larger business population in other states than in our own, and that the value of real estate in the cities of other states, is great in proportion to the amount in consequence of business which they derive from us. The value of country property in other states is also augmented by the increased wealth and population of their cities, which we sustain to the neglect and ruin of our own.

Your committee find that the British colonies in North America are in an enviable condition compared with Virginia. The Canadas, with an aggregate population less than Virginia, sustain a population in their business marts as great as Virginia, North Carolina and Georgia together, and they have few or no mechanics or artizans, and they look to the mother country for even horse shoes, and horse shoe nails, and the most common articles usually made at home.

In the island of Cuba (which is as convenient to New York, as the state of Alabama,) we find that the whole population is less than in Virginia —and yet we find that its numbers about triple our number of business population, and that the wealth and revenues of her ports is greater than from all her interior, and it is evident that her retail dealers procure their supplies in her own marts.

The same is the case in reference to Jamaica, and it appears evident that if all the retail dealers in those islands were to obtain their supplies in New York, that their present flourishing and prosperous ports would soon be reduced to the condition of our Cobham, York Town, Tappahannock, or City Point, and the destruction of those ports would be ruinous alike to the prosperity and security of the inhabitants of those islands.

Your committee find that there is no state in Europe which has not made a greater proportionate increase in population and wealth compared with their former condition, than Virginia, and the same comparison will apply with full force in reference to all our northern states.

Your committee are of the opinion that the concentration of the trade of Virginia in her own ports for a single year, with the prospect of its continuance to an amount equal to furnishing the supply for the consumption of the people of the state, would produce an increased value of property in that short period to the amount of not less than fifty millions of dollars. This it is admitted looks extravagant, but it must be borne in mind that property is valuable in proportion to the useful or beneficial purposes to which it may be applied. If the country dealers and planters would purchase the amount in our ports which they now purchase in those of other states, it would be found that our present state of agricultural strength would require and support a seaport population of over 200,000 souls. This would triple the surface of our towns, and more than quadruple the actual value of the lands therein. Buildings which are now being erected in other states upon the profits of our business would start with magic enterprise with us; and the money paid for their materials and construction would remain the property of our citizens. Lands in the vicinity of our towns would enhance in value, for lumber and fuel, while agriculture would find a new stimulus in furnishing productions to those who now subsist wholly at our expense, and to the profit of others.

If time would permit, your committee would attempt to demonstrate that the consumption of the state of Virginia, of commmodities, the produce and manufacture of which is foreign to her jurisdiction, is as great as that of the whole United States was, so lately as the year 1790; and will leave to this convention and to history to answer, whether the trade of these United States was considered of such importance as to induce national efforts (which have been successful) to enable the United States as a whole to enjoy equal and reciprocal commerce; and to inquire, is not an amount of trade which was worthy of the concerted action of the United States in 1790, at least worthy of a united and patriotic effort of the people of Virginia in 1838?

Your committee assume that the mercantile profits of export commerce from the state of Virginia is about one-eighth of the profit of the import, including with the import however the furnishing all the varied supplies for the interior. Were we therefore to export our whole productions and furnish at first hands none of our supplies, we should enjoy but one-ninth part of the profits of our business. If this position be correct, it behooves us to place ourselves in the possession of the business of furnishing the tide-water region of our state before we mature large schemes of internal improvement, to confer more trade at our cost on our rivals whom we now see possessed of that which nature designed for us, and of which we can only re-possess ourselves through that reserved sovereignty, which it is our right to exercise by a legal regulation of our internal police.

Your committee find that the evils of an indirect trade are not exclusively felt by the states of Virginia and North Carolina, but by many other states; and when they look at its result, and observe that it is verging towards a commercial consolidation of the whole pecuniary energies of this great confederacy in a single city, they cannot contemplate our condition, but with dismay; more especially when we consider that we pay our rivals one hundred dollars for what costs them about seventy dollars on the average of our transactions; and this is the boon which we obtain in going from home, not to buy supplies, but to buy credit in obtaining them.

On reference to the history of trade in the old world, and of its concentration, your committee are constrained to adopt the opinion, that it is not, nor has it ever been, absolutely free. It has, indeed, ever been subject to legal direction in all civilized societies, and in those not civilized there is but little or no trade to receive the fostering aid and protection of legislation. All the states of the old world have at least one point of commercial monopoly; and it is admitted by political economists, that the trade of an empire will find a point of supremacy within itself for all its large business; and that the smaller trade will, and should be subordinate to such concentration, which is the effect of legislative provision.

This result must be expected under any consolidated government, and it is evident that the trade is subordinate to law, or the seats of business in each nation would not, in all cases, be within herself.

It is urged by many, however, that under our federal system, we must submit to what they call the "inevitable law of trade," which they say is that of consolidation of all commerce at a single point; and such has been the perpetual tendency of the business of the United States for the last forty years. It is also admitted, that this may have been the result of governmental action; but if it be so, it has not been by the design of those who have administered our affairs, but the fault of the people of the states, who have permitted this concentration. It must be observed, that our government is not one of consolidation, inasmuch as the federal government regulates all foreign business, whilst that of each state may regulate its internal concerns as its wisdom may direct. It does not, therefore, appear to your committee, that the trade of the United States will necessarily remain consolidated any longer than those acquiesce in such a state of things, who are impoverished by its consequences. That there is abundant power over this subject, reserved to each state, is evident on reference to the fundamental principles of our government, and to the causes which led to the formation of the constitution of the United States.

That your committee may be sustained in the premises, they present herewith the opinion of that eminent jurist, James Kent, formerly chancellor of the state of New York, which they trust will be received as good authority, sanctioned, as it is, in its doctrines, by the decisions by Chief Justice Marshall, in the case of Brown vs. The State of Maryland, and Gibbons vs. Ogden.

"CHANCELLOR KENT'S OPINION.

Questions.

1. Is the law of the legislature of Massachusetts, passed the 19th of April, 1838, and entitled "an act to regulate the sale of spirituous liquors, constitutional, and consistent with the revenue laws of the United States?

2. In what manner can a violation of the license laws of Massachusetts be carried into the supreme court of the United States?

These two questions have been submitted to me, as counsel, for my opinion thereon, by a gentleman of the city of Boston, who considers himself interested in the inquiry.

Opinion.

1. The act alluded to, declares, that "no licensed innholder, retailer, common victualler or other person, except licensed apothecaries, physicians and others, who may sell spirituous liquors to be used in the arts, or for medical purposes only, shall sell any brandy, rum, or other spirituous liquors, or any mixed liquor, part of which is spirituous, in a less quantity than fifteen gallons, and that to be delivered and carried away all at one time, under a penalty, from \$10 to \$20 for each offence."

The former statute in relation to this subject, of the 20th of April, 1837, declared that no licensed innholder or other person should sell any intoxicating liquor on Sunday, under the penalty of $20; and that if any person should have been three times convicted of a breach of the act, *or of the 47th chapter of the Revised Statutes*, he should be liable to severe specified penalties and punishment. It is to be observed, that the 47th chapter referred to, has twenty-nine sections, and several distinct offences and penalties are declared in it, all relative to the regulation of licensed and selling of spirituous liquors.

I have attentively considered the first question, and I have satisfied myself that the statute of last April, therein mentioned, is not repugnant to the constitution or laws of the United States. I am of opinion, that the statute in question relates to the internal police and government of the commonwealth of Massachusetts, and that it was competent for the legislature to pass it. The government and laws of the United States have no concern with the internal regulations of the states. These regulations belong exclusively to the power and authority of the state governments, and they may pass what sumptuary laws they please in restraint of the interior commerce of the state, and of the manners and habits of the residents therein. All such regulations, however stern they may be, rest entirely on the wisdom and sense of expediency and policy of the local legislature, provided they be consistent with the constitution of the state.

In the case of *Brown vs. The State of Maryland*, (12 Wheaton, 419,) the validity of a state law, in restraint of the importation laws and foreign commerce of the United States, was fully discussed and considered. The doctrine of that case was, that a state legislature could not impose a tax on goods imported, *while the goods were in the hands of the importer, and in bulk*, and that a right to import the article under the laws of congress, and a payment of the duty, carried with it a right to sell it, free of any previous charge, or duty, or tax thereon laid by the state while in possession of the importer. But the case admitted that after the article had been sold, or passed into the hands of the retail dealer, and became incorporated with the general mass of property, it was subject in all respects to state regulation. It seemed to be conceded in the arguments in that case, that a power in the state to control the use of the article after it had passed out of the hands of the importer, would greatly and essentially affect the right of the importer to import, for who would purchase of the importer, if he could not afterwards use and dispose of the article? But this was a consequence that could not be avoided, without going too far in the denial of the right of the states to regulate, in their discretion, the internal commerce of the state. It was admitted by the court in the case of *Gibbons vs. Ogden*, (9 Wheaton 203,) that state inspection laws, health laws, and laws for regulating the internal commerce of the state, &c., were not within the power granted to congress. We may add that the power regulating auction sales, and hawkers and pedlers, and markets, are all within the discretionary power of the state legislature, as much as the power concerning the sale of lottery tickets, or the preservation of the health and morals of the citizens, by interfering with the sale of obnoxious articles. These and a thousand other cases that might be put, all fall within the general superintending discretion of the state governments, as part of their own constitutional control over their own internal trade and dealings, and customs.

I consider this to be the doctrine of the cases of *Gibbons vs. Ogden* and of *Brown vs. The State of Maryland*, both of which were decided under the liberal and sound judgment of Chief Justice Marshall; and I am persuaded that the act of Massachusetts of April last would have been regarded by the supreme court, when they decided the case of Brown, as entirely free from constitutional objection, for that statute does not touch the importer, except very indirectly. It only goes to restrain the retail of spirituous liquors under the quantity of fifteen gallons at a time, and it evidently assumes that the article has passed from the importer into the internal commerce of the country. The importer may sell in that quantity and upwards at home, or for exportation to other states.

And if the case was doubtful under the decision in the case of *Brown*, yet there is a more lax construction on state authority in the late case of *New York vs. Miln.* (11 Peters, 1839.) There the court repeat all the exceptions in favor of state control over imported articles, mentioned in the former cases, and show a decided leaning in their favor. They go so far as to say that a state law which concerns the welfare of the people within a state, and relates to their duties as men and citizens, and to persons and things within its jurisdiction, is a regulation concerning the internal police of a state. No doubt the sumptuary law in question, prohibiting the sale of spirituous liquors, falls within the rightful cognizance of the state governments according to the doctrines of the supreme court of the United States, and I am very decidedly of the opinion that it would be fruitless to appeal to the supreme court of the United States against a decision of the supreme judicial court of Massachusetts in favor of the validity of the state law.

2. As I am of opinion that the act of April 1838 is not against the constitution or laws of the United States, the second question becomes unnecessary. Yet as the gentlemen who have done me the honor to consult me, may still be disposed to try the experiment, I should in that case advise, that whenever a suit is brought for a penalty for selling contrary to the act, that the defendant demur to the bill or declaration, or set up by way of defence that the act is repugnant to the constitution of the United States, and if overruled, as he would be, that he appeal to the supreme judicial court of the state, and if the judgment against him be affirmed, as it would be, that he then, under the direction of the counsel who has conducted this defence, appeal by writ of error to the supreme court of the United States, and a decision there will put an end to all litigation on the subject.

JAMES KENT."

New York, May 12, 1838.

If this opinion is tenable, we may lay a tax on foreign goods coming coastwise or in any way indirect to our state, except they be in original packages and on the importer's account; and we may do the same in regard to our American manufactures, which now pay tribute to indirect routes, all of which rights we may and should exercise in virtue of our sovereignty over our territory and population.

Your committee see no objection to the immediate legal adoption of this alternative; but they deem that it will be inexpedient to recommend the adoption of that which the public mind is not prepared to sanction, until this subject shall have received their further consideration. They beg leave, however, to recommend an amendment to the law in relation to merchants' licenses, which is no other than a legal exercise of internal police which exists in every state of the Union; some having adopted its use for the purpose of protection of various persons or branches of trade, and others for revenue. In the state of Virginia and North Carolina it has been adopted both as a system of revenue and a means of internal police, and may with advantage be altered and amended to the great improvement of both objects. In the year 1837 we had fifty-seven wholesale merchants, as follows:—Norfolk 19, Richmond 17, Petersburg 16, and Wheeling 5, each for the consideration of $60 per annum. In the same year we had eighteen auctioneers, to wit: Richmond 6, Norfolk 4, Fredericksburg 3, Lynchburg 2, Wheeling 2, and Portsmouth 1, at the sum of $90 per annum. In the same year there was granted to the 115 counties and 8 cities, boroughs, &c. 3836 retail licenses at $20 per annum, all united producing a revenue of near $73,000.

Your committee estimate that the retail dealers purchased goods, wares and merchandise in the said year, to the amount of $38,736,000 and estimate the rates of their purchases as follows:

No. of merchants.		*Am't. of purchase.*		*Total am't.*
25	who buy say	100,000	is	2,500,000
50	do	75,000	do	3,750,000
75	do	50,000	do	3,750,000
100	do	40,000	do	4,000,000
125	do	30,000	do	3,750,000
150	do	25,000	do	3,750,000
175	do	20,000	do	3,500,000
200	do	15,000	do	3,000,000
250	do	10,000	do	2,500,000
300	do	8,000	do	2,400,000
350	do	6,000	do	2,100,000
400	do	4,000	do	1,600,000
500	do	2,000	do	1,000,000
1136	do	1,000	do	1,136,000
3836				$38,736,000

Of this amount it is believed that not more than $4,500,000 value of merchandise both foreign and domestic, were introduced into the state after the manner of a direct trade; and therefore a tribute was paid to the indirect trade on the amount of $34,236,000, which amount of supplies, if received direct, would not cost the merchants of our ports more than $25,000,000. But this is not all the indirect business, inasmuch as a very large amount of articles purchased of the consumers are purchased in other states by retail to the neglect and injury of the retail dealers who have paid the state for the privilege of furnishing the citizens with goods by retail.

Your committee beg leave to suggest the inquiry whether citizens who thus act the part of merchants to the injury of our own markets, and the prosperity of the state, should not in justice to the retail dealer, and to the revenue, pay some equivalent in the form of a license. It is manifest that the license law of this state was enacted with the design that the retail dealers should purchase their supplies from the wholesale dealers and auctioneers within the state; and were they to do so, the revenue would be greatly improved, as not less than five hundred wholesale dealers would be sustained at this time who now pay revenue to other states. If by discriminating licenses our trade were thus restored, the business of the state would command abundant supplies; and a direct export and import business and trade with the country would establish a sound condition of domestic exchanges, and save us from panic and alarm, when convulsions ensue consequent upon the over-trading of other states. And manufacturers, mechanics and artizans would find a prosperous home among us. It is notorious however, that our retailers purchase nearly their entire supplies in other states, and from dealers who contribute nothing to the support of our government, nor does the profit of the business add to our wealth or to the value of our town property; but, on the contrary, we are impoverished, inasmuch as the profits drawn from our labor and added to the capital of our rivals increase their strength in the ratio with which we become weakened and exhausted.

It is obvious that the little trade which we now enjoy is from our smaller retail dealers, and from them we derive benefit and they pay as large a sum for a license as the largest class of retail dealers: for example, those who purchase from one to two thousand dollars per annum, pay from one to two per cent. on the amount of their business for a license, and our larger dealers who purchase exclusively in other states pay only about one-fifteenth part of one per cent. for theirs.—Your committee, therefore, deem it due to justice and patriotism to reduce the license of the smaller class of retails, and especially those who purchase their entire supplies in the state, and recommend the enlargement of the same paid by dealers who purchase any portion of their supplies in other states, to a sum not less than two hundred dollars, and the adoption of a new classification of dealers is recommended, to be denominated the *Domestic* Dealers, being such as purchase exclusively within the state, and *Foreign* Dealers, those who introduce and sell goods from other states; and in this latter class we would embrace all commission merchants, factors and consignees who are the accesaries of the indirect introduction and sale of merchandise. Your committee are deeply impressed with the opinion, that this small amendment of our system of internal police, will immediately restore to our ports an export and import business, foreign and coastwise, to the amount of $30,000,000, annually; and if our merchants are found incompetent to supply the demand, those merchants who now enjoy the business of our retailers, will come from other states and compete for the rich boon which so simple a legislative remedy will wrest from them. Make our business worth competing for at home, and competition will soon, very soon, be equal to the demand. Your committee are incompetent to estimate all the advantages which would speedily result to our seaports and the towns of Winchester, Wheeling, Charlestown, &c. as they would command the trade of the retail dealers of each respective vicinity; and it will soon be manifest that under all the evils to which they might feel subjected from an enlarged license, that their larger operations would more than compensate, and the several small dealers in their aggregate would be saved the labor and expense of about eight thousand journeys annually to northern cities to obtain that which can be obtained on better terms at home. It is an axiom to be relied on in all operations that a subdivision of labor facilitates perfection. Your committee will therefore add that our retail business may be done with far less capital, as the merchants who are near the markets from which they obtain supplies may purchase more frequently and not be subject to purchase at any time too large amounts, and less loss will be sustained to them by change of fashion or damage, or from the pecuniary pressure consequent upon the use of credit beyond the means of payment. This simple system (humble as it is) once put in operation, will enable the people to unite their best exertions with the great cause of internal improvement, which will soon render the remote portions of Virginia and North Carolina as familiar in intercourse as they are friendly in sentiments.

Your committee will further remark that a prosperous business will enable us to accumulate capital from our labor and enterprise; and they flatter themselves that future legislation will extend such fostering privileges as our best interests and *investments* may require.

Your committee, prompted by sentiments of filial patriotism and devotion to our *whole country*, will further add, that the restoration of our trade and prosperity, through the exercise of our clearly reserved rights, giving our citizens and all who become such, great benefits, without infringing on their equal privileges, or the rights of the citizens of other states, will be another patriotic example of the Old Dominion, which will be followed by our suffering sisters; and our equal prosperity and success will abate all sectional jealousy or envy, and preserve our UNION *for ever.*

Your committee beg leave to close their labors with the following resolution:

Resolved, That this convention appoint a committee consisting of twenty-one, whose duty it shall be to memorialize the legislatures of Virginia and North Carolina on the subject of their internal mercantile police and such other matters as are direcctly connected with the restoration of that trade which is enjoyed by citizens of other states.

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Vol. VI. DECEMBER 31, 1838. No. 12.

EDMUND RUFFIN, EDITOR AND PROPRIETOR.

LEGISLATIVE AID TO AGRICULTURE.

No. II.

Agricultural Societies.

Agricultural Societies have as yet been the only establishments in Virginia designed as means to improve agriculture; and these have been planned, and carried into operation, (when any operation followed,) entirely by individual effort, and at the expense of the members of the several societies. Without exception, they have been so defective in their organization, and plan for working and for producing the ends designed, that but few have lived long enough to work at all; and those few which have possessed more vitality, have had almost no other element of value. Of the greater proportion of the many agricultural societies which have already existed in Virginia, the meeting and hearing the first address from the first president of the society, constituted the only public or known act, before the speedily sinking into death, or lethargy and oblivion. Some few individual members of some few of these societies have indeed presented very interesting and useful communications on agricultural subjects; but this merely proves, what no one would doubt, that agriculturists distinguished for intelligence and public spirit, are not divested of these qualities, and do not always cease to exercise them for the public good, in consequence of their becoming members of agricultural societies. But it is denied that the eliciting these communications has been caused by the fitness of any such society for that purpose. All these societies, though in different degrees, have been deplorably unfit to stimulate inquiry and effort, elicit information, or, in general, to promote the improvement of agricultural knowledge, in science or practice.

Lest this general opinion should be deemed too censorious, or as having special reference to societies still existing, and to their recent action, or inaction, (all of which is disclaimed,) we will here quote at some length, as expressive of our views of the general defects of agricultural societies, and the suitable remedies, the words of an article which appeared nearly six years ago, in one of the early numbers of this journal.

"A remarkable and notorious characteristic of Virginians is to commence the support of any good and popular scheme, with vehement and overflowing zeal; and having thus wasted their energy in the outset, to become weary, relax their exertions, and finally cease entirely to make them, by the time they are most wanting. Yet, perhaps, the deliberate judgment of each individual is as much in favor of the object, when he thus abandons its support, as when he first undertook, and gave all his strength, to commence the operation. We act more from feeling, than from reasoning. We start forward to aid a good cause, as most of us would rush to a joyous festival; and when the excitement of pleasure is over, we as readily yield to the reaction of feeling—the wearisomeness and lassitude which always follow the pursuit and enjoyment of mere pleasure.

"But besides this our national failing, which unfortunately affects all our public institutions, there are other evils which press particularly on agricultural societies, and are sufficient to destroy first their usefulness, and next their very existence.

"When the formation of an agricultural society is first proposed, there are plenty of members to be obtained. Each is willing to give his name to support the scheme; and he is willing also to add a little of his time, and a small contribution in money. But very few think of becoming *working members*, or of doing any thing as individual cultivators of the soil, to aid the object of the association. They meet at the stated times for one or two years—find that they have no communications to hear—each member thinks or declares that the society is useless, and wonders that it should be so—and finally, (and necessarily,) it sinks into contempt and dies, without even the little respect of a vote being taken for its dissolution. Of all these perfectly useless members, there may be scarcely one who might not have rendered some service, by making experiments or observations, and reporting the results: yet each one is kept silent and useless by false shame, and the fear (if he should make the attempt) of not being *distinguished* as an agricultural writer.

"So much for the mass of private members. Next let us look to the officers, on whom much more depends, to secure the usefulness and permanency of the society.

"When the society is first formed, one of the most aged, respectable, intelligent and popular members will of course be made the presiding and first executive officer, on whose zeal and energy, the success of the scheme must mainly depend. Such a man will generally be justly entitled to the love and esteem of his fellow-members—perhaps he will stand equally high as a farmer, or as a man of general and valuable acquirements. But if he wants zeal and energy, (as must be expected of most old men,) the highest other qualities will not make up for these deficiencies. After such an appointment, the high respectability and popularity of the individual forbids a change; and if he should prove an inefficient president, the society is soon *overlaid* and destroyed by his worth and dignity. The same observations apply, but with less force, to all the other subordinate officers of a society.

"To avoid these causes of danger to new societies, I will respectfully propose to those who may be their founders, a few innovations which I think will be found of use.

"I. Let the society be composed altogether of *working members;* and to be sure of that object, let no member be admitted, except he previously presents some report in writing, (however concise, or no matter how trivial the subject) of experiment made, or facts observed. Scientific and professional men, in their departments, could perform similar duties. Such a form of initiation would compel every member to "break the ice;"

and, generally, nothing more is wanting, to prove to them that they can do good service in this way to agriculture, and with credit to themselves. Let these reports, which would be presented as claims for admission, be always plain, simple and short; and in manner and form not beyond the imitation of any plain practical farmer. It would also be proper to require afterwards of each member, a small but certain amount of *working* service every year—as for example, the making and reporting of one or more experiments on some doubtful point in farming, or in any art or science connected with agricultural improvement. I do not mean to discourage the more general, speculative, and argumentative essays which have heretofore formed nearly all the communications to agricultural societies: but these might be safely left to be performed as voluntary duties.

"It may be objected that but few members would be obtained if such preliminary and regular duties were required. I think otherwise. Very few would object to write in the manner proposed, if it was made a duty, instead of being altogether voluntary, and if the performance was required of all without exception. But even if only ten members should unite on these terms, they would be more useful, and do more credit to themselves, than they could with one hundred more upon the ordinary plan.

"II. Let the duties of officers be so fixed and defined, as that the performance should be as little as possible affected by their individual characters and habits; and, by a fixed rule, require rotation in office, so that no officer shall serve two years in succession. Almost any member, who has zeal and activity, may fill well any office in a society—and a year's service would be sufficient to show in any a deficiency in those indispensable qualifications.

"If societies on something like this general plan were spread through Virginia, incalculable benefit to agriculture would be derived from thus instituting, accurately observing, reporting, and publishing hundreds of experiments, and ascertaining numerous important facts, which can be made known in no other way. If only twenty individuals, composing a society, would make so small a sacrifice as the duties would require, in as many as twenty different counties, and means were adopted to interchange communications, the result would be that each member would have the benefit of the labor of four hundred experimenters and recorders of agricultural facts, or scientific observations. Is not this an object worth seeking, and worth *working* to obtain? But if the plan was properly estimated, there might be ten thousand persons so operating, and they, and all the farmers of the commonwealth, enjoying all the benefit to be derived from combining all these many exertions of labor and intellect."

It may, at first, be deemed inconsistent with the previous expressions of general condemnation, that we should yet recommend agricultural societies as among the most effective means to improve agriculture. But it would be only upon a regular, uniform, and altogether different organization. The devising a proper plan of organization and of operation, should be one of the earliest and most useful labors of a board of agriculture; and the conforming to that plan should be the condition required for directing to each society a proportion of the state's bounty for this purpose.

Whatever might be the details of the plan, the operation and effect should be to induce *some action*, however small, by every member of every society, in learning and establishing agricultural facts by practical and careful experimenting, and in accurately reporting the results. There would be enough subjects of labor for all—from the philosophical chemist, operating solely in his laboratory, to the plain and even unlettered but judicious and sensible cultivator of the soil. The contributions to knowledge, which, in this manner, would be brought by the members of a single county society, would be very valuable to themselves and to the public, however small and apparently trifling each individual contribution might be. And when all the separate gatherings of fifty or a hundred county societies were brought together, by a state society, or the board of agriculture, and digested and put in form for general use, the amount of knowledge and of profit thus gained, in the course of a few years, would be beyond calculation.

The great advantage of thus operating through county agricultural societies, would be found in enlisting the aid of the labor and money of individuals to a very far greater amount than the treasury would, or could, alone pay for; even if paying money were sufficient to purchase talent and zeal. If the state were to offer $100, or even but $50 a year, to every county society which should contribute at least as much money, and in other respects would conform to the prescribed general plan of organization and procedure, it is likely that even that small encouragement would induce the formation of many societies, which would ultimately contribute ten times as much in money as they received from the treasury, besides their far more valuable exertions of labor and talent. To give more prominence, dignity, and effect, to the societies, they should by delegates meet annually in a general state society; and perhaps it might also be advisable to give that society more or less agency in filling the Board of Agriculture.

Agricultural Surveys

Would be excellent adjunct and co-operative means with properly organized agricultural societies, to aid the improvement of agriculture; or, they would well serve as substitutes for the societies before the latter are established, and encouragers and stimulants to them afterwards. Though proceeding by different modes, the proper end and objects of both surveys and societies are the same, viz: to gather together all the facts as to the existing state of agriculture, so as to inform the whole agricultural community of each useful particular practice, which is now known only in a small neighborhood, and to a few farmers. If this alone were effected, this general diffusion of the knowledge of the now existing but generally unknown improvements, and good particular practices in various parts of Virginia, would add at once many thousands of dollars of value to agricultural wealth in general throughout the state; which new value, would probably add immediately as much to the annual pecuniary profits of agriculture as would pay the annual expense of an agricultural survey, for as long as it should continue, and for as much cost of other aids to agriculture continued afterwards.

The great work of improvement effected by the

British Board of Agriculture was more especially produced by their very minute surveys and voluminous reports of the actual condition of agriculture in each county of the kingdom. Never was a great national expenditure more judiciously and profitably made; and unquestionable benefits were almost immediately obtained. The surveys had scarcely been in operation when they brought first to public knowledge two most important modes of improvement, which, though known and practised for many years in particular sections of England, had never been known, or even heard of, elsewhere. One of these was the plan of "warping," or raising and making great and valuable additions to the soil of alluvial lands, by arresting the muddy contents of tide-waters; and the other was Elkington's plan of vertical draining, which, when thus made known, obtained for the discoverer the distinguished and rare honor and reward, of a parliamentary grant of £1000. But though these cases are more manifest, and therefore more striking, it is likely that there were hundreds of others, of more general application and value, of which the knowledge was diffused by these surveys, to the hundred-fold greater profit of agriculture.

Though surveys, being executed by but few persons, would in some respects be of much less value than *working* agricultural societies, which would combine the labors of many individuals, yet the former would have a decided advantage in one important respect. Agricultural societies, however zealous and industrious, would not report much else than the good or commendable practices, or such as were so deemed. But surveyors would be required to exhibit the actual state of agriculture—the defects and the evils, as well as the subjects for approval and imitation. This would be an important part of their duty; and to know fully the existing evils caused to agriculture by ignorance and bad management, would be one of the most important preliminary steps towards reform, both general and particular.

The intimate acquaintance which the members of an agricultural society would have with the soil and agriculture of their own county or district, would be a very important advantage to their investigations, which would be wanting to a surveyor of districts to which he was almost a stranger. But on the other hand, the stranger, if a judicious observer, will be apt to be struck with many subjects of interest and value to all persons similarly unacquainted with the locality and its practices; and which residents there would not appreciate, whether for good or for evil, because they could not compare them fairly, and without prejudice, with other practices elsewhere.

In the present very imperfect state of our agriculture, it would not be requisite to have surveys made as minutely, nor reports as voluminous, nor to be at an expense, for the whole, at all approaching to those of the English Board of Agriculture. A very cursory and general, though correct view and exhibition of Virginian agriculture in its present state would suffice for this part of a general system of action; and at a future time, when great improvements had been produced, there would be more inducement for having surveys conducted more carefully, and reported more in detail.

The state of Massachusetts has the honor of having led the way and offered the example to her more agricultural sister states, of ordering and supporting an agricultural survey. The agricultural commissioner of that state, the Rev. Henry Colman, is now actively engaged in that duty; and we doubt not but that the profit hereafter derived by the commonwealth will fully accord with the public spirit and liberality which induced the measure, and the distinguished ability of the individual selected for the labor. Yet Massachusetts is scarcely an agricultural country, so unkind are her soil and climate, and so much are her industrious citizens devoted to other pursuits. The interest of Virginia in agriculture, and the profit which might be derived from a like measure of improvement, are twenty fold greater than those of her noble sister Massachusetts.

In several of the next points for consideration we will merely copy views which have long ago been offered to the readers of this journal in another form, with merely such present additional remarks, as may be necessary for explanation or extension. The following passages are copied from the "Sketch of the progress of agriculture in Virginia, and the causes of its decline and present depression," published in Vol. III. of Farmers' Register.

Agricultural Professorships.

"If agricultural professorships were established in our principal institutions of learning, young landholders who are there acquiring liberal educations might easily obtain a competent knowledge of the general principles of agriculture, without sacrificing the other useful parts of scientific instruction. If this object would not be a sufficient inducement to remain one more year at college, it would be an advantageous exchange in such cases, if the study of theoretical agriculture, and its connexion with chemistry and some of the branches of natural history, took up the time usually devoted to metaphysics and the higher branches of mathematics—the study of which will be of use to but few men, except as a good mental exercise—a kind of *gymnastics* for the mind. It will be easy to ridicule the agricultural instruction that could be acquired from the lectures of a professor—a mere man of books and of theory. But though it is freely admitted that no such course of instruction, *alone*, could make a farmer, yet it would be the best preparation for the future acquisition of practical knowledge. It would be folly to look to the lectures of a professor for instruction in practical operations: but we might expect them to furnish the general and true principles of agriculture and its kindred sciences, (so far as they are connected,) without some knowledge of which no man can avoid committing continual blunders, and meeting with continual losses, as a practical tiller of the earth. For example: a farmer cannot know whether he is proceeding right or wrong in the very important operations of preparing, preserving, and applying manures, without some knowledge of the chemical ingredients of the materials used, of the changes produced by fermentation, and of the functions of the plants which are designed to be fed, and of the composition and properties of the soil intended to be enriched. Even a *little* knowledge on these points would serve to guard against serious waste and loss on every farm—the total amount of which makes a hundred fold greater national and annual loss, than all the expense of agricultural professorships, and of every other means for instruction that I shall advocate."

Though fully maintaining the foregoing views as to the general advantages of an agricultural professorship, still it is proper to state an important objection to such an institution being among the *earliest* measures of aid to be adopted by the state. In the present very defective state of agriculture in Virginia, there is probably not a single individual who is qualified to fill such a professorship with credit and usefulness. Very little of scientific agriculture is known—and the best practical farmers, even if they were well qualified by their scientific attainments, are too fully and profitably engaged on their own farms to accept such a post. It could not possibly be well filled at present; and therefore this benefit to agriculture, great and valuable as it would be under different circumstances, should not be attempted until other, and more available and sure means, had been permitted to operate.

Experimental Farms, or practical Schools, for experimental agriculture.

"Experimental farms, under proper direction, would also serve a most valuable purpose for increasing general agricultural information. But it would be a mistake, fatal to the object in view, if such establishments were expected to present a system of pattern husbandry, or even to yield any clear pecuniary profit whatever. Such expectations would necessarily be disappointed—and thus would cast discredit on the whole plan. Experiments, if judiciously conducted, and accurately reported, would be more effectual than any other means for conveying valuable information to the agricultural community. They *cannot* be made extensively by private individuals—for the plain reason that they require too much expense of time, labor, and, money, and, in general, are attended with loss, even when the results are most valuable for the information they give. A farmer might lose $100 by making a series of experiments, of which the results might yet be worth $100,000 to the community at large. Hence, it is in vain to hope for such proceedings, unless induced and supported by the funds of the community; and it is foolish to count on deriving direct and immediate profit from experiments, whether conducted by public bodies or private individuals. Yet this foolish expectation is very general—or at least it is commonly deemed sufficient ground to condemn and ridicule any experiments as worthless, if their immediate result is loss to the inquiring and public-spirited individual who instituted them. Yet who ever counted on deriving direct pecuniary profit from any course of experiments in chemistry or natural philosophy? And without many such costly and losing experiments, the world would not have obtained the benefits of the steam engine, of the machinery for spinning and weaving cotton, the modern processes of bleaching and coloring, and hundreds of other improvements in the arts. If judged by the test of profit, as usually applied to agricultural experiments, Watt and Fulton, and Arkwright, would have been pronounced mere fanciful schemers, if not fools, not only because of the expense of their experiments, but perhaps because neither of them could bring into operation the mechanical skill, and habits of business, necessary to the highest perfection and greatest profit of their splendid discoveries."

In the introduction to these numbers, there was presented, as a general illustration of legislative action and aid to agriculture, the manner in which new practices could be profitably tried and taught. The operation there described, as to silk culture, would belong to the department now under consideration; and it would be but one, (though now a very important one,) of the hundreds of doubtful or untried subjects which might be fully and correctly tested, and the value and worthlessness clearly established on an experimental farm, so as to instruct thousands of the result, who, without such instruction, would incur all the loss, either of neglecting to avail of a profitable practice, or of pursuing an unprofitable one.

An experimental farm would be an excellent precursor of an agricultural professorship, and would co-operate admirably with the professorship, after one is *properly* established. Such a farm then, in addition to its other more important uses, would be a great out-of-doors laboratory and apparatus for illustrating the scientific lectures of the professor of agriculture.

Though it never should be considered that an institution for agricultural experiments is to be a model or pattern farm for general husbandry, or for any regular system of operations, (which indeed would be subversive of its proper design and greatest value,) and though loss, instead of profit, on the whole, must be caused by any such course of experimenting—still some particular and important experiments or new practices may be found profitable from the outset, and by their profits, may help to sustain the cost of others. Thus, if the state, on an experimental farm, had led and pointed out the way to the great improvements which have recently been made in lower Virginia, by the use of marl, it may be presumed, that all the usual wastefulness of public works would not have prevented that business proving highly profitable to the institution, in a pecuniary point, though in an inferior degree to the profits of private adventurers. A state institution, if existing, might have introduced this great improvement fifty years earlier than it has been done by individual exertion and risk; and if such had been the case, the commonwealth would now be twice as rich and as populous as it is. But without counting on new experiments being profitable to the institution, and even if such directly profitable exceptions to the general rule were to be altogether wanting, still the indirect and resulting profits to the commonwealth would be sufficient to make the most ample return for all the cost and loss incurred.

"It has often been recommended, and by high authorities, that *pattern farms* should also be established, to teach agriculture by example. This we should strongly oppose—and for the reason that, from necessity, what might be *named* a pattern farm, would *prove* to be any thing but an exhibition of good and profitable husbandry. Instead of attempting such an establishment, it would be better to make use of, as an additional course of *practical* instruction, the now existing farms of many private individuals, which are truly patterns of good and profitable management. Many such farms might be named, deserving the character, in various parts of Virginia. It is evident that no one of them, even if managed in the most perfect manner, according to its location, and the peculiar circumstances of its proprietor, could serve as a general pattern farm. But one, for example, might exhibit a pattern for clover fallow and wheat culture, on the singular and valuable "red land" of the Southwest Mountain slopes—another for the same, on the rich, flat loams of James River—another would show the profitable combination of tillage and grazing west of the Blue Ridge—another, the best mode of tilling and enriching the more sandy lands of lower Virginia—and all might accord in some common points of resemblance, in addition to the merit of excellent general management. The proprietors of such farms might very properly be considered as *adjunct and practical professors of agriculture*; and would render important services as such, by each receiving in turn, as pupils, two or three of the young men who had previously passed through the course of theoretical instruction. On these farms, and under such instructions, a young man could learn more of practical and profitable agriculture in a few months, than from his own solitary and unassisted efforts on his own farm, continued throughout a long life."

From the Gardener's Magazine.

ORANGE GROVES OF FLORIDA.

By Alexander Gordon.

The following remarks are the result of observations made during an extensive and varied tour, (just terminated,) over an extent of several thousand miles, in prosecuting which I have seen much which I consider both instructive and interesting. For the present I purpose confining myself to a few brief observations on the state of the orange groves, &c., at the city of St. Augustine, E. F.

You, of course, are aware, St. Augustine is one of the oldest, if not the very oldest city within the jurisdiction of the United States, and has long been a place of great resort for invalids afflicted by the pulmonary and bronchial complaints. I had visited this city in 1831, and I confess I was in perfect raptures with its diversified beauties, but particularly with its *orange groves*. It then appeared like a rustic village, the white houses peering from among groves of this delightful fruit which grew in the greatest luxuriance. The clustered boughs covered with their golden produce, yielding a rich harvest to the owners, and affording a delightful shade to the foreign invalid, when he cooled his fevered limbs and imbibed health from the perfumed atmosphere. While the ear was gratified and the feelings soothed by the various notes of that delightful songstress the mocking bird which found a ready shelter amid their verdant foliage. But, alas! on my visit the past spring, in vain did I look for those rural bowers, so gratifying to the eye and invigorating to the system. Not a single tree of any magnitude to indicate its former grandeur. The imagination could scarcely conceive such a perfect metamorphosis. For a long period of years, the orange had had flourished without interruption from frosts or other casualties. The city of St. Augustine was peculiarly favorable for this semi-tropical fruit. The soil is naturally sandy, but rich in calcareous and vegetable deposits, consequently well adapted to the growth of the orange and other horticultural pursuits. When I was there in 1831 the orange had become the staple commodity of the city's commerce, and subsequently to that time I understood several millions had annually been exported. Numerous groves of young trees were planted, and $10,000 had been refused for a grove consisting of only 2 or 3 acres. Extensive nurseries could scarcely supply the demand for young trees. A vast and lucrative field opened to the enterprising horticulturist. On the native orange were engrafted the choicest varieties of other climates with the most perfect success. Prospects of immense wealth seemed beyond a doubt, but

"There came a frost—a withering frost."

During the month of February, 1835, East Florida was visited by a severe frost, much more severe than any before experienced. A cutting N. W. wind which blew ten days in succession, but more violent for about three days. During this period the mercury sank 7 degrees below zero. The St. John's river was frozen several rods from the shore, and afforded the astonished inhabitants a spectacle as new as it was distressing. The orange, the fig, and all kinds of fruit trees were killed to the ground; many of them were completely annihilated; but a considerable number have started again from the roots. The wild groves in Florida suffered equally with those cultivated, at all events as far south as Lake George, and the inhabitants were thus deprived at one fell swoop of their only resource. But on my visit, in the month of April last, I was happy to find the inhabitants were not totally discouraged, for there are many thousands of young trees now ready for planting out, and in a few more years, it is to be hoped, St. Augustine will again exhibit its wonted appearance. The oranges grown here were considered decidedly superior to those imported from the West Indies, and as so long a period has elapsed since they experienced so calamitous a visitation, (I believe not since 1775—6,) it certainly is worth while to persevere.

CLIMATE OF LOUISIANA.

The Natchez Free Trader is publishing a lecture delivered by Dr. S. A. Cartwright before the Mississippi Lyceum. This lecture is much in favor of the climate of Louisiana. Speaking of the parishes south of the 30th degree of north latitude, it says:

"In 1830, they contained 38 persons over 100 years of age, whereas the whole of the New England States, with a population of 1,954,704, including upwards of 20,000 negroes, only contained 35 persons over 100 years of age. France, with 36,000,000 inhabitants, only contained 537 persons over 100 years of age. If France were as favorable to longevity as the land of the Jussieua Grandiflora, it ought to contain upwards of 16,000 individuals over 100 years of age.

"The persons who die in the northern states, in the prime of life, by consumption, typhus and inflammatory complaints, are about equal, or even exceed the number which die in the south of malarious diseases. But the region of the country in which the Jussieua Grandiflora flourishes, is, from its mild climate, comparatively exempt from consumption, typhus and inflammatory affections; and by reason of the anti-malarious properties of the plant, it is singularly exempted from all that tribe of diseases which are produced by marsh miasmata, or by the unwholesome air of swamps called malaria. The plant, it would seem, converts into its own nutriment those very impurities of stagnant water which in other situations load the atmosphere, at certain seasons of the year, with noxious effluvia."

[The rare quality attributed above to the Jussieua Grandiflora is sufficiently valuable and important, as well as strange, to deserve being more fully stated and explained. We confess our entire ignorance on the subject, and will be glad to receive, from any better informed source, a full account of this remarkable plant, the effects which it is supposed, or known, to produce, and to what distance, northward, its growth and operation may be extended.—Ed. Far. Reg.]

From the Southern Agriculturist.

SECRET FOR MAKING NEW [AND EXCELLENT] WINE.

[An esteemed friend handed us the subjoined documentary evidence, in support of the pretensions of Mr. Da Costa, to the possession of a secret for making "new wine in *six* days," and for converting "most inferior" into the "most excellent wines in the space of *two weeks*." The gentlemen subscribing the certificate furnished Mr. Da Costa, have not said they all saw the process of making new wine in six days, and improving most inferior wines in two weeks, but as their respectability forbids the slightest suspicion of their countenancing a trick of this or any other kind, we must presume they did all see the wonder performed. Another reason for believeing *they all saw* the grape converted into excellent wine in *one week*, and undrinkable, into good wines in *two weeks*, is to be found in the fact that two of their number have agreed to pay FIFTY DOLLARS each, "so soon as he (Mr. Da Costa) shall deliver Mr. James S. Guignard full and ample directions in writing, showing clearly the proper mode and manner of making, improving, and clarifying of wines, as it is practised by him in their presence," i. e. in the presence of James S. Guignard, and Dr. Percival. The N. B. by Mr. Da Costa, we will believe the ebullition of honorable pride—strong in its truth. He claims the "system as his own," and he has good reason to be proud of a discovery, which must rank, in point of value and usefulness, among the most important of our times.

We commend Mr. Da Costa to the partonage of all the Agricultural Societies in our state. Hitherto, fear of the rot has been a bar to cultivating the grape upon a large scale. Mr. Da Costa now offers a remedy for, or a preventive of, this disease, and we trust he will find among us such liberal patronage, as to induce him to remain here. He has "lost his country and every thing there"—cannot we make him forget that loss? Let us try.

At present, the merchant is the most deeply interested in this wonder working discovery, and for his especial benefit, we request the editors of our daily papers to republish Mr. Da Costa's letter, and the documents inclosed. Many dealers have wines they are almost ashamed to sell, but cannot afford to give them away, or afford even, the loss by sales at auction. Let such purchase the secret; it is worth FIFTY dollars, and, be it remembered, it will, unlike any other tax, be but once paid.

If Mr. Da Costa's system promises to prevent rotting of the grape, every vine growing country in the world is interrested in his discovery; and as he is with us, he should be aided and encouraged in his experiments—if experiments they are; if they are not, and his offers are based upon established facts, he should be kept among us at almost any cost. The late Mr. Herbemont, of Columbia, proved to the conviction of the most sceptical, that the grape can be cultivated to greater advantage than cotton of any name, or staple. The friends of our country generally, and of *economy* and *temperance* especially, should zealously encourage every effort to make the culture of the vine one of our ordinary pursuits.

Ed. South. Agr.]

Columbia S. C., 13th October, 1828.

My much esteemed Sir,—Permit me to take the liberty to address myself to you on this occasion, for the purpose of making you acquainted with my art of preparing wines and vines; because you and your friends may have want of me in your city. In such case, if you could assure to me a good portion of bad wine, wine of the most inferior quality, good for nothing; wine with bad taste and bad smell, almost vinegar; I can make it become *excellent wine* in the space of two weeks only. It is a fact; and the documents that I have the honour to inclose within, will prove to you my assertion. Please excuse me the liberty I take. Should you be so kind as to give me your answer, I will be ready to go to your city in the month of December next. Yours, truly and respectfully,

Correa Da Costa.

To J. R. Valk, Esq.

We, the undersigned, having seen and tasted the new wine made in *six days*, by Mr. Correa Da Costa, and also, the *very inferior wines* improved by him in *two weeks*—take pleasure to declare and certify, that the system of Mr. Da Costa is entirely commendable, as it is certainly the best American wine we have seen, both for quality and flavor, as well as expedition. In the space of *one week* from the gathering of the grapes, every vine planter may have excellent wine ready for sale; and the *most inferior wines* can be made into the *most excellent wines* in the space of *two weeks*, when prepared by the system of Mr. Correa Da Costa.

Mr. Correa Da Costa also informs us that his art extends to the planting, rearing, trimming, grafting, inoculating, and cultivating the vines—and he is of opinion that a vineyard attended to under his management, will be free from that destructive malady, the rot, which has so often blasted the fairest prospects.

Columbia S. C. Oct. 5th, 1838.

James S. Guignard,	Owen McKiernan,
Alexander Herbemont,	Col. McCord,
Dr. Percival,	I. D. Mordecai,
Dr. Wells,	Robt. Mayrant,
Dr. Marks,	John Nuffer,
Dr. Fitch,	Maj. Thos. Taylor,
G. W. Daniel,	A. S. Johnson,
Sidney Crane,	Major Starke,
W. B. Thomas,	Dr. John Wallace,
Kinsler, McGregor & Co.	Col. W. Hampton.
A. L. Kline,	Dr. J. G. Guignard,
P. W. Knapp,	Benjamin Tradewell,
Aug. W. Eaton,	Dr. E. W. Fisher,
Dr. Gibbes,	Dr. John Fisher,
James L. Clark,	E. Friday.
Col. Preston,	

Columbia, Oct, 8, 1838.

From the specimens exhibited by Mr. Correa Da Costa, of his improvements of bad and inferior wines, we deem that much benefit will result to the wine makers and vine growers of this state, by obtaining his art of so doing. We do, therefore, for the purpose of obtaining his *valuable secret*, promise to pay to him the sums opposite to our respective names, so soon as he shall deliver to Mr. James S. Guignard full and ample directions in writing, showing clearly the proper mode and manner of making, improving, and clarifying of wines, as it is practised by him in our presence. And should any of us wish to have our wines improved, we are not to pay to him more than twenty-five cents per gallon, exclusive of ingredients, and *which secret we are to keep to ourselves.*

James S. Guignard,	\$50
Dr. Percival,	\$50

N. B. A good impostor may deceive a half dozen fools in a large place, but the "*American wine*," after having been improved by my own hands, according to *my own system*, and in the presence of Major Guignard, cannot deceive *thirty-one* respectable gentlemen in Columbia. Every person that has compared the samples of the inferior wine with the same wine improved by me in *two weeks*, has expressed his amazement for such wonder. It is a fact, it is *not* a trick. My *improved* wine is *immortal*; keeps for ever, and every day becomes better. With regard to my *new wine* made in *six days*, I think it is a enough to be mentioned, to be declared a wonder. Both wines have been seen and tasted by a respectable community of this town, and I have the glory to offer my services to Columbia with *my system of preparing wines and vines*—a good source of speculation and profit. I have trusted my secret to Major Guignard, and as he has seen every thing that I have made, to him I refer those that say with the incredulous disciple," it is necessary to see for to believe it." The fact is that it is the true transubstantiation of the wine. The knowledge of this united system is absolutely necessary to all vine growers and wine merchants. Wine, worse than vinegar, that has been sold at 12 cents per gallon, is now *excellent wine;* vineyards which have produced *only rotten grapes*, will, in the future, produce excellent crops of aromatic juice for making *American wine*, in order to rival the best *improved wines* imported from Europe. The new wine made in *six days*, requires the expense of *four dollars only, in each* 120 *gallons of juice.*

Messrs. Abram Geiger, has about 60 acres of land planted with vines; Herbemont 40 acres; Guignard 12; Neuffer 10; and perhaps 10 acres more belonging to Dr. Percival, Dr. Marks, J. L. Clark, D. Ewart and L. Sherman: all these vineyards *cultivated as they ought to be* would yield a profit exceedingly superior to a plantation of cotton of the same extent.

Having unfortunately lost my country and every thing there, however, I can manage the sword and the plough alike. In the four years of my emigration, I have travelled throughout all Europe: I have visited the capitals of *all nations;* and I can declare better that any body else, that Guignard wine, Richland wine, Amaranth wine, and Costa Madeira, can be transported to Europe, and be presented at the best tables, because they are, if not superior, at least equal to the best wines made *and prepared* in Madeira, France and Spain.

All these wines are now ready for sale, at Mr. Sidney Crane's, at \$1 per bottle.

Persons wishing to have for themselves the secret of making new wine in *six days* (which, of course, is a great acquisition for the next vintage) and also the secret of improving bad wines in two weeks, are invited to call at Mr. Guignard's office at the Court house, where the list of subcribers is open for that purpose.

Correa Da Costa.

CURIOUS EXTRACTS FROM THE ANCIENT LAWS OF VIRGINIA.

(Continued from No. 9.)

The next enactment (of 1645) which will be presented was an important measure of reform, and a considerable approach made towards the better security of popular rights.

"Whereas the anncient and vsual taxing of all people of this collony by the pole, equally, hath been found inconvenient and is become insupportable for the poorer sorte to beare, This Assembly haveing taken it into considerations have for their reliefe hereafter thought fitt to alter the same: Be it therefore enacted, That all publique leavies and county leavies be raised by equall proportions out of the visible estates in the collony, The conformity of the proportions to be as followeth, (vizt.)

One hundred acres of land at	04 lb. tobacco.
One cow, 3 years old at -	04
Horses, mares and geldings at	32 a peece.
A breeding sheep att - -	04
A breeding goate at - -	02
A tithable person at - -	20"

—*Statutes at Large*, p. 305, vol. I.

At the same session, the lawful money of Virginia was changed from tobacco to coin. The first part of the act is as follows:

"The Governor, Council and Burgesses of this present Grand Assembly having maturely weighed and considered how advantageous a quoine current would be to this collony, and the great wants and miseries which do daily happen vnto it by the sole dependency vpon tob'o. have at length resolved and enacted, and be it by the authoritie aforesaid enacted as the onely way to procure the said quoine and prevent the further miseries, That all peeces of eight in Spanish money be valued and taken in payment, att the rate of sixe shillings and all other Spanish silver quoines proportionably which shall be brought into the collony: And whereas it is conceived that the said quoine will not continue with vs vnless we have a leger quoine, Therefore serious consideration had of the many wayes tending to that effect, It was at length generally allowed, That a quoine of copper would be the most beneficial to, and with most ease procured by the collony, And that after proclamation made by the Governour and Council that all person or persons within this collony whether merchants or others do desist or leave off tradeing for tob'o. vpon the penaltie and forfeiture of the thing so bought or sold, The one moyetie whereof shall be and come to the informer, and the other to the benefit of the state."—p. 308.

In 1647 the former law compelling the planting of two acres of corn per head, being found insufficient, was again strengthened by additional guards and penalties.

The next act prohibits the exportation of corn, and limits the price of all sold in the colony. Such restrictions would necessarily operate to discourage the production, more than could be counteracted by all the enactments to compel planting.

"Whereas the great scarcity of corne is like to produce much want and misery to divers of the inhabitants, vnles timely prevention be made by prohibiting of exportation of corne, and against hoarding and ingrossinge thereof, to the intent to exact vpon theire poore neighbours by extream and vnreasonable rates to the vtter vndoing of whole ffamilies: Bee it therefore enacted by this Grand Assembly that no person for this ensueing yeer shall exporte any manner of English or Indian graine or corne out of the lymitts of the collony, in which act all strangers as well as inhabitants are included; Add for preventing of all hoarding and ingrossing of corne, It is alone enacted, That noe person or persons whatsoever shall sell, bargaine, barter or exchange any Indian corne either directly or indirectly above the rate or valew of one hundred pounds of tobacco per barrall, vpon the penalty of five hundred pounds of tob'o. for every barrell of corne that shall be exported as aforesaid, The moyetie of which fine and forfeiture shall be and come to the King's Majestie and the other halfe to the informer."—p. 347.

The taking of fees by attorneys, and the profession itself, were not put down by the former act; and therefore the following was added:

"It is thought fitt that vnto the act forbidding mercenary attorneys,* It bee added that they shall not take any recompence either directly or indirectly. And that it be further enacted, That in case the courts shall perceive that in any case either plt. or defendant by his weakeness shall be like to loose his cause, that they themselves may either open the cause in such case of weakness or shall appoint some fitt man out of the people to plead the cause, and allow him satisfaction requisite, and not to allow any other attorneys in private causes betwixt man and man in the country."—p. 349.

In the same year, (1647,) was revived a former act, forbidding the legal recovery of any "wine or strong water debts."

At the session of 1656, efforts to encourage silk culture by law, which had been so early adopted as the policy of the government, were again made, by the following acts.

"Whereas by experience silke will be the most profitable commoditie for the country (if well managed) and as the greatest conducement therevnto required, is provision of Mullberry trees, *Be it enacted and confirmed by this present Grand Assembly* that everie proprietor of land within the collony of Virginia shall for everie one hundred acres of land holden in ffee, plant vpon the said land tenn mullberry trees, at twelve foote distance each from other, and secure them by weeding, and a sufficient ffence, from cattell, horses, &c. between this and the last of December, 1658, and for everie tree that shall be wanting, or vntended in manner aforesaid of the said proportion at the said last of December, 1658, he the said proprietor that shall be soe delinquent shall pay tenne pounds of tobacco," &c.—p. 420.

"That George the Armenian for his encouragement in the trade of silke and to stay in the country to follow the same have four thousand pounds of tobacco allowed him by the Assembly."—p. 425.

At the next session (1657—8) the following additional regulations were enacted, to encourage silk and other products.

"For the better encouragement of the inhabitants for the makeing of staple commodities in this collonie, *Bee it enacted by this present Grand Assembly* that what person or persons soever shall at any time hereafter make in this collonie so much silke, flax, hopps or any other staple comoditie (except tobacco) as is worth two hundred pounds sterling, or English wheate to the value of five hundred pounds sterling in one yeare and exporte the same or cause the same to be exported, or shall first make two tunne of wine raized out of a vineyard made in this collonie shall have given him by this countrey for an encouragement ten thousand pounds of Virginia tobacco.

Wheate valued at five shillings per bushell.
Silke at twenty shillings per pound.
fflax at six pence per pound.
Hopps at twenty shillings per hundred.

What other staple comodities shall be raised to be valued by the Assembly."—p. 469.

At the same session, the following act was passed.

"Whereas it is generally supposed, That the makeing of silk will much conduce to the good of this collony, *Bee it therefore enacted by the authoritie aforesaid* that what person soever shall first make one hundred pounds of wound silke in one yeare within this collony shall for his so doe-

* Act VII of Nov. 1645.

ing be paid ffive thousand pounds of tobacco out of the publique levie."—p. 487.

The exportation of hides, iron and wool, was forbidden under heavy penalties at this session. The exportation of mares and sheep had been forbidden some time previous. It is surprising how long a time was required, and through what a course of loss and injurious experiments, for our ancestors, and the rest of the world, to learn the truth of the simple maxim of political economy, that to encourage the production of commodities, it is best not to restrict their sale, or circumscribe their market.

Two more silk laws were passed at the session of 1658—9.

"Whereas the act for mulberrie trees seemes rather troublesome and burthensome then any waies advantageous to the country, *It is hereby enacted*, That the said act for planting mulberrie trees shall be repealed and made void."—p. 520.

"For incouragement to the makeing of silke, *It is enacted*, That whosoever shall make ffiftie pound of wound silke shall receive from the publique as a reward of his dilligence tenn thousand pounds of tobacco, *Provided* he prove it to be all of his owne makeing."—p. 521.

Additional penalties were imposed at this session to prevent the "ground-leaves" of tobacco being sold. The prohibition of the exportation of hides and old iron was repealed.

The preamble, or recital of reasons, for the "Act for suppressing Quakers," passed 1659—60, is curious, and characteristic of the age.

"Whereas there is an vnreasonable and turbulent sort of people, comonly called Quakers, who contrary to the law do dayly gather together vnto them vnlaw'll Assemblies and congregations of people teaching and publishing, lies, miracles, false visions, prophecies and doctrines, which have influence vpon the comunities of men both ecclesiasticall and civil endeavouring and attemping thereby to destroy religion, lawes, comunities and all bonds of civil societie, leaveing it arbitrarie to everie vaine and vitious person whether men shall be safe, lawes established, offenders punished, and Governours rule, hereby disturbing the publique peace and just interest, to prevent and restraine which mischief, *It is enacted*," &c.—p. 532.

The following brief entries are some of the "Extracts from the minutes of the proceedings of the Governor and Council of Virginia," at an earlier time of the colony.

"*Dec.* 16*th*, 1631.

Because Edw. Grymes lay with Alice West he gives security not to marry any woman till further order from the Governour and Council.

March 25*th*, 1630. Tho: Tindall to be pillory'd 2 hours for giving my L'd. Baltimore the lye & threatning to knock him down.

6*th* 8*br*. 1631. The first informer of any slanderous reports of Governour or Council were to have the fine; this day one was whipt and lost his fine for concealing such a slander."—p. 551—2.

"1 *Feb.* 1632. Two maids got with child at sea, ordered to be sent back again."—p. 552.

"Stephen Reekes put in pillory 2 hours with a paper on his head expressing his offence, fined £50 sterling and imprisoned during pleasure for saying that his majesty was at confession with the L'd. of Canterbury.

Robert Sweet to do penance in church according to laws of England, for getting a negroe woman with child and the woman whipt."—p. 552.

At the session of 1660, the first after the restoration of the royal authority, under Charles II, among a medley of numerous orders of the "Grand Assemblie" are the following:

"Ordered that by reason of the vnconcionable rates, smiths do exact on the inhabitants of this countrey for theire worke, that the countie courts have power to regulate their accompts."—p. 11.

"Ordered that the horse way over Powatan swamp to James-Cittie be at Mr. Hunts mill and that he be allowed out of the levie next yeare ffive thousand, ffive hundred pounds of tobacco for repairing and maintaining the same for eight yeares except the county of James-Cittie before the tenth of ffebruary will vndertake the same on the same tearmes."—p. 12.

The last enactment, humble as was its object, may perhaps be considered as the first step taken by the government of Virginia to promote what in these times has been improperly termed "internal improvements"—or, correctly speaking, that one important branch of the internal improvement of the country, which is found in the construction of roads, canals, and other facilities for transportation and trade. It is greatly to be desired that the government would learn, and act upon, the truth, that to increase the products of the earth by wise legislation is still more necessary and profitable than merely to facilitate their passage to market. On this head, our legislators of the present day might profit by the example of their less enlightened predecessors; as, for example, in the next following order for defraying the expense of the first attempt to produce a new and valuable commodity. In this and sundry other such efforts, our ancestors were right in the principle, but their measures for encouragement of production generally failed, because the mode was faulty.

"Ordered that Daniel Dawen for his experiment of salte have his charges defrayed in towne out of the publique levie and bee exempted out of the Accomacke levie also."—p. 12.

The "rights of man" were not as yet well understood, or guarded very scrupulously. The "ordinarie sort of people" were not treated with much respect in those old times.

"Ordered that the honourable the governour have power to presse tenne men of the ordinarie sort of people, allowing each man two thousand pounds of tobacco per annum for theire services and to employ them toward the building of a statehouse."—p. 13.

Session of 1660-1.

"Whereas the lowe prices of tobacco will hardly supply the urgeing and pressing necessities of the inhabitants of the country, and those necessities by the importation* and sale of superfluous commodities soe augmented that very few can with theire annuall labour defray their annuall charge by which meanes they are reduced to that extremity that not being owners of their owne commodity (spent before made) they are forced to part with it at what rigorous rate soever the exacting merchant will please to propose for prevention* whereof *Bee itt enacted* that noe strong drinke of what sort soever, nor silke stuffe in garments or in peeces (except for whoods and scarfes) nor silver or gold lace nor bonelace of silke or thread nor ribbands wrought with silver or gold in them shall be brought into this countrey to sell after the first of February next under penalty of confiscation of the said goods by the sellar to the governor to be exported and the value thereof by the buyer to that good common-wealth man that shall discover it."—p. 18.

"Bee it enacted that the order of the governor and councell imposeing five shillings on each barrell of privision exported be confirmed and continue in force until the end of July next and then to expire and after that the exportation to bee free."—p. 21.

"Since flax seede cannot be procured to sowe in the time limited in the act provideing for the makeing of six pound of yarne per poll, *Bee itt enacted* that the time of putting the said act in execution be prolonged untill the first of march 1662 and that afterwards it be strictly observed."—p. 26.

The last act of this session was to revive the act for planting mulberry trees, (copied above,) which had been repealed by the act of 1658-9.

At the session of 1661-2, another act was passed offering rewards for killing wolves, which, as the preamble recites, was necessary because "great complaint is made of the frequent and many injuryes done by wolves to the cattle and hogs of several inhabitants of this country." At that time, Henrico was the most western, or the frontier county of the colony.

As the assembly had thought it necessary to limit the fees and exactions of attorneys, millers and blacksmiths, it is not surprising that physicians also were put under regulation and restraint.

"Whereas the excessive and immoderate prices exacted by diverse avaritious and gripeing practitioners in phisick and chirurgery hath caused several hardhearted masters swayed by profitable rather then charitable respects, rather to expose a sick servant to a hazard of recovery, than put themselves to the certaine charge of a rigorous though unskilfull phisician, whose demands for the most part exceed the purchase of the patient, many other poore people also being forced to give themselves over to a lingring disease, rather then ruine themselves by endeavouring to procure an uncertaine remedy, for redrese thereof for the future, *Be it enacted* that it shalbe lawfull for any person or persons conceiving the accompt of the phisitian or chirurgion unreasonable to arrest the said phisician or chirurgion to the generall or county court where the said phisitian or chirurgion shall declare upon his oath the true value, cost, and quantity of the drugs administered, for which the court shall grant order against the plaintiff with fifty per cent advance, and such consideration for his care, visitts and attendance as they shall judge he hath deserved, and if it shall appeare by evidence that the said phisitian or chirurgion hath neglected his patient while he was under cure, the court shall censure him to pay soe much as they in their discretion shall think reasonable."—p. 109—110.

The preamble of the next act, for the encouragement of the growth and manufacture of flax, gives a woful account of the condition of the great staple commodity of the colony.

"Whereas the incertaine value of tobacco the unstaplenesse of the comodity & and the probability of its planting in other places, threaten this comodity with the danger of an unavoydable ruyne, which must in time fall upon it by the increase of the makers of it amonge ourselves (who have already glutted all marketts that greate quantityes are yearely left in the country, and that which is sent out sold at soe meane and inconsiderable a rate as neither merchant nor planter can well subsist by) unles some other course be spedily taken for the improvement of such other comodityes as the country will produce and making as many of them as we can into manufactures and giveing encouragement unto all persons of what ability soever to attempt it, which the former acts for encouragement to make staple commodityes have been defective in, by only proposing rewards to greate quantityes of every comodity made, when whosoever goes about, must if he faile be ruined, or if he make the quantity proposed will have noe need of the gratuity, which is better to be suited proportionably to the meanest quantity, *Be it therefore enacted* that the assembly this present yeare send into England for a considerable quantity of fflax seed to be distributed into the several counties and delivered to certaine persons who may sell it out to severall inhabitants and the produce thereof to be paid the yeare following with the levye, and the country stock by that meanes be made good, and the several inhabitants be enabled according to the ffiftyeth act of assembly 1661 to make their proportions of fflax, and whoever will spin the fflax and cause the yarne to be weaved into cloath of a yard wide, shall for every yard of cloath soe wove of yarne made of fflax growing in the country have three pounds of tobacco, and for every yard of woollen cloath made of yarne here spun in the country, five pounds of tobacco, which upon the prodnce of a certificate from some justice of peace in the county that he hath seene the same in the loome, and that to his knowledge it was really made in the country as aforesaid shall upon producing the same to the governor and councell be paid soe much in the public levye in the same county where they dwell."—pp. 120-1.

The act to compel the planting of mulberry

* The terminations *tion*, are generally written in the MS. "*con*."

trees, passed in 1656, and which had been revived at the previous session, was, at this, re-enacted at length, with heavier penalties and this additional provision.

"*And be it further enacted* that for the encouragement of all persons that shall endeavour to make silke, there shalbe allowed in the publique levy to any one for every pound of wound silke he shall make fifty pounds of tobacco to be raised in the publique levy and paid in the county or countyes where they dwell that make it."—p. 122.

The next act was designed to encourage the building of vessels, and the manufacture of salt.

"For encouragement of building vessels in this country and the promoting of trade: *Bee it enacted* that whosoever shall build a vessell of any burthen decked and fitted to goe to sea, shall for every tunn burthen the said vessell shall containe, receive upon proofe of her being soe built ffifty pounds of tobacco out of the publique levy.

"Whereas Colonel Edmund Scarborough hath to his perticuler charge but to the infinite good of the country erected a salt worke for which he hath received deserved thanks of the last assembly, This assembly for his greater encouragement have thought fitt to grant him the use of the mony raised this yeare out of the two shillings per hogshead* in Northampton county with condition that he make repayment of the same to those the assembly shall allott it the next yeare in salt at two shillings six pence per bushell, and soap at

"*And be it further enacted* that after the first of September 1663, noe master of ship, barque or vessell or any person merchant or trader shall bring in any salt into the county of Northampton under the penalty of confiscating his ship, barque or vessell, and goods to the end that he and others may be encouraged in their industrious endeavours to promote the good of the country."—p. 122.

The provisions of the next act, to encourage the manufacture of leather, are even ludicrous, for the minuteness and yet palpable insufficiency of the details.

"*Bee it also enacted* that according to the ffifth act of assembly 1660, there be erected in each county at the charge of the county one or more tanhouses, and they provide tanners, curryers and shoomakers, to tanne, curry and make the hides of the country into leather and shoes, and that the person intrusted with the oversight of the workmen, and manageing the trade doe allow to the inhabitants of the county for every dry hide they bring at the rate of two pounds of tobacco per pound, and sell them shoos at thirty pounds of tobacco plaine shoos, five pounds of tobacco for wooden heels and ffrench falls of the size largest sizes, and twenty pounds of tobacco per pair for the smaller shoos, and the county failing herein to be fined five thousand pounds of tobacco."—p. 123.

By the following act, free trade in general is again permitted:

* 'Hundred' in Purvis, 'hogshead' in Northumberland MS.

"*Bee it enacted* that ffree trade be allowed to all the inhabitants of this country to buy and sell at their best advantage, and that all acts concerning ingrossing, be from henceforth repealed and made voyd; *Provided* always that noe person or persons shall have any comerce or trade with any Indians for Beaver, Otter or any other ffurres except those commissionated by the governor." p. 124.

Yet, the two next acts to these are flagrant violations of free trade; the one renewing and enforcing the prohibition to export wool, hides, and iron, and the other to prohibit the exportation of any money, above the sum of forty shillings.—pp. 124-5.

"Whereas oftentimes many brabling women often slander and scandalize their neighbours for which their poore husbands are often brought into chargeable and vexatious suites, and caste in greate damages: *Bee it therefore enacted by the authority aforesaid*, that in actions of slander occasioned by the wife as aforesaid after judgment passed for the damages the woman shalbe punished by ducking; and if the slander be soe enormous as to be adjudged at a greater damage then five hundred pounds of tobacco then the woman to suffer a ducking for each five hundred pounds of tobacco (*a*) adjudged against the husband if he refuse to pay the tobacco."—p. 166.

The following first part of an act, too long to be copied entire, is a curious exhibition of the then prevailing ideas as to the most proper mode to induce the building of a town. A striking instance of the feebleness of legislation, when opposed to nature, is presented in the fate of the town of "James Cittie," for the durable construction of which so much care and such strong compulsory measures were here used. Not a single house of the town now remains standing, nor even one brick upon another, except in the ruins of the old church-steeple, and the wall of the adjacent church-yard.

"Whereas his sacred majestie by his instructions hath enjoyned us to build a towne, to which though our own conveniences of profit and securitie might urge us, yett encouraged by his majesties royall commands, to which in dutie wee are all bound to yeild a most readie obedience, this grand assembly taking into their serious consideration the best meanes of effecting it have in reference thereto enacted.

First. That a towne be built at James Citty as being the most convenient place in James River, and alreadie best fitted for the entertainment of workmen that must be employed in the work.

That the towne to be built shall consist of thirty-two houses, each house to be built with brick, forty foot long, twenty foot wide, within the walls, to be eighteen foote high above the ground, the walls to be two brick thick to the water table, and a brick and a halfe thick above the water table to the roofe, the roofe to be fifteen foote pitch and to be covered with slate or tile.

(*a*) The words 'then the woman to suffer a ducking for each five hundred pounds of tobacco,' not in Northumberland MS.

2*dly*. That the houses shall be all regularly placed one by another in a square or such other forme as the honorable Sir William Berkeley shall appoint most convenient.

3*dly*. That for the better expediteing this worke, each of the severall seaventeen counties build one house, and to that purpose be authorized to impresse in each of the said respective counties bricklayers, labourers, carpenters, sawyers and other tradesmen necessary to be readie at such time as the governour shall think fitt.

"4*thly*. That for avoideing the exaction of workemen, the price of bricks, the wages of workmen and labourers, and their diett at the ordinaryes shall not exceed the prices following, vizt.

"Bricks being statute bricks and well burned, one hundred and fiftie pounds of tobacco per thousand; labourers besides diett two thousand pounds of tobacco by the yeare.

"Brickmakers haveing theire diett and six able labourers to helpe them, provided at his or their charge that employ them, and wood sufficient brought in place for each thousand bricks moulded and burned, fortie pounds of tobacco.

"Bricklayers haveing theire diett and three able labourers to attend each of them, for each thousand of bricks layed fortie (*a*) pounds of tobacco.

Carpenters per day besides theire dyett thirty pounds of tobacco.

Sawyers for boardes and summers one pound of tobacco per foot, for timber for joyce, windowes, door cases and rafters, principalls, purloyners and other smalle timber, the said sawyers finding themselves and labourers dyett, halfe a pound per foot in length."—p. 172.

More legislation in regard to mulberry trees was thought necessary at the session of 1663.

"Whereas there hath been an impossibility of procureing soe many Mulberry trees as every proprietor of land is by act of assembly enjoyned to plant for his proportion, being ten trees for every hundred acres; this grand assembly takeing the same into their consideration *have therefore enacted* that the time shalbe respited for three yeares longer, vizt. untill the last of December, 1666, and that whoever shall then be defitient shall for every tree wanting be fined twenty pounds of tobacco being double the fine already imposed."—191.

"George the Armenian having proved the making of ten pounds of wound silk it is ordered there be paid him for his encouragement in the levy according to act.

"John Dolby procuring certificate that he had made and wove nineteen yards of woolen cloth in Northton county, the assembly hath ordered him the encouragement according to act being tobacco.

"John Pitte producing certificate that he had built a vessel of 28 tuns in the Isle of Wight county, the assembly ordered him the encouragement of accordingly."—p. 199.

Among other "Propositions humbly presented to this honorable assembly" was the following:

"That the act for planting of mulberry trees may be repealed it being very prejudicial to such as want clear grounds and are not in a capacity at present to fulfill the same without great prejudice, and it is humbly conceived that (if it be beneficial) men as they find themselves in a capacity will fall upon it without constraint,"—p. 202.

The following are the general and material parts of "an act for a cessation" of the cultivation of tobacco for a limited time, passed in 1666. This was a favorite policy, both with the government and the people. But though it was often attempted to be put in force, it was to little advantage, from the non-concurrence of Maryland and North Carolina, as well as for more general and sufficient causes.

"Whereas the quantity of tobacco made in this country by encrease of the number of inhabitants imploying themselves wholly to the makeing that comodity, and their continued ffreedome of their unlymitted planting is become soe greate that all marketts have beene glutted with itt, and the value of it reduced to so low a rate that the planter is rendred incapable of subsisting, the merchant discouraged in his trade, and consequently by the decay of trade his majesties customes impaired, while the tobacco that formerly releived the planter, encouraged the merchant, and augmented the custome, both now and some yeares past did and doth rest perishing on the planters account, to his utter undoeing; the remedy of which inconveniencies the governour, councell and burgesses of this assembly takeing into their serious consideration, have found that the most proper and effectuall course to effect the same wilbe by enacting for one yeare a cessation from planting, In which vacant yeare time wilbe given to the planter to settle himselfe upon the finding out and improvement of some other staple (as wee have already begun in silke, fflax, and potash) the merchant encouraged to give a better price when he shalbe assured to have tyme to vend it, and his majesties customes noe way diminished, since the exportation of all the tobacco already made, and likely to be made this next crop, will in all probability (notwithstanding the cessation) equall the quantity of that which hath beene in the like tyme exported; ffor which consideration often message hath beene sent from the assembly of Virginia to the lieutenant generall of *Maryland*, to establish a stint or totall cessation from planting in both governments who have communicated the same to the assembly of that province, they being equally sensible of their pressures, have enacted a cessation with provisoe of the concurrence of this country of *Virginia* and *Carolina*, ffor which causes *it is thought fitt to enact, and be it enacted by the governour, councell and burgesses of this present grand assembly and the authority thereof* that from and after the ffirst day of ffebruary which shall be in the yeare of our Lord 1666 till the ffirst of ffebruary which shalbe in the yeare of our Lord 1667, noe tobacco shalbe any wayes sowne, sett, planted, or tended, directly or indirectly within the government of Virginia," &c.—p. 224-5.

The next is another example of misdirected attempts to encourage industry.

"Whereas the present obstruction of trade and

(*a*) 'Fifty' in Northb. MS.

the nakednes of the country doe suffiiently evidence the necessity of provideing supply of our wants by improveing all meanes of rayseing and promoteing manufactures amonge ourselves, and the governours honour haveing by apparent demonstrations manifested that our poverty and necessity proceeds more from the want of industry then defect of ability, since that five women or children of 12 or 13 yeares of age may with much ease provide suffitient cloathing for thirty persons, if they would betake themselves to spinning, which cannot be objected against, if weavers and loomes were once provided; for the better effecting whereof, *Be it enacted by the authority of this grand assembly* that within two yeares at furthest after date of this act, the commissioners of each county court shall provide and sett up a loome and weaver in each of the respective counties of this country, at the charge of the county, and that noe private person setting up a loome at his owne charge shall excuse the county from setting up a publique one; But that every court neglecting to performe the tenour of this act shall be fined two thousand pounds of tobacco to the use of the publique and informer. *Provided* that the executing hereof in the counties of *Rapahanock*, *Stafford*,* *Westmerland* and *Northumberland* who by the newnesse of their ground pretend themselves incapable of makeing provision for the soe soone imployment of a weaver be respited for fowre yeares after the date hereof."—p. 238-9.

The next act repeals all prior acts for encouragement of silk, and other commodities, not upon the ground of their inefficacy, but for reason that they had so operated as no longer to be necessary. This assertion is not sustained by other evidence, and may well be refused credence.

"Whereas the providence and care of the publique good in former assemblies thought fitt for the advance and promotion of trade, manufactures and staple comodities in the country, to grant of the publique certaine encouragements for building of vessells, makeing of silke, cloath, &c. By which meanes diverse people being induced to put the same in practice, have by their successe made evident demonstrations how beneficial the same will prove; This assembly in hopes that all people now convinced of the profitts accrewing thereby will of theire owne accords vigerously prosecute those now apparently profitable designes, have therefore for the ease of the publique taxes *thought fitt to enact, as by this grand assembly and the authority thereof, it is enacted*, that all acts of encouragement of silke, cloath, building of vessells or any thing else may henceforth be generally and totally repealed and voyd, except the act for release of the impost of two shillings per hogshead to inhabitants of this country adventuring in vessells belonging properly and solely to Virginia owners, according to the one hundred and thirty fourth act of assembly; And moreover that the act imposeing a fine for not planting of mulberry trees which every one intended to make silke will now propagate voluntarily, be also repealed and made voyd."—pp. 241-2.

(*To be continued.*)

* This is the first time the name of *Stafford* occurs among the counties. In Mercer's abridgment, title 'Counties,' it is said to have been established in 1675.

To the Editor of the Farmers' Register.

Murfreesboro' N. C., Dec. 1, 1838.

Lately meeting, in a copy of the "Courier des Etats Unis," with a communication read in the French Academy of Sciences, by M. Roulin, on a subject which comes within the sphere of agriculture, I have thought that I might at least interest if not instruct your readers, by sending you a translation of it for publication in your valuable periodical. Should this be favorably received, I may possibly send you others during the winter.

B. S. W.

THE CHANGES UNDERGONE BY DOMESTIC ANIMALS ON BEING TRANSPORTED FROM EUROPE TO AMERICA.

Being part of an essay on that subject, read in the French Academy of Sciences, by M. Roulin, and translated for the Farmers' Register.

The observations of our author on this subject were made during a residence of six years, in a part of Colombia, extending from the third to the tenth degree of north latitude, and from the 70th to the 80th degree of west longitude. Although this space is limited, it offers a field very favorable for observations of this character; being traversed throughout its whole extent by the great chain of the Andes, divided here into three smaller branches, so that animals fitted for a temperature of ten degrees, (Reaumur) and those for a temperature of thirty degrees, may be found within a very short distance from each other.

Has the establishment in these regions of animals, transported from Europe, been attended with any remarkable phenomena? Once naturalized, do they remain, as they were in Europe? If they have undergone any permanent change, may not this new transformation throw some light upon that which they have formerly experienced in passing from the savage to the domestic state? These are the questions which would naturally present themselves to the student, and for the solution of which the author brings a great many facts relative to the different species.

The Mammiferæ.

The animals of this class, which have been transplanted from the old to the new world, are the hog, the sheep, the goat, the ass, the horse, the cow and the dog. These have become at this day much more numerous in the new continent than all the large native quadrupeds.

The HOG, considered as an occupant of warm valleys, or as roaming through the forests and seeking wild fruits, which, at certain seasons, compose his whole food, has passed almost all the marks of his domestic state. He has become again half-wild. In 1493, one year after the discovery of America, the first hogs were introduced into this country, in the island of St. Domingo. In succeeding years, they were carried wherever the Spaniards settled, and in the space of half a century, were established from the 25th degree of north latitude, to the 45th of south latitude. They seemed to suffer nothing from the change of climate, and from the very commencement were raised with the same facility as in Europe.

The naturalization of CATTLE presented difficulties of a more serious kind, which, however, were conquered by the admirable perseverance of the first colonists. The island of St. Domingo, where these animals were first introduced, became a sort of nursery, where they multiplied prodigiously, and whence were drawn vast herds to stock the different parts of the mainland, the coast of Mexico, and the interior. Oviedo tells us, that, in spite of this immense exportation, herds of 4,000 cattle were very common in that island, only 27 years after its discovery. Herds even of 8,000, were sometimes to be met with; and, according to Acosta, in 1587 the exportation of hides from the island of St. Domingo, alone, amounted to 35,444. In the same year, were exported from the different parts of New Granada, 64,350. This was the sixty-fifth year from the conquest of Mexico, an event, previous to which the Spaniards had been engaged in nothing but war.

As soon as cattle were multiplied to such an extent as to become almost wild, it was discovered that a certain quantity of salt was indispensable in their food, and that, if they did not get this salt from the herbs, the water, or certain earths of a brackish taste, which exist in many countries, they became lean, the females were less fruitful, and the species rapidly degenerated. In those places where there is a sufficiency of salt, the inhabitants find an advantage in giving some to their cattle, as, besides its beneficial influence on their health, this practice accustoms them to come up at a fixed hour to the place where they are usually fed, and where they know they will find salt. If these regular calls be neglected, it is no wonder they soon disperse and become wild.

In Europe, where milk is regarded as a very important part of the produce of the dairy, the cow is milked, from the moment when it becomes capable of propagating its kind, until the time when it ceases to be so. This plan, constantly exercised on every individual during a long series of generations, has ended by producing important alterations in the species. The teats have become of immense size, and the milk continues to flow from them even when the calf is taken away from the mother. In Colombia, a train of circumstances, useless to mention, have contributed to produce very different results; but only a few generations are necessary for this animal, left in liberty, to return to her original organization. For the cow to preserve her milk, it is necessary, in Colombia, that the calf be with her the whole time, and be able to suck. If it be taken away only for one night, nothing is gained by the milk which is collected during this interval; for as soon as the calf ceases to suck, the milk immediately dries up.

The ASS, in those provinces in which M. Roulin had opportunity to notice it, appears to have undergone only some slight alterations in its form and habits. In some places, where little care is taken of this animal, and where it is overworked, it is not unfrequently born deformed; but in none of the provinces visited by our author has it ever become savage.

The same observations do not hold good with respect to the HORSE. From the wild and independent life of the horse, a uniformity of color arises peculiar to the untamed species. The chesnut is not only the prevailing, but almost the only color of this animal.

The gait preferred in saddle-horses, is either an ambling or a stately gait. Pains are taken and kindness is employed, in training the animals to either of these motions that may be preferred. Whilst they are undergoing this system of discipline, they are not permitted to move in any other gait. After a certain time, the horses contract these motions habitually, and if they are of a beautiful form, they are let go in the forests to propagate their breed, as very few of them are ever gelded. From these result a race of horses in which the amble, among the full grown ones, is as natural as the trot among other horses. These are called *aguillillas*.

DOGS were transported into America, during the second voyage of Columbus; and it is worthy of remark, that in his first battle with the aborigines of St. Domingo, he had, in his little army, a pack of twenty blood-hounds. This animal was afterwards employed in the conquest of different parts of the continent, especially in Mexico, and New Grenada. The race is still preserved without apparent alteration, on the table-lands of Santa Fé, and is there used for hunting the stag. It displays, in that region, extreme ferocity, and employs the same mode of attack which formerly rendered it so dreadful to the native inhabitants. This consists in seizing the animal when in full career, under the lower part of the belly, and in overturning it by a sudden motion of the head, taking advantage of the moment when the whole weight is suspended upon the fore-legs. The weight of a stag thus thrown to the ground, is frequently six times that of the dog.

Certain dogs of a pure breed inherit, without instruction, the necessary instinct for the chase of the peccasy, (Peruvian hog,) in which they are often employed. The art of the dog consists in restraining his ardor, in never attacking any particular animal, but in holding the whole herd at bay, without permitting himself to be surrounded. One dog, the first time he is carried into the woods, attacks the herd in the most advantageous manner; another rushes indiscriminately upon the whole herd, and whatever may be his strength, he is devoured in an instant.

The species of SHEEP transplanted into America, is not the Merino, but two kinds, called in Spanish *lana basta y burda.*

The sheep propagates very well in temperate climates, and in no part shows any disposition to forsake the authority of man. In the burning climate of the plains it is maintained with more difficulty; but its existence there gives rise to an extremely curious phenomenon. The wool of the lamb grows almost like the wool produced in more temperate regions, with the single exception, that it requires a longer time to mature. When the animal is in the proper state to be sheared, the wool presents nothing remarkable in respect of firmness, and if it be then taken from the lamb, it commences growing again, and every thing proceeds just as among the sheep of more temperate countries. But if, in this warm climate, the shearing season is suffered to pass away, and the fleece left on the lamb, the wool thickens, becomes like felt, and finishes by detaching itself from the body, leaving under it not a new growth of wool ready to spring up, nor a naked and diseased skin, but a short, fine, shining, velvety nap, very similar to that of goats, reared in the same climates. On those spots where this nap or hair has once appeared, wool never again grows.

The GOAT, though its form is evidently that of a native of the mountains, accommodates itself much better to the low and burning valleys, than to the elevated parts of the Cordilleras. Not being milked so often, it has not those large teats which render it so remarkable among us. In this animal, a change may be observed analogous to that which we noticed in the cow.

Birds.

Among the bird-tribe, very few changes have occurred. The DOMESTIC FOWLS present little or no difference from those of Europe. But in warm countries, and among the acclimated species, a remarkable anomaly presents itself. Chickens, whose parents have lived for a great number of generations, in a medium temperature, above 28°, (Reaumur,) are hatched with but little down upon them, lose that little very soon, and for more than two months have no feathers except on the wings.

Chickens not acclimated, (and twenty generations are not sufficient to acclimate them,) cherish their first down as if they needed it. How many years, asks our author, must have been required to have effected this very sensible change in their organization?

The common hen has thrived very well in most of the islands in which it was first introduced by the Spaniards. But in some higher regions, as at Cuzco, and throughout the whole adjacent valley, great difficulty was found at first in propagating it. By care and perseverance, however, some chickens were obtained. These were by no means fruitful, but their descendants have become extremely so, and at this day they propagate with the same facility as in our climates. The same phenomenon appears to have taken place with the GOOSE, which has only within a few years been introduced into Bogota. The PEACOCK, the SPECKLED-HEN,* and the PIGEON seem to have undergone no change. The first has even preserved the variety of colors for which it is distinguished in Europe.

Conclusions. Although the foregoing observations have not been made by the author for the support of any particular system, it seems to us that we may very naturally deduce the following inferences: First, that species must be acclimated as well as individuals. Second, that domestic animals, left to themselves, have a great tendency towards the organization of those of the same species which we observe in the savage state, and that a very few years sufficed to effect this transformation.

[The further contributions of the translator of the foregoing article, will be thankfully received. ED. FAR. REG.]

From the Agricultural Magazine.

AN ACCOUNT OF AN IMMENSE CHIMNEY, RECENTLY BUILT AT CARLISLE.

"The immense chimney attached to the new cotton factory, now being built for Messrs. Peter Dixon and Sons, in Shaddongate, had the last stone placed upon it on October 24, 1837. It is one of the highest buildings in England, being 305 feet from the ground; and for the purpose to which it is to be applied, is understood to be the highest erection in the world. It may be distinctly seen for many miles in all directions around Carlisle, and forms a beautiful object in the view of our city, from whichever quarter you approach it. The building is of the octangular form, and is built with brick, the angles being formed of stone. The base, which is built with fire-bricks, is 17 feet 8 inches in width inside, and the thickness of the wall at the foundation is 10 ft. It tapers upwards to a width, inside, of 6 ft. 3 in.; and on the outside 8 ft. 9 in. Near the top there is a cornice of stone, 7 ft. in depth, which projects 3 ft., and above this there are 8 ft. 3 in. of brickwork, surmounted by a coping stone one foot in thickness. The cornice gives a finished and classical appearance to the building; and the whole would be taken for some splendid national monument, rather than a mere conduit pipe for smoke. It is not a little creditable to Carlisle, that this magnificent work was entirely executed by a native of that city, a builder, a Mr. Richard Wright, who has completed it in the way to give the most entire satisfaction to every scientific man who has examined it. Considering its immensity, the work was completed in an incredible short period of time. The foundation stone was laid on Sep. 11, 1835, by P. Dixon, Esq.; the first brick was laid by Mr. Wright, on Sep. 17.; the last course of bricks, also by Mr. Wright, on Oct. 22, and the last coping stone on Oct. 25, 1836; thus completing the work in thirteen months. The erection was carried on from the inside, stages being erected as the work proceeded, and the workmen and materials being taken up in boxes prepared for the purpose, by a crab worked by four men; and it is gratifying to add that the whole was finished without any accident occurring to any individual engaged in it.

THE MILK SICKNESS, AND THE BOHAN UPAS OF THE WEST.

The mysterious disease which bears this name, is peculiar to the region west of the mountains, and prevails only in certain districts of that region. Many parts of Kentucky, Indiana, Illinois and Missouri, have been greatly afflicted by it, hundreds have died its victims, and some districts of country are almost uninhabitable on its account. The Kentucky legislature has long since offered a reward to any one who could ascertain the cause of this terrible disease, but all inquiries upon the subject have been hitherto unsuccessful. The St. Louis Bulletin, however, contains a letter on the subject, said to be from the pen of an intelligent gentleman, in which the cause of the disease is referred to a tree, the properties of which are described to be very similar to those attributed to the Bohan Upas of the East Indies. The letter, which will be found interesting, is subjoined:

Femme Osage Township.
St. Charles Co., Mo., Nov. 9, 1838.

Mr. Koch—Dear Sir—I herewith transmit to you one of the genuine apples of Sodom. It grew on a large Sodomite tree in Femme Osage bottom, in St. Charles county. The tree is nine feet thick, one hundred and forty feet high, and straight in the body, there being no limbs for forty six feet above the ground. In a fruitful year

* Pintada, or Guinea fowl?—ED.

it is estimated that it bears one-thousand bushels of fruit. The leaves resemble those of a pear tree, but are much larger and evergreen; the blossoms are similar to the tulip. and when in full bloom, it is considered the most grand, beautiful and imposing object in the vegetable kingdom. But it is of the most poisonous nature; its roots, bark, sap, leaves and fruit, are all destructive poisons. Its twigs and branches operate as a slow, malignant and incurable poison, of a peculiar quality, destructive of animals and man. It has been recently discovered, and satisfactorily tested, that the browsing upon the sprout about its root, is the cause of that mysterious disease, called the milk sickness.

The fruit, when full ripe, has an inviting appearance, but it soon takes a dry rot, and the inside becomes a poisonous and disagreeable dust, in appearance resembling Scotch snuff. Notwithstanding its noxious qualities, cattle and various other animals are fond of frequenting it and feeding on its leaves, and they frequently die in its vicinity. Numerous skeletons of animals may be found in the bottom, within a mile round, but when taken in small quantities, it terminates in lingering and uncontrollable milk sickness. Since the tree has been fenced in, no milk sickness has existed. The wood of the tree is as solid and heavy as lignum-vitæ or ebony, and from its similarity, some intelligent persons have conjectured that is the celebrated tree called the Bohan Upas in the East Indies. When any part of the green tree is lacerated, a peculiar gum exudes from the wound, like unto white native turpentine, which is esteemed one of the strongest poisons, and will blister and seriously injure and ulcerate the human body if applied externally.

It is thought by some persons that this tree might be advantageously used in the practice of medicine if its powerful medical qualities were properly understood, but its poison is so destructive that every person here is afraid to make any experiments with it. If the citizens of those parts of Illinois, Ohio and Kentucky, that are afflicted with the milk sickness, will make proper examination, I have no doubt that they will find somewhere in the sick district a solitary tree similar to the one I have described above, and if they will destroy or enclose the tree, they will effectually prevent the disease. Many marvellous stories are told in the neighborhood, but respecting many of them I am very incredulous; but the foregoing statement I have prepared from personal observation, and from information in which I could place implicit confidence. If you should desire further information respecting this tree, I will take pleasure in answering any inquiries directed to me by mail, to Missouri town, my nearest post office.

With great esteem,

Your obedient servant,

———.

IMPROVEMENT OF LAND BY MANURING WITH MARSH-MUD, MARSH-GRASS, SEA-WEEDS, SHELL BEDS, &c., &c.

[The following connected papers, which appeared in the American Farmer of 1831, are republished here, both on account of the interesting contents of the correspondence, and in the hope of drawing forth, from the same or other sources, additional and more recent facts, on any of the same subjects. In "Potomac," we recognize, by internal evidence, one who has since been a highly valued contributor to the pages of the Farmers' Register; and whose contributions exhibit proofs of the profit which he derived from this earlier correspondence, when a "novice" and a mere seeker of information. We know not who is the writer of "Corn-planter;" but if he is not already one of our contributors, his becoming so is much to be desired; and especially from him, or others, is wanting, and would be of great use to many readers, the fullest and most recent information on the use of marsh-mud, as manure.

It is astonishing that so little has been yet done, and so much less made generally known, in the use of marsh-mud as manure. It is true that hundreds of writers recommend the mud of ponds, ditches, marshes, &c. as ingredients for compost heaps, or for the foundation of, or for mixing with barn-yard manure; and very many speak, generally, but as from experience, of the profitable results thence derived. But still, there is an utter deficiency, so far as we are informed, of any precise and satisfactory statements or estimates, of the amount of profit, or of increased products, obtained from the application of any certain quantity of marsh-mud, or of expense in its use. And the few applications which we have known of, including some of our own, of the mud applied alone, have not produced such apparent increase of early product, or of fertility, as to encourage the repetition.

Still, reason and theoretical views would strongly recommend the very extensive use of marsh-mud, both for its great available quantity, its cheapness in application, and for the value of the fertilizing ingredients which it certainly contains, (and indeed mostly consists of,) and must give to the soil. A very simple and yet sure mode of analysis, (by fire,) which we have often used for this purpose, will prove to any experimenter, that about one half of the dry weight of all common tide-marsh-mud consists of vegetable matter; and that part, when dry, is so very light, that what serves to make half the weight, is probably nine-tenths of the entire bulk of any given quantity of the mud. All vegetable matter, finely broken down and much decomposed, as this is, would be supposed to be manure, and of a kind ready for speedy action; and if not so in this case, it cannot be for want of richness, or on account of the deficiency of the elements of food for plants in the mud; but because the vegetable matter therein is not in a state to serve as food for plants. This is the case with peat, which is almost entirely a vegetable substance, but of vegetable matters made insoluble, and therefore incapable of acting as manure, and feeding growing plants. Yet peat may be rendered soluble, and made a valuable material for compost manure, by being mixed with and acted on by highly putrescent manure, by alkaline fluids, and by quick-lime. Now it is possible, that though our marsh-mud is very far from being incapable of rotting, still its being so long water-soaked may have taken out all the soluble parts, ready for immediate action; and that composting with other substances, as is recommended for peat, may be required to bring the balance of the mass into early and profitable use. Several things give countenance to this supposition. The only known cases of the marsh-mud being supposed profitable, were when it was used in mixture or union with other manures; or when it was from salt-marsh—the salt perhaps serving in some measure for the same purpose. In addition—and it is the most important circumstance—the readers of this journal may remember the French practice (stated in Puvis' Essay on Lime, vol. 3, Far. Reg.) of applying lime in quantities as small as 5 bushels to the acre, with profitable effects. But this lime was put in compost, with rich vegetable soil, which is much like marsh-mud in composition, and it was stated that the older the compost, the better its operation as manure. Now, as the lime could not grow stronger or richer by age, it may be inferred that it was the mass of vegetable matter, acted on slowly and gradually by this small leaven of quick-lime, which was improving in value, and which in fact constituted the greater strength of the compost as a fertilizer. If by any means, this enormous and inexhaustible supply of natural material can be profitably used as manure, it would be the greatest means for improvement, except calcareous manures, yet offered to the tide-water region. Nor would it be confined to that region; for others have rich alluvial and vegetable deposits, in swamps and in the bottoms of ponds, to which the same rules and practices would apply. And if the state government should attempt to aid agricultural improvement, there will be few subjects for experiment more worthy of being directed, and paid for, by the state, than the conversion of some portion of this widely spread and now unmixed evil and nuisance, to a source of fertility and profit, as manure for the neighboring lands.—Ed Far. Reg.]

From the American Farmer.

Westmoreland county, Va.
August 11, 1831,

Mr. Smith—I am engaged in making extensive experiments with marsh-mud, Indian banks, or partially decomposed oyster shells, which are found in great abundance on the margins of many of our creeks, and kelp or sea-weed, which is thrown in great quantities upon the shores of the Potomac, by almost every tide. These abundant and convenient resources for fertilizing our lands, have hitherto been almost totally neglected by the farmers in this part of the country; and in making my experiments I am entirely unaided by the results of the experience of others. In applying the marsh-mud, the plan recommended by Judge Johnson of South Carolina, in 11th vol. of the American Farmer, has been pursued, and I have no doubt will be successful. The partially decomposed oyster shells have been applied in the manner in which marl is used in different parts of the United States. In the application of the kelp I have experienced more difficulty, having been unable to find any practical treatises upon that subject. To my surprise, although this manure has been used with great effect as I have been informed, for many years, in different parts of Maryland, there is not a line to be found in the American Farmer upon this subject, with the exception of the communication from Thomas Griffin, Esq. of York Town, Virginia, contained in the first volume of that valuable work. A practical essay upon this subject, by some intelligent agriculturist who has used this manure extensively, would be of vast service to the farmers upon the sea-board, and upon the salt-water rivers, where this valuable "*weed*" may be obtained in almost inexhaustible quantities. I should be much gratified by information particularly upon the following points. What is the best season for applying the sea-weed? Is it most efficacious when applied in summer, winter, or spring? Should it be applied fresh as taken from the river, or after standing in heaps until partly decomposed? Is it true that wire grass is introduced by its use? Should it be turned in immediately, or left upon the surface until the earth is tilled for a crop? The plan which I am pursuing, is to distribute the weed regularly in the water furrows of an old cornfield, as soon as convenient after it is carted out, and to list immediately upon it, to protect it from the rays of the sun. I put from 70 to 100 loads, drawn by two yoke of oxen, upon an acre.

Since the beginning of the present year, I have kept a cart, a man and a woman, and two small boys who could do nothing in the field, constantly engaged in collecting and carting out manure of various kinds, and at this time, which is a season of comparative leisure with farmers, I employ an additional cart, and a few additional hands, and with my short experience I can confidently say that the labor thus employed is ten times more productive, than it would be in any other work upon the farm. I yesterday stood by for two hours where my carts were carrying kelp from the river shore, and in that short time twenty-one loads, averaging about 20 bushels, were carried out. The distance of course was short, and the kelp abundant, so that little time was lost in loading. I have little doubt that with the force exclusively devoted to this business, and with occasional assistance from the farm hands, I shall be able to manure at least one hundred acres annually. This may be startling to those who have paid little attention to the improvement of the earth, but it is not more incredible than the account given by Mr. Singleton of the Eastern Shore of Maryland, in the 2d vol. of the Farmer, of the great improvements effected upon his farm, with comparatively limited means. The accuracy of that account I was at one time disposed to question; I am now thoroughly convinced of its truth. You may find some valuable information upon this subject of kelp as a manure, in the 1st vol. of the New Edinburgh Encyclopædia. Art. Agriculture, page 270, by transferring which to your columns, you will probably benefit your readers.

When my experiments are sufficiently matured to enable me to afford any useful information to the public, I may trouble you with a communication under my proper name; but for the present, being merely seeking information from others, I subscribe myself your obedient servant,

POTOMAC.

SEA-WARE, MARSH-MUD, ETC.

Talbot county, Eastern Shore, Md.
August 30, 1831.

Mr. Smith—Sea-ware is thrown on our shores in considerable quantities, and we have had numerous banks of partially decomposed oyster-shells, but they are now nearly exhausted. Many have made their lands rich by the application of these materials, and the more modern ones—marsh-mud, and the heads of creeks. It may be encouraging to "Potomac," and such of his neighbors as have the good fortune to possess these precious treasures, to know that the annals of this county afford instances of more rapid improvement from them, aided by well managed farm-yards, than that mentioned by the late Mr. Singleton from shell-marl. That nothing has been written on the subject in this quarter is owing to the general knowledge of their value:—the time for experiments in regard to them has gone by. They have been used extensively for thirty years—partially, much longer.

One good dressing of Indian bank shells is *sufficient.* The sea weed may be applied with advantage to every new crop:—they act together better than separately—and better still combined with stable or farm-yard manure. But it cannot be expected that all this can be effected, to any considerable extent, in one year—if done in the regular course of cultivation it will be sufficient. That is, give a dressing of marsh one year, and one of shells the next time it is cultivated—or the reverse. My experience and observation lead me to recommend that the shells be dropped on every fourth or fifth *land*, or ridge, as near to each other as convenient to the carter; that is—when his team arrives within a few feet of the load just deposited let him tilt his cart. The same process to be observed in dropping the sea-ware. This valuable article acts well on all crops, and at all seasons—the sooner it is turned in the better: it loses much of its virtue by exposure—but it is a common practice to drop it during the summer on land intended for corn next year, where it lies until it is time to *list.* It is excellent for fallow. When thrown on shore by a favorable wind the most pressing jobs are postponed until it is secured, either by taking it to the field where wanted, or by heaping it a few feet above high-water-mark, to prevent its being carried off by the ebb tides. It is useless, and double labor, to put it in large heaps—if heaped in the field, in large bulks, nothing will grow on the spot it occupied for several years:—indeed a single cart load, if it lies a few months, deposits rather too much salt—to obviate this one of my neighbors distributes it in half loads. No instance is known of its introducing wire-grass or any other pest.

Marsh-mud and the heads of coves are now extensively used. Unexpected quantities and qualities of manure are frequently found:—after penetrating through a stratum of rich salted alluvial soil, well rotted marsh, emitting a strong stench, is often found. These *compost-beds,* from *six to ten feet* deep, of the best *materials* ready *to our hands*, are invaluable. Some of our landholders, who let land on shares, are so sensible of the value of these resources that they furnish a cart, team and carter, (the tenant finding food,) to be employed on them exclusively all the year. Marsh can be got out in the dead of winter—it makes an excellent dressing for the farm-yard. Oyster-shells, collected from bars by men who make a business of it, in large quantities, are sold at $1\frac{1}{2}$ to three cents per bushel to farmers, who burn them in kilns made of pine logs. The lime, and half burnt shells, are spread with shovels from the cart tail, at the rate of 150 to 200 bushels per acre, just before or after planting corn—or before seeding wheat.

Indian banks should be dug with grubbing hoes, or (if the ground will admit) ploughed up, and *shovels* used in loading. Iron pronged forks suit the sea-weed, *spades* and shovels the heads of coves and marshes. From two to five carts should be run, so that the hands employed to load may have constant work. *Single* teams are preferred.

I am no *essayist;* but hope something useful may be found in the above.

CORNPLANTER.

SEA-WEED, ETC.—MANURE.

Westmoreland county, Va.
Sept. 17, 1831.

Mr. Smith—I have to return my thanks to your correspondent, "Cornplanter," for the prompt and obliging manner in which he has responded to the inquiries made by me in my last communication. I am much instructed, and encouraged in the course which I had determined to pursue by the facts which he has disclosed. But I am a young and inexperienced farmer; and most of my time, moreover, being devoted to public and professional pursuits, I have but little opportunity, except in occasional intervals of leisure, of attending to the practical details of agriculture, or of acquiring by personal observation that minute knowledge, which is so essential to successful husbandry. Your correspondent will, I hope, therefore, excuse me, when I ask, not only for my own instruction, but also for the benefit of some of my neighbors, who are equally uninformed, and have, moreover, inveterate prejudices to subdue, that he will favor the public with another essay, in which more detailed information may be given. I have, myself, not the least doubt of the accuracy of the statement that there are instances of more rapid improvement on the Eastern Shore of Maryland, from the use of sea-weed, marsh mud, and Indian banks, than that afforded on the farm of the late Mr. Singleton, from shell marl. But there is no subject, on which there is so great a disposition to be incredulous, as in relation to agricultural improvements. And it is owing, in a great measure, to this very incredulity, that whilst improvement in the mechanic arts, and in the liberal sciences, and indeed in almost every other department of life, is rapidly advancing, agriculture, the most indispensable of all arts, is in many parts of the country completely stationary. As an instance of this incredulity, I may state the fact, that when I commenced digging in the marshes for manure, I was regarded by my neighbors as a visionary enthusiast, equally as mad as one who should seek for perpetual motion, or the philosopher's stone. The negroes were amazed; the overseer expressed serious apprehensions that the land would be *killed;* and one of the lights of the neighborhood in agriculture, completely confirmed his fears, by telling him that *he* had tried it, and he had enough "dead land" already, without attempting to "kill any more." It was in vain that I quoted the high authority of the American Farmer, and Judge Johnson; nothing could convince them of the efficacy of marsh-mud. I had the satisfaction, however, in the course of about two months, of seeing prejudice and incredulity completely subdued. Upon visiting my farm, I was met by the overseer with a smiling countenance, and informed that he was beginning to be convinced that the mud might be of some service; for the weeds were much higher upon the land where the mud had been put, than upon that adjacent to it, which was originally much better. And upon visiting it, a few days ago, I found him entirely convinced by a thick growth of crab grass, upon the land covered with the "marsh," whilst the surrounding vegetation was much less luxuriant.

But to return from this digression; your correspondent may remove the doubts that are now entertained, as to the practicability of manuring on an extensive scale, and perhaps stimulate to exertion many who are slumbering in indolence by stating the extent of the improvement effected upon a few particular farms, by the use of the means referred to; the condition and quality of the soil before the improving process was commenced; the amount of labor and capital expended; the crops made upon the land formerly, compared with its present productions; and whether the use of these means is supposed to have had any *peculiar* effect in adapting the soil to the growth of the beautiful white wheat for which the Eastern Shore of Maryland is so justly celebrated. This information in the community in which he resides may seem entirely unimportant, but he may be assured that to a large portion of Eastern Virginia, it is calculated to be of vast service. We have here a soil originally fertile, but much impoverished by a long course of barbarous cultivation. The means of resuscitating are at hand, if the public attention were only turned to them. And no greater service could be rendered to the cause of agriculture, than to convince the farmers in this part of the country of the natural advantages which they possess. They would thus be urged, if not by necessity, yet by reason, to exertion; with the hope not only of securing a competence, but of accumulating wealth, and by the desire which the loftier considerations of patriotism might inspire, of improving, fertilizing, and adorning their native land.

I fear that I have trespassed too far already upon the politeness of your correspondent, but I must ask information on one other subject. Can the "rotted marsh" found in the natural "compost beds" of which he speaks, be applied with safety or advantage immediately to a growing crop? Or does it require exposure to the atmosphere before it is fit for application? I am induced to make this inquiry because, in pursuing the instructions of Judge Johnson, in relation to marsh mud, I had applied a quantity of this "compost" (of which I have inexhaustible beds) early in the summer to land which I intended to *fallow* for wheat, and I was surprised to find, contrary to my expectations, that the vegetation was greatly advanced, almost immediately upon its application, and at this time the land exhibits unequivocal indications of very great improvement. I was led to infer from this circumstance, that Judge Johnson's instructions might have reference to a subject entirely different; and reasoning from analogy I concluded that this manure might be beneficial, when applied fresh to growing crops. But all arguments from analogy are more or less fallacious, and I should be much better satisfied with the experience of your practical correspondent.

POTOMAC.

MARSH-MUD, ETC.

Talbot county, Eastern Shore, Md.
October 12, 1831.

Mr. Smith—I do not know how I can more satisfactorily answer the polite call of "Potomac" than by giving some account of improvements made on one of the farms alluded to in my last, by the application of bank-shells, sea-ware, marsh-mud, and heads of creeks, aided by a well conducted farm-yard. These have been so remarkable as to have had a beneficial effect in this county, and I think such examples should be made known as widely as possible for general benefit.

I select this farm, *Emerson's Point*, in particular, because no one can pretend that *capital* had any agency in restoring its fertility. It lies near the mouth of Mile's river, emptying into the Eastern-branch of the Chesapeake bay, and contains two hundred and seventy-five acres. It was purchased by the father of the present proprietor, Mr. Wm. Hambleton, about the year 1790, at 40s. Md. currency—5.33 dollars, per acre,—and was occupied by a tenant, as it had been for two or three generations, until the year 1808, when the proprietor married and settled on it. The soil is a stiff yellow clay—growth chiefly pine; it was worn down to the lowest state of sterility: a considerable portion had been suffered to run into pine thickets, where the corn ridges are still visible; and it was nearly destitute of the buildings indispensable to a farmer. But the means of improvement were at hand: the proprietor knew their value, and lost no time in availing himself of them. He had *no capital* of any kind: but he was young, skilful and industrious. Having no slaves he commenced with two hired hands, and, occasionally, two boys, two horses and a yoke of oxen. The arable land was one hundred and twenty-nine acres, but his operations, for many years, were confined to ninety-nine acres—a poor field of thirty acres, distant from his resources, he left idle, unenclosed. He laid off these ninety-nine acres as follows:—two fields of 45 each, two lots, 5 and 1½, orchard and garden 2½ acres. For his first crop, to make a *push*, he selected his best land, including the old tobacco ground near the house. From forty-five bushels of wheat seeded Sept. 1807, he got a crop of one hundred and fifteen, less than three for one. In the spring of 1808 he planted corn on one half of his other field, after getting out a considerable quantity of bank-shells and sea-ware, and left the other half, *under the same enclosure*, for fallow, to be manured as opportunity might permit during the summer—and this plan he continued to follow about eight years, and would have continued it longer but for the inconvenience arising from the want of *pasture*. It is to be regretted that he did not keep an exact record of all his crops: however, he assures me that the following may be depended on as very near the truth. His first crop of corn was eighty-five barrels, his second thirty-five, of which twenty were short corn. (It may be well to mention that a barrel of corn is five bushels of *grain*, or ten bushels of *ears*.) His second crop of wheat was two hundred and fifty bushels from 45 of seed, being five and a half for one. His third crop of 350, nearly eight for one. Fourth 500, fifth 700—and so on, increasing every year, until, in the year 1816, having altered the arrangement of his fields from two of forty-five to three of thirty acres each, he reaped from sixty-seven and a half of seed a thousand bushels of prime wheat,—one half on corn land—the other fallow. This crop he had the good fortune to sell at two dollars 91 cents per bushel, and the good sense, although not pressed, to apply the proceeds to the payment of debts necessarily contracted in the erection of buildings, among others an excellent barn, and the purchase of three or four boys; and various expenses incident to a new establishment and growing family. It should be remarked also, that, until the end of the year 1818, his land was burdened with a third of the estimated rent, as dower.

No memorandum can be found of his crops for the three succeeding years, nor does he recollect the amount; but they were not so great as that just stated. He failed in one crop from defective seed which he purchased.

In 1820 he reaped eleven hundred and twenty-seven bushels from ninety of seed, thirty of which was sown on the out-field before mentioned. This, and several other crops to be noticed, he has on record. In 1823 his wheat crop from seventy-two was one thousand and thirty-nine bushels—nearly fourteen and a half for one.

In 1830, from 88 of seed he reaped fourteen hundred and ninety-seven bushels of wheat, 17 for one—one half from corn-land, the other fallow—thirty acres each—the fallow yielded *twenty-five for one*—see some account of this crop in the Farmer about July 1830.

Last year, being much occupied in repairing and building, he seeded only fifty bushels of wheat, which produced a crop of six hundred and twenty-eight bushels. All this was on corn-land except a lot of five acres, which, from seven and a half of seed, gave one hundred and fifty-seven bushels, nearly *twenty-one for one*. I have confined myself principally to an account of his wheat crops, because he could not inform me with so much accuracy the amount of his corn crops—they were generally good, seldom fallowing below three barrels to the thousand and frequently reaching four. His greatest crop of corn was in 1827, from two of his thirty acre fields, five hundred and twenty barrels.

Last year he bought five thousand bushels of oyster shells, at the cost of one hundred dollars—burnt and spread them as far as they went, at the rate of 200 bushels per acre just before planting corn, on the out-field, which got also a dressing of farm-yard manure. The crop of corn, just gathered, is fair—few in the county better.

His shell-banks giving out and the drifts of sea-ware being less abundant than formerly; about eight years ago he commenced the use of marsh, and heads of creeks, of which he thinks favorably, paying strict attention, as usual, to the farm-yard and compost heaps. He has one now, containing upwards of a thousand *skates* or double-heads, taken a few weeks ago in his seine—from this he calculates on a thousand cart loads of manure for his corn-land next spring. From their livers he extracted seventy-three gallons of oil. From experiments made last year with similar oil, he is of opinion that it is a remedy against the worm, so destructive to the peach tree. He does not spread sea-ware so thick as I recommended in my last, on account of the difficulty of ploughing in—nor would he recommend the shells to be put so near—intervals of five lands should be left: between marsh, &c. three. I readily yield to his superior judgment.

For fourteen or fifteen years past he has made great use of the sickle—much of his wheat being too rank for the cradle. He ploughs about four inches deep, and cannot be induced to go deeper—in good land sows a bushel and a half to the acre, in poor one bushel; breaks his fallow ground about the middle of June—cross ploughs soon after harvest—rolls and harrows—and, if likely to be grassy, gives it a third ploughing—puts in with the plough, very shoal, in narrow ridges, keeping his manure near the surface. I consulted him respecting the question of Potomac: he is of opinion that no danger is to be apprehended from the application of rotten marsh to growing crops, if put on in reasonable quantities.

It will be observed that this farm, notwithstanding its rapid improvement, has been *severely cropped*,—present gain, from necessity, being the main object. The proprietor was not insensible of the value of clover as an improving crop; but he could not let it remain long enough to be of much use to the land. He never cut but one field crop of it, 1825, upwards of fifty tons from thirty acres. Hereafter, having got his out-field in pretty good order, he will adopt the four-field system, cutting one field of clover every year. His regular force is five able hands, with some small boys,—he runs three ox and two horse-carts—has never kept an overseer, and for many years labored daily. I have not thought it necessary to state his root crops—the produce of his hog-pen, &c., supposing that his principal crops would clearly show the progress of improvement.

There are three other farms within a few miles of Emerson's Point, on which wonderful improvements have lately been made. I mean those of Colonel John Tilghman, Mr. Edward N. Hambleton, and of Doctor John Barnett. I hope they will favor the public, through the columns of your useful paper, with an account of their management, crops, &c. There are other farms in the same neighborhood which deserve honorable notice and minute description; in particular, those of Mr. Rigby Hopkins, Major Wm. Caulk, Mr. Joseph Harrison, and Mr. Stephen Harrison, improved, principally, by the use of *shell-lime*.

CORNPLANTER.

From the Lexington Gazette.

AGRICULTURAL SHOW AND FAIR OF THE AGRICULTURAL SOCIETY OF ROCKBRIDGE.

October 11*th*, 1838.

The society upon being called to order, by the president,—Professor GEO. D. ARMSRONG, of Washington College, delivered the annual address.

The premiums were awarded as follows:

For the best stud colt under 4 and over 2 years old, to Jno. McKamy of Augusta.

For the best brood mare, to James Johnson.

For the best filly, to Saml. McD. Reid.

For the best bull, to A. T. Barclay.

For the best milch cow, to William Moffat.

For the best heifer, to Thos. Wilson.

For the best bull calf, to Thomas Wilson.

For the best boar—A premium was awarded to two of equal merit, viz.: to Thomas Wilson and A. T. Barclay.

For the two best rams, to Jno. Jordan and A. T. Barclay.

For the two best ewes, to Jno. Jordan and A. T. Barclay.

For the handsomest and best counterpane, to Mrs. R. Grigsby.

For the best piece of sheeting, to Miss Johnston.

For the best piece of table linen, to Miss E. Finley.

For the best pair of blankets, to Mrs. Jno. Jordan.

For the best man's saddle, to Jno. T. Figgat.

For the best specimen of ploughing, to Wm. Moffett.

The committee recommend to the directors, to award premiums for counterpanes to Miss Grigsby and Miss Finley—for hearth-rug, to Miss Christian—for a piece of flannel, to Miss Alexander—for a cheese, to Miss Grigsby.

On motion of Samuel McD. Reid, it was resolved, That hereafter, no premium will be awarded to any person who shall not have been a member of society more than six months previous to the awarding of such premium.

On motion of C. P. Dorman, it was resolved, That the president and directors of the Rockbridge Agricultural Society, prepare, and address a memorial, to the general assembly of Virginia, on behalf of this society, asking its incorporation, and praying the aid of the state to the cause of agriculture, and agricultural societies.

On motion of John F. Caruthers, it was resolved that the corresponding secretary communicate the foregoing resolution, to the several agricultural societies of Virginia, and solicit their immediate and active co-operation.

On motion of C. P. Dorman, it was unanimously resolved, That the thanks of this society are due to Professor GEO. D. ARMSTRONG, for the able and appropriate address this day delivered by him, and that a committee be appointed to communicate our sense of its merit, with a request that a copy be furnished for publication.

Committee appointed by the president under the foregoing resolution—C. P. Dorman and A. T. Barclay.

The society then proceeded to the election of officers for the ensuing year, when

Maj. John Alexander was elected president.
Thos. Wilson, vice president.
J. T. L. Preston, corresponding secretary.
A. T. Barclay, recording sec'ry.
Henry B. Jones, Matthew White, & Robt. McCluer, } *Treasurers.*

And Jos. Cloyd, Wm. Moffir, R. R. Barton, Alfred Leyburn, Saml. McD. Reid, Jno. F. Caruthers, C. P. Dorman, Saml. Wilson, Jonathan Brooks, Wm. Houston, and Wm. Inglis, *Directors.*

Resolved, That the next annual meeting of this society be held on the 3d Thursday of October next, at Fancy Hill.

Adjourned,
SAML. WILLSON, Pres't.

Teste,
A. T. BARCLAY, Sec'ry.

From the Salem Observer.

THE SNOW OWL.

Taking a stroll among the market wagons that crowded our streets, on Wednesday, laden with poultry and other agricultural products, we noticed in one of them, a living specimen of the snow owl, which was captured in Topsfield. Every season, between the months of November and February, several of these beautiful birds are seen hovering around—always exciting a considerable degree of interest; their movements are generally so closely watched, that not a few of them are taken by the lovers of the chase and others.

They are inhabitants of the coldest and most dreary regions in the northern hemisphere, being constantly found in Iceland, Norway, Lapland, and the country adjoining Hudson's Bay. In the Atlantic states they are merely a winter visiter, and in their migrations wander along the sea coast as far as Florida, sometimes stretching interiorly, as they are met with in Ohio and Tennessee, and have been seen in the vicinity of the Red and Arkansas rivers. In Massachusetts and Maine they are more abundant than in any other part of the United States.

To protect this bird from the external cold to which it is exposed, especially in its native haunts, nature has bountifully provided it with a complete encasement of the most soft, warm, and elastic plumage beneath the outer covering of feathers, and so closely matted together that it is difficult to penetrate to the skin.

Its short and curved bill is nearly hid by the mass of feathers that cover the face; the feet are covered with a long, thick hair-like plumage, resembling very much those of a dog, the claws, which are curved, black and sharp, only being visible; the eyes are deep sunk under projecting eye-brows; and are of a bright yellow color; the general color of the body is white, and usually more or less marked with spots of pale brown, according to the age or sex of the individual.

AN ALLIGATOR IN NEW YORK.

The New York Sun says that a stonecutter employed in a shantee near the corner of Seventh street and avenue C, was on Thursday breaking the ice in a pond in a vacant lot in that neighborhood, when he was suddenly and not very agreeably surprised. No sooner had he made a hole than out jumped *a large alligator!* He raised an alarm and the animal was forthwith attacked and despatched without mercy. He measured from head to tail seven feet ten inches. The Sun says that one of these animals was picked up in the East river last July. But how they came there, or for what purpose, no one can tell.

From the Journal of the Franklin Institute.

ON THE PART WHICH THE SOIL ACTS IN THE PROCESS OF VEGETATION. MEMOIR READ AT THE ACADEMY OF SCIENCES, BY J. PELLETIER.

Translated from the Journal de Pharmacie, for the Journal of the Franklin Institute, by J. Griscom.

The ground is the support and nurse of plants; in its bosom, by means of roots, they seek for and find a portion of their nourishment. But to this truth, so simple and obvious, are attached questions of a complicated nature, and of the highest interest to physiology and agriculture. With one, among others, I have been particularly arrested, and it has been the object of my meditations. Before I enter upon it, permit me to bring into view some facts which appear to be necessary to the discussion of it.

The earth is not an elementary substance. Its exterior bed, the residence of plants, is formed of various metallic oxides, silica, alumina, lime, to which are often joined magnesia and the oxide of iron. It contains, moreover, the detritus of organic matters which had before possessed life and existence. Thus constituted, and under the influence of air, water and imponderable fluids, the earth is eminently fit for the development of germs deposited in its bosom, and to the growth of the vegetables which flourish upon it.

The necessity of the presence of organic matter, to constitute a soil, endowed in the highest degree with vegetative force, cannot be considered doubtful. In vain did Tull, in 1773, attempt to maintain that distinct earthy particles formed the sole nourishment of the plant. This theory was overturned by the positive experiments of Duhamel who had at first embraced it. Nevertheless, if it is certain that the presence of organic matter is a condition of fertility, we may still ask whether it is so *essential* a condition—such a *sine qua non*,—that a plant cannot vegetate in a soil totally deprived of organic matter, particulary if other circumstances, such as the presence of water and carbonic acid, be united with it.

Numerous experiments have been made to resolve this question. Many of them are contradictory. The greater portion, from the high interest which they involve, ought to be discussed and repeated with care. But another question not less important, and which I think ought to be first ascertained, is this: *What influence have soils themselves in the act of vegetation?* To this question I at present confine myself.

A vegetable soil, in its normal state, must be considered a mixture of various earths, that is, of metallic oxides.

Every soil devoted to agriculture, is in general, says Chaptal, formed of a mixture of silica, lime and alumina, and in support of this assertion he cites various analyses.*

Davy confirms this statement in his Agricultural Chemistry, and, in fact, not a single instance of a fertile soil has occurred, which consisted of only one earth, or even of two, such as lime and silex, silex and alumina, alumina and lime.

In another passage in his *Chimie Agricole*, Chaptal expresses himself thus:

"A mixture of lime, silex and alumina forms the basis of a good soil; but that it may possess all the desirable qualities of good land, these ingredients must exist in certain proportions, which analyses of the best soil can only establish.

If we consult the analysis of the most fertile soils, we find that fertility diminishes in proportion to the predominance of either of these principal earths, and that it becomes almost null when the mixture has the properties of only one of them."

Complexity of composition is therefore, in general, a condition of fertility in a vegetable soil. The loose earth which we find in valleys arising from the decomposition of primitive rocks, makes generally an excellent soil. Now we know that granite, composed of quartz, feldspar and mica, and frequently amphibole, must yield by its composition, a soil containing silica, lime, alumina and a little magnesia and sometimes potash. Soils originating, on the contrary, from the decomposition of more simple rocks, siliceous limestone, for example, are lighter, and suitable only for a limited number of plants; they require, says Chaptal, to

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* A very fertile soil in Sweden was found by Bergman to consist of:

Coarse Silex,	30	56
Silica,	26	
Alumina,		14
Carbonate of Lime,		30
		100

A fertile soil in Middlesex gave Davy—Siliceous Sand 3-5; the remaining 2-5 consisted of

Carbonate of Lime,	28
Silica,	32
Alumina,	39

Analysis of a fertile soil in Touraine:

Sand,	49
Silica,	16
Alumina,	10
Carbonate of Lime,	25
	100

A very fertile compost, formed by Tillet consisted of clay 3-8, pulverised lime-stone 3-8, sand 2-8, corresponding to

Course Silex,	25
Silica,	21
Alumina,	16.50
Carbonate of Lime,	37.50
	100

be enriched, and are valuable only in moist climates. Land originating in the decomposition of trap, basalt and other rocks of complicated elements, possess, on the contrary, great natural fertility.

"Rivers," he further adds, "receive in their courses other streams whose mud is mingled with its own, and it often happens that the united sediment of two rivers possesses greater fertility than that of either separately."

This then appears to be an established fact, that a soil (independently of organic matter) is the more fertile as its composition is more heterogeneous.

If we seek for an explanation of this fact, we find in authors only vague opinions and doubts; the greater number merely state the facts without attempting an explanation.

Agricultural chemists, who indulge more in theory, appear to regard the cause of fertility as dependent on the physical character of the soil rather than on its chemical constitution. Thus Davy having observed that different soils attract moisture with different degrees of energy, and having discovered, as he believed, that the most hygrometric soils were the most fertile, he ascribes their superior fertility chiefly to this property. But Davy has not proved that the hygrometric force of a soil bears any given relation to its composition.

If this attraction of moisture were the principal cause of fertility (abating the influence of manures) we perceive no necessity for the combination of the three earths in the constitution of a soil of the first quality. Indeed a certain quantity of alumina in a soil otherwise entirely siliceous, or entirely calcareous, a certain proportion between the adhesive and the loose or sandy portions, would be sufficient to confer this hygroscopic quality, and of course the fertility of the soil. But we have nothing to confirm this supposition.

The hygroscopic quality of a ternary soil may then be considered as an *element* of fertility, but only a secondary element, subordinate to its chemical composition.

The property of becoming more or less heated by the rays of the sun, which appeared to Davy to hold a relation to the fertility of different soils, appears to me to be also a secondary cause. In the cases referred to by him there was a mixture of black mould, and he did not sufficiently consider its fertilizing action as a manure upon the soil.

To me, it appears evident, that the mixture of the various earths which compose a soil, acts upon vegetation and determines its fertility *by an electro-chemical force*, whose action has been clearly recognized in other circumstances, but not yet brought into view in the case now under consideration. In the first place, let us observe, that it is a fact, though the truth may have escaped observers, or rather, it has not yet been brought under a formula, that the silica, alumina and lime which enter into a good vegetable soil, must not be combined with each other, but simply mixed, the lime being in the state of a carbonate. A triple silicate of lime or alumina, in which the silex, lime and alumina should be in the proportions which constitute the best arable land, could not, even if thoroughly divided, furnish a soil essentially adapted to vegetation. If, in a fertile soil, composed of a mixture of lime, alumina and silica, a combination between these three oxides should begin to take place, the ground would become cold and steril. Now, it is certain, that in a mixture of these three ingredients, a force does exist which tends to combine them. The silica and alumina are, in relation to the lime, electro-negative bodies, and in their presence the lime must acquire a contrary electricity. According as external or mechanical movements of the soil, or other foreign causes, shall bring these molecules within greater or less distances from each other, and group them in various ways, electrical piles will be established, discharges will take place, producing various tensions, and the earth will thus, if we may use the term, become animated. The electric fluid which pervades it will excite the stomata of the radical fibrils, determine the play of the organs, and the absorption of the fluids requisite to the nourishment of the plant. The radical fibrils, and the capillary roots impregnated with moisture, will become so many electrical conductors, engaged in transmitting electricity, certainly as necessary to life as light and caloric.

The merit of a theory is, that it accounts for observed facts, enables us to foresee what will take place under particular circumstances likely to happen, and indicates the considerations which it may be desirable to bring about with a view to useful results.

Let us inquire whether the theory now presented, fulfils these conditions:

Suppose a chalky soil. To improve it, we add argillaceous marl; i. e. to the lime which predominates we add silica and alumina. *To the positive element which we found alone, we add the negative elements which we found deficient.*

Will it here be said, that "chalk is so compact that the roots cannot penetrate it, or so split up that water passes through it like a riddle, and that the marling is simply designed to change this physical condition?*

But, if the object was merely to divide the chalk, in order to change its physical condition, a calcareous sand would accomplish this object, and yet it never came into the head of an agriculturist to improve his chalk by limestone, while Gordan de Saint-Memin produced a magnificent vegetation by a mixture of chalk with heath sand.

In a piece of ground belonging to Chaptal, the soil was clayey and rather barren; below was a layer of black earth. Chaptal went to work empirically, dug up the ground and mixed the two beds together. Contrary to his expectations, the sterility was increased. It was not till the fifth year that the ground acquired a common degree of fertility, that is, when all the iron had passed to the state of peroxide, and the land, black as it was, had become of a deep, bright yellow. Chaptal asks, if, in this case, the black oxide is injurious to vegetation, either by itself, or in reference to the oxygen.

In our theory, the fact explains itself, and might have been foreseen: the black oxides of iron (fer oxidule d' Haüy) is a combination of protoxide and sesquioxide of iron, a substance *indifferent* in relation to silica and alumina. Exposed to the air, the combination is destroyed, the iron passes to the state of peroxide, susceptible of union with silica and alumina. Yet, under such circumstances, it was not worth while to mingle the two

* G. Dict. d'Agriculture, article *Craie*.

beds, since five years were lost in attaining a common degree of fertility.

The theory which we have adopted, is applicable, likewise, in the happiest manner, to the operation called marling. Marl is not a simple mixture of silica and alumina with more or less of carbonate of lime. Its base is argillaceous and calcareous silicates; some mineralogists consider it even as an oryctognosaical species.* It is on this account that plants cannot vegetate in marl which has been long exposed to the air, even when the silica, alumina and lime are in the proportions which form good arable land. By exposure to the air, carbonic acid *destroys the combination* which existed between the earths, and it is then, and then only, that marl will enrich the soil. In this case, if the negative element prevails, as in the case of argillaceous marls, it becomes excellent for calcareous soils; and marls called calcareous are in their turn advantageous for argillo-sandy land.

It has been remarked, that the alkaline and earthy salts, which, in a certain quantity, injure vegetation, produce a good effect when employed in small doses. Chemists and farmers have sought to explain this action of saline compounds. Some have thought that certain salts were good for plants, as some are for animals—that salts, and even earths, formed part of the food of vegetables; others, on the contrary, that they act principally as stimulants to vegetation. Without denying that earthy substances may enter into the constitution of a vegetable, to unite and give strength to the parts that are to support the organs, like phosphate of lime in the bones of quadrupeds, I may remark, that with a few exceptions, the presence of any salt is not absolutely necessary to vegetation. Thus, for example, borage and lettuce, whose extracts contain much nitre when they grow in highly manured soils, do not contain any sensible portion of it when cultivated without dung. I therefore rather incline to the opinion of physiologists, who think with M. Decandolle, that salts act as excitants or stimulants. But, what is the meaning of excitation? At the present day, science no longer admits of those vague explanations which consist of nothing but words. I understand by excitation, the eminent property of conducting electricity which salts communicate to water. It is in this manner, as it appears to me, that nitrate of potash acts, in the prodigious energy which it gives to vegetation. It is probably in this way that sulphate of lime acts; that is to say, by rendering the water a better conductor, though, in this case, the effects appear to me to be complicated, and to be worthy of direct experiment.

Thus far, for greater simplicity, we have considered lime as free, in speaking of the mixture of silica, alumina, and lime, which constitute a soil: now the lime is in the state of carbonate, but it does not, in that state, cease to be an electro-positive element in relation to silica and alumina. This circumstance allows us to explain an important vegeto-physiological fact. The carbon in vegetables is produced mostly, if not entirely, by the decomposition of the carbonic acid which they absorb not only from the air, but from the ground: such is the opinion of the celebrated Decandolle. This carbonic acid, furnished by the ground, appears to enter into the vegetable at the moment of its liberation, probably dissolved in the water which the soil contains. It is absorbed by the spongioles of the radicules; it ascends with the sap, urged forward as by a *vis à tergo*. But how is this carbonic acid produced? In certain manured soils, and in superficial portions of the earth, penetrated by the air, we may conceive it to be formed by the re-action of oxygen upon the carbon of organic detritus; but at those great depths which are attained by the roots of oaks and cedars of a hundred years old, how can the carbonic acid be developed? How can the oxygen and organic matter penetrate to such depths? In our theory there is no difficulty. Carbonic acid comes from the lime, on which the silica and alumina act slowly but continuously to form silicates.*

Thus, then, at certain depths, and under influences but little understood, silica would decompose carbonate of lime, while at the surface of the earth, and under the influence of exterior agents, the silicates would be decomposed by carbonic acid produced by the reaction of the oxygen of the air on organic detritus—an admirable and providential rotation, which re-establishes the equilibrium, and incessantly tends to the rejuvenescence of nature.

The last corollary of my theory—the decomposition of silicates by exterior agents, and particularly by carbonic acid, cannot be called in question. It has been established by M. Becquerel, under circumstances in which the force of cohesion might seem to present a serious obstacle. I allude to the decomposition of the feldspar of granite, and the formation of kaolin. The analogy is here so strong that I must render the homage of my first conception to the distinguished academician I have just cited.

The fact of the decomposition of carbonate of lime by silica in the interior of the earth is equally supported by experiment and observation. And, first, if, in proceeding to the analysis of a vegetable soil, when the coarser siliceous sand has been separated by agitation and deposition, and the carbonate of lime has been removed by weak acids, we examine the finer terrene substance which has resisted the weak acids, we find that it is not alumina, as Chaptal indicates, nor silica, as is stated in various works, but that it consists principally of veritable silicates of lime, of alumina, and of oxide of iron.

Still, it may be objected that these silicates are anterior to all vegetation; that to prove their recent formation and daily production, requires direct experiments. These direct experiments are among the objects which I wish to undertake. They require much time. But to prove truth, are we to depend solely upon new experiments

* Brochant's Mineralogy.

* Animal manures may contribute to the decomposition of silicates, not only by the carbonic acid which they form by absorbing oxygen from the air, but in producing such substances as the FAT ACIDS, which have a tendency to unite with lime and to eliminate the silica which is combined with it. M. Raspail, whose talents we are glad to acknowledge, without sharing in all his scientific opinions, appears to us to have explained the siliceous petrefactions that are found in chalk, in a very happy manner by the action of animals entombed in siliceo-calcareous beds.

[*Physiol. Vegetale*, t. 2. p. 339.

peculiar to him who advocates it, and are we forbidden to rely on the labors of our predecessors? Certainly not. I may therefore again refer to the interesting researches of M. Becquerel, and bring into view those mineral species which he has formed in his laboratory, and which present all the characters of their natural congeners. Neither can I omit to mention the important fact of the artificial formation of feldspar by Cagnard de Latour.

There is still another objection which may be made to the theory now presented. If, in this mixed state, the earth acts by virtue of electro-chemical forces, why are three earths requisite to the construction of a good soil? Ought not silica and lime, or lime and alumina to be sufficient to produce, in each element of the mixture, an opposite electricity? It is easy to answer this objection also, by a reliance upon facts well known to mineralogists: it is certain that the binary silicates are more rare in nature than the ternary silicates, and that their mass in particular is less powerful: silica has therefore a greater tendency to combine with lime and alumina together than with either of these earths separately. Hence, we may perceive, that the union of the three becomes necessary to constitute a soil endowed with the highest degree of vegetative power.

If the ideas which I now submit to the academy appear to deserve any attention, I propose, on the return of the favorable season, to renew the inquiry, and to devote myself to the labor of positive experiment—experiments, which, whatever may be their results in reference to my theory, will at least have the advantage of eliciting facts which may be friendly to agricultute, that science which is so prominently stamped with the character of utility.

THE SYSTEM OF PLUNDER PRODUCED BY THE SYSTEM OF IRRESPONSIBLE BANKING.

[The following letter, by Dr. Hagan, editor of the Vicksburg Sentinel, and a bank commissioner, presents a picture of effects which have not yet been produced so completely in any state except Mississippi, but which may be produced any where by the same cause, viz.: banking corporations not being held strictly responsible for all violations of their legal and moral obligations. And whatever may be the letter of the law for restraining bank frauds, the restrictions and penalties imposed are in fact made null and void, by the state and the bank being in any manner partners in trade. The partnership, and (supposed but not real) identity of pecuniary interest of bank and state, (for the state partner is sure to be the loser,) is the great evil of the system in Virginia. If banks were permitted to trade only on their own capital and credit, and without having the government for a partner and supporter, then there would be much less danger than now threatens, even if in that case they were to push their operations to the utmost wants of the trade, and judicious enterprise, of the country. Make them as much responsible for over-trading, and for incurring obligations which they cannot perform, as are all other corporations, and all individuals, and there would be no greater danger of their running into excess. But who is it, whether a private or corporate trader, who will not, for the sake of greater gain, incur obligations which cannot be redeemed, when knowing that so soon as the penalty is about to be incurred, the government, the strong partner in the firm, will step in to ward off the threatened blow, and annul the penalties incurred, and about to be incurred?—ED. FAR. REG.]

From the Mississippi Intelligencer.

We feel it to be a sacred duty that we owe to the cause of justice, to warn the public against the infamous schemes which are now being concocted for the unholy purpose of robbing the community of their honest earnings. Every hobby, from the theory of the alchymists to the charms of animal magnetism, has had its day of triumph; but the present seems to be the age and the supremacy of swindling in Mississippi. Unless the people arouse from their lethargy and put down the nefarious band of robbers who are now maturing the most extensive system of speculation and fraud that ever disgraced a civilized country, the character and the prosperity of the state will receive a fatal blow. A high-handed system of plunder has been carried on by most of the banks in this state for the last twelve months. The people begin to feel and understand the effects of this system; but they have no idea of the deep and damning conspiracy by which the swindlers contemplate the plunder of the community. We had but an imperfect idea of the extent and the enormity of the swindling and corruption of most of the banks in this state. The chartered, and real estate or unchartered joint stock companies for the issue of paper money, seem to vie with each other for supremacy in the base art of swindling the people out of their property; and we now call on the public, as they regard their own interests and the prosperity and honor of their country, to be on their guard. The banks swindled them out of the principal part of last year's crop, and they are bent on getting possession of the present. The people were deceived by the falsehood and knavery of the banks last year; but it will be their own fault if they permit the banks to rob them of this crop after this warning and past experience. The northern counties of the state are more cursed with banks than even the southern counties; they are springing up three or four in almost every county, and in many instances the unchartered or real estate banks seem to be more infamous than those that swindle under the *forms* of law. But it seems that this state is not sufficiently extensive for these plunders; and they have extented their operations to Texas. We have been credibly informed that the "Oakland Bank," "one of the machines for making money," has despatched a pair of saddle-bags full of their notes to Texas, in order to obtain the property of the people of that country for their worthless trash. It is said that the joint stock company of this county has passed off in Texas fifty thousand dollars of their paper, which is probably not worth more than a dollar a bushel. We know that it will not now pass in the very town in which it is issued, though travellers have it imposed upon them at a distance of hundreds of miles. Banks whose charters required the stock to be paid in "in specie or the notes of specie paying banks" have been organized without a single dollar of either having been "paid in," and now these same banks are issuing and flooding the country with thousands and tens of thousands of their notes. These notes are put in the hands of agents in every part of the country in order to be advanced on the present crop of cotton; and each agent exercises banking privileges! It is in this way that the banks intend to rob the country of the proceeds of its industry. They hold out the impression that as soon as they send the cotton to market they will redeem their notes with the good money which cotton will always command; but as soon as they get possession of valuable property for their false promises to pay, they laugh at their note-holders, and use the funds with which they ought to redeem their promises, in speculations in pork, bagging and bale rope, and in purchasing up their own or their neighbor's paper at 30 or 40 per cent. discount, or the lowest price for which it can be obtained in market, and the pork, &c., is again sold to the people at two prices.

Every class of men who can exercise an influence in pursuading the honest and unsuspecting planter to exchange his cotton for this irredeemable and worthless trash, will be sought by the banks to be enlisted in this unrighteous and unholy operation. Influential men of all parties are engaged in it. Whigs, Democrats, and we are sorry to say, even Nullifiers, from whom we would expect better things, are found playing this swindling game. Every sense of justice and lofty moral feeling seems to wither and die at the approach of this odious and avaricious spirit of banking. Members of the legislature, members of the church and ministers of the gospel may be found embarked in this infamous speculation. The saddle-bags full of "Oakland" notes, (already alluded to,) which are probably not worth more than as many oak leaves, have been entrusted to a distinguished reverend gentleman to be circulated in Texas. By prayer and the assumption of piety he will more effectually succeed in disarming suspicion and in imposing on the people. He will, unless this notice arrests his swindling career, soon obtain leagues of Texas land for the contents of his saddle-bags. Men who have heretofore borne good characters, and who would scorn to pick pockets or steal a dollar from their neighbor, have now no hesitation in swindling to the amount of thousands. What is the difference between picking a man's pocket of 50 dollars, and the directory of a bank conspiring together to render 1000 dollars of their issues worth only 500 dollars. If ten mechanics receive each one dollar of this money for their labor, or ten merchants the same for their goods, each of the ten directors might as well filch fifty dollars from the pocket of one of these note-holders. The moral turpitude is the same. The very men engaged in this business will acknowledge its impropriety; but justify themselves by saying others are engaged in it, and we must in self-defence take a hand in the game. If we do not we will suffer the loss without receiving any of the profits. Now if the whole world could live in prosperity and happiness, by swindling, this might be a very good argument. But the very idea is repugnant to every principle of common sense or common justice, without which the elements of society cannot cohere.

The notes of one of these establishments will not pass 11 miles from the place of issue unless at enormous discount. In paying for our dinner a short distance from Holly Springs, we had our choice to pay 50 cents in irredeemable shin-plasters issued hundreds of miles off, or 75 cents in McEwen, King & Co.'s notes! Those who issued this paper might with as much justice have stolen my property to the amount of one-third of their notes which I spent after taking them in payment of debt; and yet it is said that this institution intends to throw out two or three hundred thousand dollars more of its paper and exchange it for cotton!

Now as it is impossible for a cheap or spurious currency, and a sound one to circulate together, the above evils will curse the country, until public indignation shall have banished them from circulation, or until the laws of the country shall have provided apartments in the penitentiary for all men engaged in this nefarious swindling. As the latter is necessarily a work of time, we now call upon the people to adopt the former. Every honest man is interested in putting down this system of robbery. Let the honest merchant, mechanic, planter, and professional man meet and declare unanimously not to receive any of these false promises to pay either in payment of debt, or for cotton, or for merchandise. Now is the time to destroy these worse than Egyptian plagues. Let the planters refuse to take their paper in payment for cotton. If they are indebted to the banks, let them sell their cotton for good money, and purchase up the trash to pay the bank debts. This will be an effectual mode of disinfecting the country, and eradicating one of the most loathsome diseases that ever afflicted a people not under the special vengeance of the Deity. If the people do not pursue this plan, but place their cotton again in the hands of the swindlers, they may prepare to pay 40 or 50 dollars a barrel for pork next year. Their currency will also be worth about 50 cents in the dollar, and the banks will reap another glorious harvest, buying up bank notes, extorting from the planters and mechanics about three prices for provisions, bagging, bale rope, &c., and finally they will destroy the whole planting and mercantile interests of this country. The honest portion of the community is called on by every consideration of justice, of patriotism, of self-respect and self-defence, to consult together and unite in one solid phalanx to resist the desolating march of these bold and daring swindlers.

Some of the banks will resort to every trick and device to deceive the people this year and to get the control of the present crop of cotton. They took the lion's share of the last crop, and it will require some ingenuity to cheat the planter again. Last year they held out the idea that they would check on the north in a few weeks and make their paper good; this year they will be compelled to raise the value of their paper, which they will do about the commencement of the season. They will then induce the belief that they intend to resume specie payments every month. But let the people have nothing to do with their paper or their promises till they commence paying specie. They were deceived last year; this was the fault of the banks; if they are plundered this year, the fault will be their own. When the report of the bank commissioners shall appear, the oldest swindlers will be astounded at the scenes of speculation, corruption and fraud which modern banking has given rise to in this state.

JAMES HAGAN.

From the Farmers' Cabinet.

STATEMENT OF THE CULTURE AND PRODUCTS OF A LOT, THROUGH A SERIES OF YEARS.

Catawissa, Columbia county, Pa., Oct'r. 11, 1838.

Dear Sir—Knowing the deep interest that you have taken in the promotion of agriculture, and possessing something of the same spirit, induces me to communicate to you the manner that I have pursued in farming a lot, containing three acres and three quarters, adjoining our town. I have also farmed 130 or 140 acres to very good effect, a part of which has produced quite equal to the lot above mentioned. The lot is on the second rise from the river Susquehanna, and was formerly covered with yellow pine saplings—the soil is rather light—I purchased it 14 or 15 years since. I farmed it for seven or eight years with wheat and clover alternately, mowing the first crop of clover and ploughing down the second, and sowing wheat after one ploughing, and harrowing it in. I have had 40 bushels of clean wheat to the acre in this way of farming, and found my land to improve. In the autumn of 1833, I sowed timothy seed shortly after my wheat, and in the spring following clover seed also, and had a good crop of wheat in 1834.

In July 1835 I cut $16\frac{1}{2}$ tons of excellent timothy and clover hay from this piece of land, say worth $12 per ton, amounting to	$198 00
July 1836 cut $14\frac{1}{2}$ tons of hay at $12	174 00
July 1837 cut $15\frac{1}{2}$ tons of hay at $12	186 00
Oct. 1838 had 636 bushels of corn in the ear from $3\frac{1}{2}$ acres of it, say 318 bushels of corn at 75c. per b.	238 50
Oct. 1838 had from $\frac{1}{4}$ of an acre of headlands of lot, 30 bushels of potatoes at 75 cts. per bushel	22 50
Oct. 1838 had 200 pumpkins grown among corn at 1 ct. each	2 00
Prod. of $3\frac{3}{4}$ acres for 4 successive years	$821 00

In the statement of the corn I have not included 10 or 12 bushels of ears, sold or taken from the lot for boiling. The crop is rather extraordinary for the season. Last fall I ploughed down the sod that had been mowed for the three previous years, which sod had been well manured the spring before—early this spring it was well harrowed, and at planting time it was furrowed out three feet apart each way, and four grains put in each hill, and two rows of potatoes planted around the lot. The cultivator was principally used in dressing the corn, and at the last dressing, one half the lot was reduced to two stalks to the hill, leaving three stalks in the other half, and taking care to let the thriftiest plants remain. In furrowing out, care was taken not to turn up the sod.

On examination of the ears, it was found that where there were three plants to a hill they were more numerous, but where there were two only, the ears appeared to be larger. It was the large yellow corn that was grown, and some of the ears were eight inches in circumference, and many of them from 13 to $14\frac{1}{2}$ inches in length. The seed was taken from stalks that had two or three ears on each, taking the upper and the best one. The lot has been sown with wheat since the corn was taken off; it had been topped, and as the ploughing progressed, a man and boy pulled up the stalks and placed them in the furrows, with the but or root end towards the plough, and in this way the whole of them are completely buried, and if I mistake not, will decompose and make a good manure. The ploughing turned up the old sod which had not been disturbed during the season, and it presents at this time on the surface the appearance of a rich coat of manure, and I would not exchange the chance for wheat from this piece for that of any other of the same size—if I live till next harvest I will let you know the result.

I think there is an average crop of corn in the valley of the Susquehanna, from this to Wilksbarre, say 45 miles. The crop of hay never was exceeded; wheat excellent; rye and oats rather light, buckwheat very light, having been destroyed in most instances by the frost in the early part of September.

Respectfully, your friend,
JOSEPH PAXTON.

From the Library of Useful Knowledge.

FLEMISH HUSBANDRY.

Of the Cultivation of Roots, Potatoes, Turnips, Beets, Carrots, Parsnips, Chicory.

If we are indebted to the Flemish for the introduction of clover and turnips into our agriculture, they are equally so to us for the valuable potato. This root is now become a great substitute for corn throughout all Europe, and its influence on the population cannot be denied; when corn fails potatoes are generally most abundant, and thus prevent that distress, which is so great a check to population. In Flanders potatoes form a part of every rotation, the light soils being peculiarly adapted to the growth of this root; and as a great part of the produce is consumed by cattle, and thus gives an adequate return in manure, the objection often made to its extensive cultivation, that it exhausts the soil and returns little to it, is not well founded. Where it not for potatoes to keep the cattle during the latter part of the winter and beginning of spring, when the supply of turnips fails, a much smaller number could be kept; for hay is a dear fodder in most parts of Flanders.

Potatoes were at first only known as an esculent root in gardens; and it was a long time before their real value was found out. In 1740 they were for the first time sold in the market of Bruges, in consequence of the zeal of an individual of that town, Mr. Verhulst, who distributed some sets gratuitously to the farmers in the neighborhood. From that time the cultivation increased rapidly, and spread all over the country. The varieties which are mostly sold in the towns are the earliest and best flavored, which are chiefly raised in sheltered gardens. The plant being a native of a warmer climate cannot bear the least frost. It is therefore not safe to plant it in the fields before March or April. The sets which are planted to produce an increase, are not seeds but buds, and as such perpetuate the qualities, good or bad, of the parent stock. Each variety proceeds from some original plant raised from seed, and is subject to age and decay with its parent. Hence varieties continually degenerate or wear out, and fresh or new varieties must be produced by sowing the seeds; recent experiments and observations fully bear out the truth of this assertion. It is therefore not sufficient merely to find a superior variety, the age of the parent plant should also be noted. Some will last longer than others, but all old varieties sooner or later show marks of decay; and the sooner they are exchanged for younger and more vigorous the better. In Flanders the principal crop of potatoes is planted in April. Potatoes require much manure to give a great return, although those which grow in poor soils are much pleasanter to the taste. For cattle, however, quantity is of more consequence than flavor. The soil in which potatoes are to be planted should be well prepared by deep and repeated ploughing, or what is still better, by trenching with the spade. In Flanders the sets are planted in rows two feet wide or more, and the same distance between the sets, so that each plant may have the earth drawn up to the stem, and a small hillock made round it. Sometimes the land is ploughed and manured as for other crops, excepting that the quantity of manure is at least double the quantity usually put on for corn. The sets are then dropped into holes regularly made with a blunt dibble, and filled up with earth. These sets are either small potatoes picked out for that purpose, or larger cut into pieces, taking care that there shall be at least two eyes or buds left in each piece. When potatoes are planted to any considerable extent, the method is similar to that which we described for beans, the furrows being proportionably deeper; the sets are dropped upon the dung in every second or third furrow about eighteen inches apart, and covered by the return of the plough. In this manner nine or ten bushels of potatoes will plant an acre. The crop averages about three hundred bushels, if the land is well prepared, and the potato plants have been well hoed and moulded up. This is not a very great return, considering the quantity of manure. The quality of the potatoes depends on the nature of the soil as well as on the variety planted; in light sands the potatoes are small, and mealy when boiled; in good loams they grow large and more juicy, but are not so well flavored; the latter producing a greater bulk, are preferred for cattle.

There is a potato called *Schelde Windeke* potato, from the name of a village near Alost: they grow in a strong soil and are remarkably mealy and good; but they rapidly degenerate when planted in a different soil. The potatoes which are preferred for cattle are called *Elsen Motten* and *Kattenbollen*, both very large. A variety was introduced from England into the neighborhood of Ghent some years ago, by a gentleman of the name of Lankman, which are in great repute, and go by his name. It would be difficult to point out the variety from which these sprung, as the soil in which they are transplanted has, no doubt, had a great influence on their present quality. A few small Flemish potatoes, which we once sent to a friend at Kenilworth, produced in that rich soil some of the largest potatoes we ever met with. None of the original potatoes were so large as a hen's egg.

When we were on the subject of manures, we mentioned the pond weeds as highly useful in planting potatoes. Long litter and even old thatch is excellent to plant the sets in, if the soil is not very light. Potatoes are usually taken up in the end of September; this is done by means of a three-pronged fork, which is less apt to cut the roots than the spade. The ground is at the same time cleared of the roots of couch grass, and other perennial weeds; and when the harrows have gone over the field, and all the potatoes are picked up which had escaped the fork, no other preparation is required to sow wheat, or winter barley. When the seed is sown, the stitches are marked out by the plough, the intervals dug out, and the earth is spread over the seed, after the urine cart has deposited half the usual quantity of liquid manure in these intervals. This is sufficient on land which has had a double manuring for the potatoes.

Turnips are not often cultivated as a main crop, or a substitute for the old fallows, as it is in England and Scotland; but mostly as a second crop after barley or rye, which we call *eddish turnips* in England. But as the barley and rye harvest are early in Flanders, and not an hour is lost in getting the turnip-seed sown, they are often of a very good size before winter.* The crop, however, can bear no comparison in point of weight, with a turnip crop in Norfolk, still less in Berwickshire and Northumberland; but it is obtained at a small expense, and does not interfere with any other crop. In a farm of twenty acres, if five acres were set apart every year for turnips, the remainder would scarcely give sufficient occupation to the farmer and his family, and produce sufficient corn to feed them and to pay the rent. It is by quick succession of crops that a small farm is made to produce much more in proportion than a large one, and that every member of a family is constantly and busily employed. As soon as the corn is cut, the portion of the field which is cleared is ploughed and harrowed, liquid manure is poured over it, and the seed is sown; so that in twenty-four hours an acre, which was but just cleared, is again producing a fresh crop. The ploughing and sowing goes on every day, and follows on the heels of the reapers; of such consequence may be the delay of two or three days, that the seed sown first will be out and in the rough leaf, when that which was two or three days later is only just coming up, and is subject to all the depredations of insects. When the turnips are fairly up,

* Mr. Van Aelbrock sowed some turnips in May, 1837, and they were of sufficient size in August to be given to the cows. Large turnips are not thought so sweet as the smaller, which do not give that disagreeable taste to the milk, which prevents many farmers in England from giving them to milch cows. The introduction of early turnips in Flanders might be of great advantage. If winter tares were sown to be cut in May, and turnips to follow immediately, these two crops, with the intermediate ploughing, would prepare the land admirably for wheat or colza, and not only give two useful crops; but have all the meliorating and cleansing effect of a fallow.

they are watered with diluted urine; and their growth is rapid beyond belief. We have seen turnips sown in the middle of July, after barley harvest, which in the end of August already showed very promising bulbs. If it were not for this acceleration of the growth, no crop of any weight could be raised by the end of September, when they are usually pulled up.

The cultivation of the beet-root had been introduced into Flanders under the dominion of Bonaparte, for the manufacture of sugar; it was then a forced cultivation, and was abandoned as soon as peace had restored the usual supply of sugar from the colonies; and although the revival of this manufacture in France, where considerable fortunes have been lately realized by it, has induced several speculative individuals, and also a company with a large subscribed capital to re-establish manufactories of beet-root sugar in different parts of Belgium, the Flemish farmers in general are not much disposed to raise the beet-root for sale. They imagine, whether correctly or not, that the land suffers from this crop, when there is no return of manure, as much as it would from potatoes sold off the farm, while the latter are much more profitable; and the carriage of this heavy produce to any distance through roads almost impassable in autumn greatly diminishes the return. The manufacturers of sugar have found, in consequence, that they cannot rely on a longer supply from the farmer, and that they must enter into the cultivation of the beet-root to a large extent on their own account, to keep up a proper supply. The company established near Waterloo have purchased a large tract of land, a great part of which is in woods, which they are cutting down and converting into arable land for this purpose; on this fresh soil, which is by no means rich, the beet-root appears to thrive well. A large sugar manufactory is erected at Bruges, another near Ghent, and a smaller near Dixmude, and various other places, which will require many hundreds of acres for beet-root annually, and thus make this root an important article of cultivation. The mode in which this root is cultivated has nothing peculiar in it. The land is ploughed and well manured; the seed is dibbled, as in the garden, in rows a foot or eighteen inches wide and a foot asunder in the rows; when the plants are up they are weeded and hoed by hand; the seed is put into the ground in the beginning of May, and the roots taken up in September and October. A common crop is from fifteen to twenty tons of roots from an acre of land.

This cultivation has not been adopted for a sufficient number of years to ascertain what rotation is most profitable, where beet-root is the principal object. Those who are sanguine think that alternate crops of beet-root and corn may be kept up by good tillage and manuring. The old farmers are of opinion that there will soon be a great falling-off in the crops. Time will show who are right. In the mean time the cultivation of the white and yellow beet, which contain most saccharine matter, is extending rapidly. A small portion only of these useful roots is raised for the cows. They are not supposed to be so good for the milk as turnips, and they take up the whole season. Should the cultivation be greatly extended, it may have a great effect in causing a variation in the usual rotations of crops, now generally adopted. The advantage to agriculture of the beet-root sugar manufactory, where good land is not over-abundant, is still problematical.

The *ruta baga*, or Swedish turnip, which is so highly valued by the British farmer, is not generally cultivated in Flanders. If a few small patches of it are seen, it is only as an experiment made by some rich proprietor. It does not enter into the regular system of cultivation, and is not so well suited to sandy soils as the turnip.

Carrots grow well in light soils, which have been trenched to a good depth, and they consequently form a part of the regular rotations in all light soils; when they are sown as a principal crop, it is generally next after potatoes, buckwheat, or turnips. The land, having been well stirred for these crops, is ploughed before winter, and manured with half the usual quantity of cows' dung, or of the sweepings of streets, with which is mixed a third part of pigs' dung, from the notion that the smell of this dung keeps off the moles and field mice, who otherwise would injure the crop. This is ploughed in six or seven inches deep, and the land is left so all winter. In the beginning of April, a very deep ploughing is given, two or three inches deeper than the last; twenty hogsheads of liquid manure are then poured over this, and $2\frac{1}{2}$ lbs. of carrot seed are sown. The harrows reversed are drawn over the land; the intervals between the stitches, are dug out with the spade, and the earth thrown evenly over the seed. It is slightly rolled. Some put on no dung, but only liquid manure on the land intended for carrots. If the preceding crop was potatoes, the ground is already sufficiently manured, and any additional quantity would have a tendency to produce forked carrots, which is the consequence of over manuring; but if they follow buckwheat, which has had no manure, a fresh supply is necessary to ensure a good crop of carrots. The more the manure is decomposed and intimately mixed with the soil, the better for this crop. When the carrots come up, they require to be most carefully weeded; this is the principal expense. It is done by women and children, who go on their hands and knees and pull up every weed. If carrots were sown in drills much of this labor might be spared, by using horse-hoes between the rows, and small hand hoes between the plants in the rows. Should the carrots fail, turnips or spurry are immediately sown, that no time may be lost. In May the carrots are thinned out where they grow too close, and those which are pulled out are given to the cows; they are left about six inches apart.

There are two sorts of carrots sown in the fields; the one is the large Dutch orange carrot common in England, the other is a white carrot which is very hardy, grows to a great size, and is more productive in light sands than the orange. It has lately been introduced into England; some fine specimens of the root were exhibited at the Smithfield show in December 1836. From a trial on a small scale, we are inclined to think that it will be a valuable addition to our roots for cattle in winter. The white carrot is that which is generally preferred for sowing in another crop, as flax or barley, which is a common practice. In this case the carrot seed is sown a week or two after the principal crop. The flax or corn grows faster than the carrot, which is thus kept down, and only pushes its slender root deep into the ground without making much top, or swelling to any size. In weeding care is taken not to pull out the carrots, which are easily distinguished from weeds. After the flax is pulled, the ground is gone over and weeded again; liquid manure is then spread over, and the carrots soon begin to grow, and the roots to swell. If the main crop was barley, the stubble is carefully pulled up, and the carrots are then treated as before. Thus by the middle of October a good weight of carrots is produced on land, which had already given a profitable crop that season and a great supply of winter food is obtained for the cattle. Carrots are occasionally sown amongst peas. The peas ripen in July, and are pulled up; and then the carrots are treated as we have been describing. If the row culture were introduced, and the carrots and peas drilled in alternate rows, the success would probably be more complete. This is done in the intervals of the colza or rape with good success. About fifteen small cart-loads of carrots, or about ten or twelve tons per acre, is considered a fair crop. Judging from the produce of about one-eighth of an acre of good sand, in which the white carrot was sown in England, in March 1836, without manure, the rows a foot apart and well weeded and hoed, the crop would have reached twenty-two tons per acre; the common orange carrot in the same ground did not produce half that weight.

Parsnips are sown in land too heavy for carrots; and in a deep rich loam, the produce is very great. They have the advantage of bearing the severest frost, and therefore do not require to be housed, but may be left in the ground until they are required for use. They are not thought so good for milch cows as carrots, but superior for fatting cattle. The quality of the soil must decide which of the two may be sown to most advantage.

There is another root, the cultivation of which is often very profitable, although of comparatively small use on the farm. This is chicory, of which the dried roots are roasted and used instead of coffee. A considerable commerce in this root has sprung up lately, which has caused a duty of £20 per ton to be laid on its importation into Britain. It is the same plant which Arthur Young so strongly recommended for its leaves for cattle and sheep; but it has not been found to answer the expectation in this point of view. The roots contain a strong bitter, which may be extracted by infusion; it is also used in the brewing of beer to save hops. It is wholesome, and if it does not impart an unpleasant taste to the beer, there can be no objection to its use. At all events the cultivation of it, whether for beer or coffee, is a part of Flemish agriculture, and deserves to be noticed. The seed is sown in the end of March or beginning of April. It is treated exactly as the carrot, when sown alone. The ground should be mellow and deep, rather heavy than light, and ploughed or trenched to a good depth. It is sown broad-cast in Flanders, as every thing else is; but it would be much better if it were sown in rows eighteen inches apart. The leaves may be given to sheep or pigs; but they give a bad taste to the milk of the cows who eat them. The roots are taken up in September, and are then of the size of a small carrot; they are cut into pieces, and dried in a kiln. In that state they are exported. The price varies much, according to produce and demand. It is not an object of general cultivation, but only by particular persons and in particular soils; the market is overstocked at one time, and a great demand exists at another. Such a produce can never enter into a regular course, but may be raised as circumstances may afford a prospect of sale and profit.

From the Farmers' Cabinet.

BLUE MUD.

Mr. Editor—There is an article on our salt marshes called *the blue mud*, which doubtless possesses many fertilizing properties. Several farmers have endeavored to experiment with it in their agriculture, but these have been very few, and their experiments quite limited. Where the article has been exposed to severe frost, say one winter, (the object is to pulverize it) and applied to corn in the month of May, when it is two inches out of the ground, it has had a very fine effect. The corn being three times as good where this mud was applied, than in any other portion of the field. If this article is a valuable manure, we have an inexhaustible store—and need not fear the apparent increasing poverty of our lands. The probable properties are sea-salt, oil and sulphur. Some suppose it is the washings of the upper country, having a clay basis. This seems improbable, from the fact, that when a ditch is dug, where the tide has access, it will be filled in a very short time with this substance. But what renders it difficult to determine, is the clay accompanying it; it is affirmed that the sea does not deposit that. As it will be a cheap manure, and easily obtained by every farmer, whether proprietor or rentor of land, if found to be valuable, my object is to elicit information through the pages of the Cabinet. I hope some gentleman who is acquainted with the deposits of the flood-tide, (as this is the tide bearing to our shores) will give us an essay on the subject, and whether he has thoroughly investigated it or not, any additional knowledge of its properties will be gladly received by the farmers of Kent county, Delaware. If any gentleman, having experimented with it on his land, will give us the result of the same, it may help agriculture onward. At present there is a spirit of agricultural improvement in Kent county; and a dwindling away of that prejudice so long fostered against agricultural papers, in so much, that almost every farmer is patronizing or anxious to subscribe for some good practical journal. It is therefore a matter of interest to the proprietors of the Cabinet, as well as the farming community at large, to enrich the pages of their work with articles of utility. Your friend,

A SUBSCRIBER.

Dover, Kent Co., Del. Sep. 15, 1838.

From the Farmers' Cabinet.

THE MULBERRY—SILK, ETC.

Burlington, N. J. Aug. 1, 1838.

Your letter of the 11th ult., was duly received, in which a number of interrogatories on the subject of silk-growing, &c., were addressed to me, but, by reason of other engagements, I have been obliged to delay answering them until the present time. In replying to your questions, it will be necessary for me briefly to recapitulate them. "Question 1. Have you been long engaged in cultivating the mulberry? 2. What species of morus do you deem preferable, and what kind of soil suits it best? 3. What is the best mode of propagating, planting, and managing it? 4. What is the value, expense, and profit on an acre of mulberries for the first five years inclusive? 5. What kind of worm do you consider the most valuable? 6. What help does it require to raise one hundred pounds of silk? 7. What buildings, fixtures, &c., are necessary in this latitude to raise one hundred pounds of silk? 8. What bounty or bounties does the legislature of your state offer to encourage the growth of silk? 9. Is there a ready market for cocoons and reeled silk? Any other information you may be pleased to communieate in accordance with the foregoing questions, will be thankfully received and duly appreciated." I will endeavor to give each of these questions, in their order, a fair investigation.

First. "Have you been long engaged in cultivating the mulberry?" I am one of the number who first commenced the silk-business in this vicinity, and have devoted the two last years with close application, practically, to the culture of the morus multicaulis, and rearing the silk-worm.

Second. "What species of morus do you deem preferable, and what kind of soil suits it best?" I have taken much interest during the last few years, in comparing the relative qualities of the different mulberries; and at present I know of none I deem preferable to the morus multicaulis for this and the more southern latitudes, for the silk-business. The Alpine, the Canton, and the Brussa, are excellent species, and may be well adapted to the more northern latitudes; but they are slower of growth, and less productive of foliage. Most of the different species I have seen, which are fourteen or fifteen varieties, require four or five years' growth before having much foliage to part with; but the multicaulis will yield a large quantity the first year's growth without injury to the tree, and is eaten with great avidity by the silk-worm. The mulberry that is most productive of fruit, is less productive of foliage. The multicaulis produces very little fruit, and is not often grown from the seed. It will flourish well on all soils where the peach tree does. To select a location on which to plant a field for the silk-business, I would prefer undulating grounds, having a deep mellow loam, and mixed with sand and gravel sufficient to prevent the soil from baking or crusting.

Third. "What is the best mode of propagating, planting, and managing it?" After having the ground made mellow, lay out the field in rows about four feet apart, and the surest mode, by taking one season with another, is to lay the trees down full length and cover deep enough to keep moist. The time for planting in this latitude, I think, will be during the first and second weeks in April, in common seasons. By planting a field of mulberries in this mode they must be taken up in the autumn, as they will stand too near each other to remain in the ground. But to plant a field of mulberries not to be taken up in the fall, my views are, to lay out the rows about five feet apart, and plant, in the rows, roots or cuttings two feet apart, and in the autumn take up every other tree in the rows, leaving them standing four feet apart; the remainder to have the tops cut off near the ground in the fall. The following spring, many shoots from each stump will start up with vigor, and produce abundance of foliage, and easy to be gathered. Where the field is large, I think every fifth row may be omitted and not planted, but used as a passage for a cart or wagon, in which to transport the foliage to the cocoonery. Our experiments, made this season, have proved the feasibility, that mulberries treated in the above manner, will fulfil the most sanguine anticipations.

Fourth. "What is the value, expense and profit, on an acre of mulberries for the first five years inclusive?" To answer this, it will require some philosophical speculations, as the feeding of silk-worms from an acre of multicaulis of four or five years' growth, has not been done by me, or under my observation. At the rate of fifty pounds reeled silk to the acre has been produced from the first year's growth of trees. But from an acre planted in the manner I have described, thirty pounds the first year will be a fair production, and by leaving the roots in the ground and pruning the tops in the autumn, I deem it not extravagant to estimate one hundred pounds reeled silk yearly on an average, the four succeeding years after the first year's growth of trees. After the cocooneries and fixtures for feeding are prepared, we can feed the silk-worms and reel the silk at an expense not over two dollars and fifty cents per pound, and it is then worth from four dollars and fifty cents to six dollars a pound to the manufacturer.

Fifth. "What kind of worm do you consider the most valuable?" At present, I know of none I prefer to the white mammoth worm, so called; but we have a kind that spins a large yellow cocoon, and is a very good kind. The silk of the white is worth most. We have a kind called the two-crop kind, as it can be re-produced the same year, but they spin a small cocoon.

Sixth. "What help does it require to raise one hundred pounds of silk?" It requires a person having experience to take charge of the feeding, who can manage during the first week alone after the worms hatch, and the second week a boy or girl will be wanted to pick leaves, and after that another person, equal to a full hand, will be all that will be required to finish the crop, which will be about three hundred thousand in number. By this calculation I expect the cocoonery to be convenient to the mulberry field. It requires two hands to change the worms dexterously, but they can attend to that in the morning, when the dew will be upon the leaves, and to gathering the foliage after the dew shall disappear. A stock of leaves will always be wanted before hand, lest there should be rainy weather, when they cannot gather them.

Seventh. "What buildings, fixtures, &c., are necessary in this latitude to raise one hundred pounds of silk?" Common rough made buildings will answer well to feed in. I have seen a common barn used as a cocoonery, and the silk-worms do exceedingly well. They like a gentle current of fresh air to keep them healthful. The fixtures, &c., such as we have adopted in this place for feeding, I described to you in a former letter. [See Farmers' Cabinet, Vol. II, p. 331.]

Our fixtures for spinning, are common sawed lath placed about three inches apart on the under side of the shelves, and some simple means fixed for the worms to mount up on. They spin their cocoons in the corners, where the lath comes in contact with the shelf.

Eighth. "What bounty or bounties does the legislature of your state offer to encourage the growth of silk?" The legislature of New Jersey at its last session passed a law granting fifteen cents premium, per pound, on cocoons, the production of this state, and to be in force five years.

Ninth. "Is there a regular market for cocoons and reeled silk?" There are regular markets at fair prices for cocoons produced near where manufacturing silk has now begun. The transportation of large bodies of cocoons to a distance, is not practicable. The manufacturers are anxious to obtain all the good reeled silk our country can produce at present, and for some years to come, and pay a much higher price than for the best imported. Those who raise silk and wishing to sell it in its raw state had better reel it into skeins, and it is then in a merchantable condition.

Mr. Gamaliel Gay is the inventor of a set of machinery which is now in use in this place, that first spools the silk from the cocoons, and is then doubled and twisted into sewing silk, and is thought will answer a good purpose.

I have answered your interrogatories in a manner that appears most feasible to my views, but I do not pretend to lay down any particular modes or systems as applicable to all future generations.

Respectfully yours,

CHAUNCEY STONE.

Jos. S. Naudain, M. D., Middleton, Del.

From the Farmers' Cabinet.

DON'T FORGET TO LIME.

A short time since a farmer was inquired of why he didn't use lime as a manure? His reply was, "I can't afford it."

What, can't afford to make your fields produce twice as much grain and grass as they have heretofore furnished; I don't understand that kind of logic.

Well, I don't see how I could well afford to buy lime; it costs money, you know

Yes, it costs money, that is true; and what is the use of money but to lay it out in such way as to make it produce more, in the same way that we sow wheat and plant corn, in order that we may get more wheat and corn in return.

The true plan of using money is to vest it so as to make it as productive as possible; and there is no way that I know of by which a farmer can make his funds increase faster, than by so applying them as to increase the fertility of his farm.

That wise old farmer, William West, admonished his friends and neighbors "to be kind to the soil;" well knowing from his own experience that the result would be prosperity; but those who go on skinning and impoverishing it, are acting the part of the old woman who killed the goose that laid the golden egg; they soon arrive at that state when they think—

"They can't afford to lime."

There is a class of people in the world, and some of them are called farmers, who despise small things, and therefore they can never achieve great ones; they are too proud to thrive, and too lazy to grow rich; and because they can't do things on a large scale, omit to do them altogether, and these are the people—

Who can't afford to lime.

George Esher, the worthy and successful farmer and horticulturist, who is referred to under the heading of "More fruits of industry and intelligence" in vol. ii. p. 306 of the Cabinet; humble as was the commencement of his career in life, could always afford to buy manure, because he knew that if he enriched his soil, *it* would in turn enrich him, and in this way they have been going on for half a century, conferring reciprocal benefits on each other, and it is now a question not easy to determine which is the richer, George, or his farm, for—

He never said he couldn't afford to lime.

Those who think they can't afford to lime much, should lime a little; make a beginning, for there is nothing like commencing to do right. A farmer some years since was prevailed upon to buy lime enough to dress about ten acres of his ground; this gave him a start, and the increased produce gained by this trial, has induced him to continue it since, and from that time he began to thrive, and now he thinks—

He can afford to lime.

X.

POOR RICHARD'S ALMANAC.

*The Way to Wealth, as clearly shown in the Preface of an old Pennsylvania Almanac, entitled, Poor Richard Improved.**

Courteous Reader.—I have heard, that nothing gives an author so great pleasure, as to find his works respectfully quoted by others. Judge, then, how much I must have been gratified by an incident I am going to relate to you. I stopped my horse lately, where a great number of people were collected, at an auction of merchants' goods. The hour of the sale not being come, they were conversing on the badness of the times; and one of the company called to a plain clean old man, with white locks, 'Pray, Father Abraham, what think you of the times? Will not these heavy taxes quite ruin the country? How shall we ever be able to pay them? What would you advise us to?' Father Abraham stood up, and replied, 'If you would have my advice, I will give it to you in short, "for a word to the wise is enough," as Poor Rich-

* For many years Dr. Franklin published an almanac, under the fictitious name and authorship of Richard Saunders. It was distinguished for its proverbs, and old sayings, calculated to teach habits of industry and frugality, and addressed to the taste and feelings of common people. It was much valued, and gained an individuality of character, both for itself and for "Poor Richard," as its author. The following article formed the preface to one of the last numbers; in which the author, in a manner both amusing and impressive, brings together most of the old proverbs which had been scattered through the earlier numbers of Poor Richard's Almanac.—ED. FAR. REG.

ard says.' They joined in desiring him to speak his mind, and gathering round him, he proceeded as follows:

'Friends,' says he, 'the taxes are, indeed, very heavy, and if those laid on by the government were the only ones we had to pay, we might more easily discharge them; but we have many others, and much more grievous to some of us. We are taxed twice as much by our idleness, three times as much by our pride, and four times as much by our folly; and from these taxes the commissioners cannot ease or deliver us, by allowing an abatement. However, let us hearken to good advice, and something may be done for us; "God helps them that help themselves," as poor Richard says.

'It would be thought a hard government that should tax its people one tenth part of their time, to be employed in its service; but idleness taxes many of us much more; sloth, by bringing on diseases, absolutely shortens life. "Sloth, like rust, consumes faster than labor wears, while the used key is always bright," as poor Richard says. "But dost thou love life, then do not squander time, for that is the stuff life is made of," as poor Richard says. How much more than is necessary do we spend in sleep! forgetting, that "the sleeping fox catches no poultry, and that there will be sleeping enough in the grave," as poor Richard says.

'"If time be of all things the most precious, wasting time must be," as poor Richard says, "the greatest prodigality;" since, as he elsewhere tells us, "lost time is never found again; and what we call time enough always proves little enough;" let us then up and be doing, and doing to the purpose; so by diligence shall we do more with less perplexity. "Sloth makes all things difficult, but industry all easy; and he that riseth late, must trot all day, and shall scarce overtake his business at night; while laziness travels so slowly, that poverty soon overtakes him. Drive thy business, let not that drive thee; and early to bed, early to rise, makes a man healthy, wealthy, and wise," as poor Richard says.

'So what signifies wishing and hoping for better times? We may make these times better, if we bestir ourselves. "Industry need not wish, and he that lives upon hope will die fasting. There are no gains without pains; then help hands, for I have no lands." or, if I have, they are smartly taxed. "He that hath a trade, hath an estate; and he that hath a calling, hath an office of profit and honor," as poor Richard says; but then the trade must be worked at, and the calling well followed, or neither the estate nor the office will enable us to pay our taxes. If we are industrious, we shall never starve; for, "at the working man's house, hunger looks in, but dares not enter." Nor will the bailiff or the constable enter, for "industry pays debts, while despair increaseth them." What though you have found no treasure, nor has any rich relation left you a legacy, "diligence is the mother of good luck, and God gives all things to industry. Then plough deep, while sluggards sleep, and you shall have corn to sell and to keep." Work while it is called to-day, for you know not how much you may be hindered to-morrow. "One to-day is worth two to-mor[illegible]vs," as poor Richard says; and farther. "[illegible]ave that till to-morrow, which you can do [illegible]." If you were a servant, would you not be a[illegible]ned that a good master should catch you idle? Are you then your own master? Be ashamed to catch yourself idle, when there is so much to be done for yourself, your family, your country, and your king. Handle your tools without mittins; remember, that "the cat in gloves catches no mice," as poor Richard says. It is true, there is much to be done, and perhaps you are weak-handed; but stick to it steadily, and you will see great effects, for "constant dropping wears away stones; and by diligence and patience the mouse ate in two the cable; and little strokes fell great oaks."

'Methinks I hear some of you say, "must a man afford himself no leisure?" I will tell thee, my friend, what poor Richard says; "employ thy time well if though meanest to gain leisure; and since thou art not sure of a minute, throw not away an hour." Leisure is time for doing something useful; this leisure the diligent man will obtain, but the lazy man never; for "a life of leisure and a life of laziness are two things. Many, without labor, would live by their wits only, but they break for want of stock;" whereas industry gives comfort, and plenty, and respect. "Fly pleasures, and they will follow you. The diligent spinner has a large shift; and now I have a sheep and a cow, every one bids me good-morrow."

'II. But with our industry we must likewise be steady, settled, and careful, and oversee our own affairs with our own eyes, and not trust too much to others; for, as poor Richard says,

"I never saw an oft-removed tree,
Nor yet an oft-removed family,
That throve so well as those that settled be."

And again, "three removes is as bad as a fire;" and again, "keep thy shop, and thy shop will keep thee;" and again, "if you would have your business done, go, if not, send." And again,

"He that by the plough would thrive,
Himself must either hold or drive."

And again, "the eye of the master will do more work than both his hands;" and again, "want of care does us more damage than want of knowledge," and again, "not to oversee workmen, is to leave them your purse open." Trusting too much to others' care is the ruin of many; for, "in the affairs of this world, men are saved, not by faith, but by the want of it?" but a man's own care is profitable; for, "if you would have a faithful servant, and one that you like, serve yourself. A little neglect may breed great mischief; for want of a nail the shoe was lost, and for want of a shoe the horse was lost, and for want of a horse the rider was lost," being overtaken and slain by the enemy; all for want of a little care about a horse-shoe nail.

'III. So much for industry, my friends, and attention to one's own business; but to these we must add frugality, if we would make our industry more certainly successful. A man may, if he knows not how to save as he gets, "keep his nose all his life to the grindstone, and die not worth a groat at last. A fat kitchen makes a lean will;" and

"Many estates are spent in the getting,
Since women for tea forsook spinning and knitting,
And men for punch forsook hewing and splitting."

"If you would be wealthy, think of saving, as well as of getting. The Indies have not made Spain rich, because her outgoes are greater than her incomes."

"Away then, with your expensive follies, and you will not then have so much cause to complain of hard times, heavy taxes, and chargeable families, for,

> "Women and wine, game and deceit,
> Make the wealth small, and the want great."

And farther, "what maintains one vice, would bring up two children." You may think, perhaps, that a little tea, or a little punch now and then, diet a little more costly, clothes a little finer, and a little entertainment now and then, can be no great matter; but remember, "many a little makes a mickle." Beware of little expenses; "a small leak will sink a great ship," as poor Richard says; and again, "who dainties love, shall beggars prove;" and moreover, "fools make feasts, and wise men eat them."

'Here you are all got together to this sale of fineries and nick-nacks. You call them *goods*, but if you do not take care, they will prove *evils* to some of you. You expect they will be sold cheap, and perhaps they may, for less than they cost; but, if you have no occasion for them, they must be dear to you. Remember what poor Richard says, "buy what thou hast no need of, and ere long thou shalt sell thy necessaries." And again, "at a great penny-worth pause awhile." He means, that perhaps the cheapness is apparent only, and not real; or the bargain by straitening thee in thy business, may do thee more harm than good. For in another place he says, "many have been ruined by buying good penny-worths." Again, "it is foolish to lay out money in a purchase of repentance;" and yet this folly is practised every day at auctions, for want of minding the almanac. Many a one, for the sake of finery on the back, have gone with a hungry belly, and half-starved their families; "silks and satins, scarlet and velvets, put out the kitchen fire," as poor Richard says. These are not the necessaries of life, they can scarcely be called the conveniencies; and yet, only because they look pretty, how many want to have them? By these, and other extravagancies, the genteel are reduced to poverty, and forced to borrow of those whom they formerly despised, but who, through industry and frugality, have maintained their standing; in which case it appears plainly, that "a ploughman on his legs is higher than a gentleman on his knees," as poor Richard says. Perhaps they have had a small estate left them, which they knew not the getting of; they think "it is day, and it will never be night: that a little to be spent out of so much is not worth minding; but always taking out of the meal-tub, and never putting in, soon comes to the bottom," as poor Richard says; and then, "when the well is dry, they know the worth of water." But this they might have known before, if they had taken his advice; "if you would know the value of money go and try to borrow some; for he that goes a borrowing goes a sorrowing," as poor Richard says; and indeed so does he that lends to such people, when he goes to get it again. Poor Dick farther advises, and says,

> "Fond pride of dress, is sure a curse,
> Ere fancy you consult, consult your purse."

And again, "pride is as loud a beggar as want, and a great deal more saucy." When you have bought one fine thing, you must buy ten more, that your appearance may be all of a-piece; but poor Dick says, "it is easier to suppress the first desire, than to satisfy all that follow it;" and it is as truly folly for the poor to ape the rich, as for the frog to swell in order to equal the ox.

> "Vessels large may venture more,
> But little boats should keep near shore."

It is, however, a folly soon punished; for, as poor Richard says, "pride that dines on vanity, sups on contempt; pride breakfasted with plenty dined with poverty, and supped with infamy." And, after all, of what use is this pride of appearance, for which so much is risked, so much is suffered? It cannot promote health, nor ease pain: it makes no increase of merit in the person; it creates envy, it hastens misfortune.

'But what madness must it be to *run in debt* for these superfluities? We are offered by the terms of this sale six months' credit; and that perhaps has induced some of us to attend it, because we cannot spare the ready money, and hope now to be fine without it. But ah! think what you do when you run in debt; you give to another power over your liberty. If you cannot pay at the time, you will be ashamed to see your creditor, you will be in fear when you speak to him, when you will make poor pitiful sneaking excuses, and by degrees come to lose your veracity, and sink into base, downright lying; for, "the second vice is lying; the *first* is running in debt," as poor Richard says; and again to the same purpose, "lying rides upon debt's back;" whereas a free-born Englishman ought not to be ashamed nor afraid to see or speak to any man living. But poverty often deprives a man of all spirit and virtue. "It is hard for an empty bag to stand upright." What would you think of that prince, or of that government, who should issue an edict forbidding you to dress like a gentleman or gentlewoman, on pain of imprisonment or servitude? Would you not say, that you were free, have a right to dress as you please, and that such an edict would be a breach of your privileges, and such a government tyrannical? And yet you are about to put yourself under the tyranny, when you run in debt for such dress! your creditor has authority, at his pleasure, to deprive you of your liberty, by confining you in a gaol for life, or by selling you for a servant, if you should not be able to pay him. When you have got your bargain, you may, perhaps, think little of payment; but, as poor Richard says, "creditors have better memories than debtors; creditors are a superstitious sect, great observers of set days and times." The day comes round before you are aware, and the demand is made before you are prepared to satisfy it; or, if you bear your debt in mind, the term, which at first seemed so long, will, as it lessens, appear extremely short; time will seem to have added wings to his heels as well as his shoulders. "Those have a short lent, who owe money to be paid at Easter." At present, perhaps, you may think yourselves in thriving circumstances, and that you can bear a little extravagance without injury; but

> "For age and want save while you may,
> No morning sun lasts a whole day,"

Gain may be temporary and uncertain, but ever, while you live, expense is constant and certain; and, "it is easier to build two chimneys than to keep one in fuel," as poor Richard says; so, "rather go to bed supperless than rise in debt."

"Get what you can, and what you get hold,
'Tis the stone that will turn all your lead into gold,"

And when you have got the philosopher's stone, sure you will no longer complain of bad times, or the difficulty of paying taxes.

'IV. This doctrine, my friends, is reason and wisdom; but, after all, do not depend too much upon your own industry, and frugality, and prudence, though excellent things; for they may all be blasted, without the blessing of heaven; and therefore ask that blessing humbly, and be not uncharitable to those that at present seem to want it, but comfort and help them. Remember, Job suffered, and was afterwards prosperous.

'And now, to conclude, "experience keeps a dear school, but fools will learn in no other," as poor Richard says, and scarce in that; for, it is true, "we may give advice, but we cannot give conduct:" however, remember this, "they that will not be counselled cannot be helped;" and farther, that "if you will not hear reason, she will surely rap your knuckles," as poor Richard says.

Thus the old gentleman ended his harangue. The people heard it, and approved the doctrines, and immediately practised the contrary, just as if it had been a common sermon, for the auction opened and they began to buy extravagantly. I found the good man had thoroughly studied my almanacs, and digested all I had dropped on those topics during the course of twenty-five years. The frequent mention he made of me must have tired any one else; but my vanity was wonderfully delighted with it, though I was conscious, that not a tenth part of the wisdom was my own, which he ascribed to me, but rather the gleanings that I had made of the sense of all ages and nations. However, I resolved to be the better for the echo of it; and, though I had at first determined to buy stuff for a new coat, I went away, resolved to wear my old one a little longer. Reader, if thou wilt do the same, thy profit will be as great as mine.

I am, as ever, thine to serve thee,
RICHARD SAUNDERS.

From the Farmers' Cabinet.

INDUSTRY, PROMPTNESS AND PUNCTUALITY, CROWNED WITH SUCCESS.

Stephen Girard, the great merchant and banker, was also a great and successful farmer. He owned a farm of several hundred acres of land within a few miles of Philadelphia, the cultivation of which he superintended with his usual industry and acuteness. This farm was his principal hobby; for every day, at one o'clock precisely, his gig was in waiting for him at his counting-house door, and as soon as the clock struck one he started for his farm in the Neck, not suffering any matter whatever to interfere with his daily visit. During the afternoon he gave his personal attention to the various agricultural affairs requiring it, plying his own hands to any and every kind of business that was in season. In the evening he returned to the city to lodge, and the return of day light, the next morning, would find him again engaged in the labors of his farm, which he would intermit so as to be in the city by nine o'clock to attend to his extensive and well managed commercial and banking concerns, and at one o'clock he was again on his way to his farm. He followed out this routine for twenty or thirty years, permitting no part of his business to suffer from neglect or want of attention. His farm presented a perfect model for imitation. His grain fields, grass grounds, orchard, and garden exhibited the most luxuriant and perfect appearance, while his stock of every kind, and poultry in all their varieties, were the finest and most perfect that were to be found in the country.

A distinguished foreigner, then resident in this country, on a particular occasion, had some special financial business to transact with the great banker, and 12 o'clock was fixed upon for making his visit for that purpose, but he did not arrive till the clock had struck one, he was too late, the great banker was gone to his farm, and he followed after; on his arrival he was kindly and courteously received; he was waited on over the farm and through the barn-yard, but not a word could be extracted from Mr. Girard on the subject of his mission. He could now think or talk of nothing but agriculture and rural affairs, and his friend had to return to the city and learn to be more punctual to his engagements in future.

On an occasion, many years since, the city authorities were making an improvement at Market street wharf, and there was a large quantity of rich earth, that had been accumulating there for a long series of years, to be removed, and any person was permitted to haul away as much of it as he chose without charge. It was deemed a good compost or manure, and no person knew better the value of manure than the rich merchant: he soon had his team at work removing it to his farm; an acquaintance of his who saw him superintending his work, remonstrated with him on account of the avidity and industry with which he engaged in what his friend thought so small a concern;—"Oh," says he, "Mr.——, I work to-day, if I die to-morrow." S.

From the Farmers' Cabinet.

LIME—ITS APPLICATION, &c.

On looking over the 43d No. of the Farmers' Cabinet, I find some information is elicited from me relative to the application of lime and manure, &c. "How the lime is applied? the quantity per acre? the quality of the lime? and the nature and constitution of the soil to which it was applied."

In reply to the above queries, I may state that (with one exception) for the purpose of *improving* poor land so as to produce good crops, with as little delay as possible, I have thought it best to combine the lime and manure, by applying both for the same crop; that is, in preparing for a crop of corn I should put on about 25 ox cart loads of barn yard manure to the acre, spread it evenly and plough *late* in the fall, harrowing it well before winter sets in. In the spring I spread on sixty bushels of lime to the acre, again harrowing until the ground is in good order for planting, it is then struck out lightly for planting, so as not to turn up the sward, nor is it my wish in the cultivation of the corn crop through the summer to plough so deep as to disturb the manure, preferring that it should decompose without exposure to the sun and rain. By this means it is (I believe) in a better prepared state for the wheat crop that follows. After the corn crop is taken off. I have the ground ploughed deep so as to mix the manure well with the earth, sow broadcast and harrow in. By this course I have raised from sixty to seventy bushels of corn per acre the first year, and from twenty-five to thirty bushels of wheat, following the corn crop, and from land that would not previously produce oats worth cutting. I prefer ploughing in the fall as above stated, under the impression that the eggs of insects previously deposited are in a measure destroyed by being exposed to wet and frosts of winter. By adopting this course I have never had my corn injured with the cut worm—some farmers are opposed to ploughing in the fall, because (as they say) the ground becomes grassy and difficult afterwards to keep under—this I know by experience is the fact, and the reason is a want of proper attention on the part of the farmer—if he will harrow his ground *well* directly after it is ploughed, and again in the spring, he will not be troubled with grass—at least I find it so. In harrowing in the spring, I place a weight on so as to loosen the ground to the sward, or as deep as can conveniently be done; the ground by this means is placed in good order not only for covering the corn, but gives room for the easy spreading of its fibrous roots while young and tender, and of course comes up better and stronger than when the ground is not well pulverized.

In the exception alluded to above, the lime was applied by itself, not having any manure to spare at that time. It was a lot of eleven acres of poor worn out land, and not wishing that it should lie useless, I concluded to try the effects of lime by itself—for this purpose I had the ground prepared and ploughed in the spring, and understanding that poor land would not bear much lime, I determined to ascertain that fact for my own satisfaction. I commenced putting on at the rate of one hundred bushels of fresh valley lime per acre, gradually reducing; finished at sixty bushels—the lime was slacked, and spread immediately and sown with oats, harrowing it in. The crop was unusually large, and had to be cut with the naked scythe, being all laid, (or lodged.) Where the most lime was put the crop was best, and so continued to produce in succeeding crops for many years afterwards.

The lime used in the *improvement* of my farm was from the Great Valley (in Pennsylvania) near Downingtown, which is considered of good quality for land. Of late years I have used oyster shell and Schuylkill lime—the former I have had burnt on the farm, having a kiln for that purpose. The refuse wood only is used, say at the rate of 1½ cords for 600 bushels of lime—the cost when burned does not exceed eight cents per bushel—the quantity per acre, from 150 to 200 bushels, the latter quantity I consider fully equal to 100 bushels of stone lime, and the cost less, having to give with us 25 cts. for the Valley lime. Schuylkill can be had for 17 cts. burnt with coal, or 20 cts. burnt with wood, but it is generally too much slacked by the time it reaches us, and in some instances (on being analyzed) is found to contain too great a proportion of magnesia. It would be well for our agricultural societies to turn their attention to this subject, and publish the result of their labors.

The farm on which I reside is of primitive formation—situation high—the soil naturally poor, composed of clay, sand and gravel, varying as to mixture more or less in the different fields.

EDWARD TATNALL.

Brandywine, 10th mo., 9th, 1830.

Extract From the Edinburgh Farmers' Magazine.

EARLY SOWN GRAIN HAS LESS STRAW, COMPARED TO THE GRAIN, THAN LATE.

Early sowing produces less straw than late sowing, and that in exact proportion to the times (cæteris paribus).—The knowledge of this principle which has not been discovered, at least not attended to, till within the last twenty years, is of much importance to the farmer. Before it was known and practised, the hazard of sowing land in a very high state of cultivation was very great. Oats or barley sown in such condition, at the usual period of seed time as formerly, viz. oats, late in March, and barley about the term of Whitsunday, would have been often entirely ruined by being too strong. English barley (commonly from Lincolnshire) and Dutch and many other early kinds of oats, were adopted without changing the time of sowing: and as these have a tendency to produce shorter straw, they were found of much advantage in securing a full crop without lodging. But it is found that any of our oats sown early, produce a shorter and stiffer straw, which has the same effect. Early oats, however, are still much in vogue. The Lincoln barley is almost out of repute. It is well known to some farmers, that the common Scotch barley is the best substitute for it—as, when sown early, its straw becomes shorter, much stiffer, and less apt to lodge. Potato oats are a new species introduced within these very few years; and are said to be natives of South America. It appears they were first imported into some of our Midland counties of Scotland, in a quantity extremely small; and that they obtained that name from the circumstance of their arriving in a *package of potatoes*. This is a valuable kind of oats in point of meal, yielding two to three pecks per boll more than the Angus, which, in every other respect, we reckon our best oats. They appear to be again losing ground in the estimation of some people. They are more apt than any other kind to keep the soil, like wild oats, and thereby to annoy the succeeding crops. It seems to be apprehended that, were they to be frequently shaken and ploughed in dry, that they would be as a great a weed too. They seem to have another disadvantage, which in the present circumstances of our labor, is not a small one. They ripen along with the wheat; and that article being now more than ever the chief object of the farmer, it is in danger of occasioning very serious consequences as to the timeous cutting of that crop. Potato oats are also extremely apt to shake, and seldom fail to drop in shearing. All kinds of early oats are fit only for fine land, or land in a high state of cultivation; but upon inferior land, they are the best when a bad season has thrown the seedtime too far back for common ones. Blainsley oats are our native early, and have a finer meal as well as finer straw; but they seem mostly out of favor at present. These several varieties of oats and barley afford the farmer great advantages in securing his grass-seeds, as well as his corn crop, in certain seasons and situations.

From the Farmers' Cabinet.

COOKING GRAIN FOR STOCK.

In compliance with the suggestions made in the Cabinet, several farmers have procured and put up large boilers for the purpose of cooking corn and other grain for their stock, and so far as trial has been made, it answers expectation fully. In one case two bushels of the hard Dutton corn was subjected to the operation of cooking for several hours, until it was fully expanded; it was then measured accurately, and it was found to have increased in bulk to five bushels and half a peck. This was a greater increase than was anticipated, and it is thought that the softer, lighter kinds of corn would not increase so much, perhaps not more than double, but trial has not yet been made of it.

A cask perforated with holes in the bottom, it is found, may be placed on the top of the boiler, and filled with pumpkins or potatoes, and the steaming of them may go on at the same time that corn, buckwheat, or oats is cooking in the boiler below. One farmer has adopted the plan of breaking the ears of corn into pieces three or four inches long, and then boiling or cooking them without shelling, and in that way feeding corn and cob together: his success so far in feeding some fattening cattle has been very satisfactory and encouraging.

In order to economize fuel and to procure the full effect of the heat, it is very important to have a grate under the fire, with a door to shut close where the fire is put in, so that air to supply the fire may pass in under the grate only, for where a fire is supplied with air, which passes between it and the boiler, it is constantly carrying the heat up the flue, and tends to keep the boiler cooler than it ought to be from the quantity of fuel consumed; but when the air has to pass through the fire from below, it is thoroughly heated before it comes in contact with the boiler. After the fire has burnt down so as not to need ventilation for the smoke, the flue or pipe should be closed above, and the access of air under the grate prevented by a suitable stopper or door; this prevents the circulation of cold air from conveying off the heat from the brick work and boiler, and the process of cooking will be carried on for hours after the fire has burnt down, provided the access of cold air is prevented. The fire-place should not be made larger than that of a small stove, and the brick work should be brought pretty well up to the boiler, leaving but a small space around it for the smoke to pass up. A boiler of the kind referred to, is of good value to a farmer for other purposes than cooking grain, and one of them ought to be put up on every farm in the country, and to be considered as much a fixture as a corn crib or pig pen. B.

From the Connecticut Courant.

EGGS AND POULTRY.

Among all nations, and throughout all grades of society, eggs have been a favorite food. But in all our cities, and particularly in winter, they are held at such prices that few familes can afford to use them at all; and even those who are in easy circumstances, consider them too expensive for common food.

There is no need of this. Every family or nearly every family, can, with very little trouble, have eggs in plenty during the whole year; and of all the animals domesticated for the use of man, the common dunghill fowl is capable of yielding the greatest possible profit to the owner.

In the month of November, I put apart eleven hens and cock, gave them a small chamber in a wood house, defended from storms, and with an opening to the south. Their food, water, and lime, were placed on shelves convenient for them, with warm nests and chalk nest-eggs in plenty. These hens continued to lay eggs through the winter. From these eleven hens I received an average of six eggs daily during the winter; and whenever any of them was disposed to set, viz. as soon as she began to cluck, she was separated from the others by a grated partition, and her apartment darkened; these cluckers were well attended and well fed; they could see and partially associate through their grates with the other fowls, and as soon as any of these prisoners began to sing, she was liberated, and would very soon lay eggs. It is a pleasant recreation to feed and tend a bevy of laying hens; they may be tamed so as to follow the children, and will lay in any box.

Egg shells contain lime, and in winter, when the earth is bound with frost or covered with snow, if lime is not provided for them, they will not lay, or if they do, the eggs must of necessity be without shells. Old rubbish lime, from old chimneys and old buildings, is proper, and only needs to be broken for them. They will often attempt to swallow pieces of lime plaster as large as walnuts.

I have often heard it said that wheat is the best grain for them, but I doubt it; they will sing over Indian corn with more animation than over any other grain. The singing hen will certainly lay eggs, if she finds all things agreeable to her; but the hen is much of a prude, as watchful as a weasel, and as fastidious as a hypocrite; she must, she will have secrecy and mystery about her nest; all eyes but her own must be averted; follow her or watch her, and she will forsake her nest, and stop laying; she is best pleased with a box covered at top with a backside aperture for light, and a side door by which she can escape unseen.

A farmer may keep a hundred fowls in his barn, may suffer them to trample upon and destroy his mows of wheat and other grain, and still have fewer eggs than the cottager who keeps a single dozen, who provides secret nests, chalk eggs, pounded brick, plenty of Indian corn, lime, water and gravel, for them; and who takes care that his hens are not disturbed about their nests. Three chalk eggs in a nest is better than a single nest egg, and large eggs please them; I have often smiled to see them fondle round and lay into a nest of geese eggs. Pullets will commence laying earlier in life where nests and eggs are plenty, and where other hens are cackling around them.

A dozen dunghill fowls, shut up from any other means of obtaining food, will require something more than a quart of Indian corn a day; I think fifteen bushels a year a fair provision for them. But more or less, let them always have enough by them, and after they have become habituated to find enough, at all times a plenty in their little manger, they take but a few kernels at a time, except just before retiring to roost, when they will take nearly a spoonful into their crops; but just so sure as their provision comes to them scanted or irregularly, so surely they will raven up a whole crop full at a time, and will stop laying.

A single dozen fowls, properly attended, will furnish a family with more than 2,000 eggs in a year, and 100 full grown chickens for fall and winter stores. The expense of feeding the dozen fowls will not amount to 18 bushels of Indian corn. They may be kept in cities as well as in the country, and will do as well shut up the year round as to run at large; and a grated room, well lighted, ten feet by five, partitioned from any stable or other out-house, is sufficient for the dozen fowls, with their roosting place, nests and feeding troughs.

At the proper season, viz. in the spring of the year, five or six hens will hatch at the same time, and the fifty or sixty chickens given to one hen. Two hens will take care of 100 chickens well enough, until they begin to climb their little stick roosts; they should then be separated from the hens entirely; they will wander less, and do better away from the fowls. I have often kept the chickens in my garden; they keep the May bugs and other insects away from the vines, &c.

In cases of confining fowls in summer, it should be remembered that a ground room should be chosen: or it will do just as well to set into their pen boxes of dried sand, or kiln-dried, well pulverized earth, for them to wallow in, in warm weather.

From the Edinburgh Farmers' Magazine.

UTILITY OF THE BRITISH COUNTY AGRICULTURAL REPORTS.

Extract from the address of Sir John Sinclair to the Board of Agriculture.

County reports.—The idea of ascertaining the agricultural state of every district in the kingdom, and of printing each survey, according to one uniform model, is the greatest undertaking ever attempted by any institution; and, though carried on with funds extremely inadequate to such an attempt, yet it is at last in a fair way of being happily accomplished. All the counties in England will be completed in the course of this year. Several will remain to be done in Scotland, for the execution of which fit persons can be procured, as soon as adequate funds are obtained for that purpose. In the course of this year, five reports have been already printed, and eight transmitted to the board in a state ready for publication; so that the progress has been considerable, and the termination of this most important undertaking, by which so large a proportion of the funds of the board has hitherto been absorbed is probably at no great distance.

The advantages to be derived from these reports, are universally recognized in foreign countries; for the same plan has been already adopted in France and Russia, and will probably be imitated in every other civilized country. A letter has lately been received from a celebrated agriculturist in France, in which he states his opinion, 'that such a measure is the most useful that can be undertaken, for bringing, in a short space of time, agriculture to a high degree of perfection.'* Indeed the information furnished by the various reports and communications published by the Board, far exceeds what is generally apprehended. Dr. Coventry, Professor of Agriculture in the University of Edinburgh, who from his situation, is led to examine every work connected with the subjects on which he lectures, has recently declared, 'that in these late reports and publications, there is detailed more useful and distinct information, on various branches of agriculture, and on rural concerns in general, *than was in print before these were drawn up.*'† What then may not be expected, when all these reports are completed, for little more than one half of them were printed, when this idea of their merit and utility was formed by Dr. Coventry.

REMARKS ON THE CULTURE OF THE MORUS MULTICAULIS, AND ON SILK-CULTURE.

To the Editor of the Farmers' Register.

December 14*th*, 1838.

Dear Sir—I take the liberty, through the columns of your valuable journal, to offer to the growers of the morus multicaulis a suggestion, which, if attended to next season, will save many young trees from destruction, and, if neglected, more I fear will be lost, than can well be spared. The management of about 60,000 trees having devolved on me the past summer, and it being an entire novelty, I was induced to observe, with minute attention, the peculiarity of their growth, and to note carefully the best mode of working them. The caution I am about to give, is, therefore, the result of experience, and some little practical knowledge of the subject. It has been said, that the cultivation of the mulberry is precisely similar to the cultivation of Indian corn; this, in the outset of its tillage, is an error, and proved so fatal a one to me, that I lost several thousand young trees before I found it out. There is no plant more delicate and tender than the young mulberry, and none that requires, at the period of its germination, a nicer and more cautious management. The perennial grasses and weeds, which, in early spring, shoot up on the most highly cultivated spots, give an immediate check to its growth, and unless removed, would speedily destroy it. To free it from this evil, without injury to the young plants, is the desideratum; and as hand-weeding (on a large scale) is inadmissible, the hoe is usu-

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* The French expressions are, 'Je crois que ce travail est le plus utile de tout ceux qu'on peut entreprendre, pour amener, dans un tres court espece de temps, l'agriculture à un grand degrè de perfection.'

† See Discourses explanatory of the Object and Plan of the Course of Lectures on Agriculture and Rural Economy, by Dr. Coventry, 1 vol. octavo, printed at Edinburgh, 1808, p. 187.

ally employed to cleanse the crop. I found that instrument, (although placed in very careful hands,) far more destructive to the trees, than either grass or weeds. You are aware, that the cutting germinates by throwing out from its extremities small and delicate roots, at first not larger, and more brittle, than the finest cambric thread; before these are strong enough to sustain themselves, the slightest touch or even jar from the hoe, will snap them asunder; when the recuperatory process, (especially in dry weather,) is so slow, that the plant perishes before it can take root again. To avoid this danger, I would recommend, as a substitute for the hoe, an instrument made similar to a pitch-fork, but having a sharp blade, in lieu of prongs; or, if economy is to be considered, an implement used by the old fashioned Virginia gardeners for weeding gravel walks, which is nothing more than a foot or two of an old scythe blade, somewhat bent to make the edge cut upwards, and fastened, midway its length, to the handle of a rake or hoe, would be equally efficient. With such a hand-skimmer, the plants can be rapidly weeded without danger of disturbing them—but whatever substitute may be considered best, I can only say, that experience has taught me that the hoe cannot be used in the field culture of mulberries without great risk, until the roots attain strength enough to resist a blow from it. In conversation the other day, on the subject of the morus multicaulis, (the prevailing topic of the day,) with an eminent eastern culturist, he informed me of a practice successfully followed by him, which appears so plausible, that I propose the next year to adopt it. If it does no good, it at least has the negative merit of doing no harm, and is therefore worthy of trial. My informer, (who is, by the way, a most respectable man, and well versed in his vocation,) says, that it has been his custom, when preparing his cuttings for planting, "to make an incision through the bark from one extremity of the cutting to the other, taking especial care not to wound the bud—the result was, that from each side of the incision roots were thrown out as well as from the extremities, thus materially aiding the growth of the tree and greatly tending to its preservation, as every new root gave an additional assurance of its living. This fact, if not erroneous, and I see no reason to doubt it, would be especially advantageous with one-bud cuttings.

While on the subject of the Chinese mulberry, I trust it will not be trespassing too far on your time and patience, to hazard a speculation as to their present extravagant value, its tendency, and probable result. That no prudent man will, or ought to purchase trees at present high prices, with a view to engage in the culture of silk, is obvious to all—and that the mulberry must in a year or two depreciate, as an article of speculation, and be only sought for as the means of making silk, is likewise susceptible of demonstration. The temptation, however, offered by the hope of a continuance of high prices, and the prospect, (however dark it may be) of realizing great profits from the sale of trees, having induced many of our most intelligent and wary farmers to engage largely in their cultivation, is, I think, a most fortunate circumstance, and will eventuate most happily for the state, by opening a source of wealth equally as abundant, and more beneficial, than ever was her tobacco trade. Nothing but this unaccountable *morimania* (if I may coin a word) could have aroused attention and stimulated inquiry into the nature and practicability of growing silk in the United States. Committees of Congress might have issued reports, and writers on silk have published volumes on the subject; but our apathetic brethren of the plough would not have read either, or given a passing thought to the matter, until awakened by the astounding fact, that a shrub six or seven feet high, raised in eight months, from a cutting six inches long, actually sold for, and *was worth* a silver dollar. This came home—curiosity and inquiry are now on the "qui vive"—and now is the accepted time for the friends of the silk business to strain every nerve to push forward its introduction. This humbug, as it is called, even by those who have been seduced into it, is certainly the most fortunate delusion that ever arose in Virginia; it is the inscrutable working of Providence to convey a blessing, which is destined to redeem this ancient commonwealth from the state of decay into which she is rapidly falling; and when the bubble of high prices for trees shall burst, as soon it must, the question will then be presented to the agriculturists, who have engaged in it from motives of speculation, and are left in the lurch—what is to be done with the stock of trees on hand, for which there is no market? Are they to be dug up and thrown away, or shall they be used for feeding silk-worms? It is not difficult to anticipate the solution self-interest will give to this query. The farmer has but to learn the fact, that in conducting this new business (for which his soil and climate are peculiarly adapted) not a single efficient laborer will be abstracted from his farm—that his barns and other buildings, (not in use during the short feeding season) will, (for want of better) answer as laboratories—that he has on hand abundant food for his worms; and above all, that the product of his care and attention will find a ready market at his door. Moreover, to give it a political cast, this grave fact is worthy the consideration of the patriotic farmer, as well as the statesman and political economist. The market in Europe for raw and manufactured silks, exceeds forty millions, and in the United States twenty millions of dollars; and to this amount are we tributary to semi-barbarous Hindoos, indolent Turks, and imbecile Italians. Now, Mr. Editor, is the auspicious moment to draw the attention of the agricultural portion of the community to this important subject. To do this effectually, permit me respectfully to suggest the creation of a state society for the encouragement of silk-growers. Such an association, with an active, influential president at his head, with its committees of correspondence, premiums, &c., would do much towards exciting attention, disseminating information, and, finally, would pave the way for the introduction of silk-making, as one of the ordinary occupations of every farm. Had I the talent of an essayist, the field is most ample, and it might be indulged to satiety; but as I do not possess it, I will close this (as you perceive) hastily written and imperfect epistle, satisfied that in leaving the subject with you, I place it in far abler hands. I am, respectfully, &c. T. M. R.

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From the Edinburgh Farmers' Magazine.

ON THE USE OF SOAP-MAKERS' WASTE ASHES, COMMONLY CALLED SOAPERS' WASTE, AS A MANURE.

Drawn up by order of the Board of Agriculture, and published by its direction.

Introduction.—The Board of Agriculture having found, upon inquiry, that the produce of soap-makers' waste ashes, in London and its immediate neighborhood alone, amounts to above 20,000 tons *per annum*, and is likely to increase, more especially from the use of kelp having been lately introduced into the London market, which furnishes a greater quantity of refuse ashes; and being convinced, from the most accurate information, and the experience of many of its members, that this quantity of valuable manure, if brought into more general use than has hitherto been the case, would be an object of considerable importance to the national agriculture, are desirous of giving all the publicity possible to a circumstance so well deserving the attention of farmers, gardeners, hop-planters, nurserymen and others employed in the cultivation of the soil, more especially those in the neighborhood of the metropolis, and on the borders of the navigations therewith connected; and, with that view, have resolved to circulate the following observations, collected from the best information which it has hitherto been in the power of the board to obtain.

Sort of ash.—The great distinction to be found in soap-ashes, depends upon the sort of alkaline salt used by the soap-boiler. When kelp and barilla are the materials, the ashes are found to be more than twice as strong and effective as a manure, than such as are the refuse of common potash; and to this circumstance may be attributed, not only the different quantities per acre that are recommended, but also the different results which have attended the use of this dressing in different parts of the kingdom, and any failures which may have taken place. The ashes to be procured at London are all made from barilla and kelp.

Analysis.—Mr. Davy analyzed two specimens of soapers' waste (sent him by Mr. Hawes), in the laboratory of the Royal Institution, and the following was the result.

The waste from barilla gave, in 100 parts,—

Of carbonate of lime, about	76 }	
Of quick-lime, about	15 }	
Total calcareous matter,		91 parts.
Of gypsum, about		5
Of common salt		$1\frac{1}{2}$
Of carbonate of soda		$1\frac{1}{4}$

The waste from kelp, in 100 parts, gave about 94 of calcareous matter, in the same state as that from barilla; about three of gypsum, and one and a half of soluble saline matter, containing, apparently, nearly the same proportions of carbonate of soda, and of common salt, as in the former instance.

It is obvious, from the chemical nature of soapers' waste, that it will be applicable wherever calcareous matter is wanted in lands, and that it will serve the purposes of liming.

The small quantity of alkaline salt and of gypsum that it contains, will likewise render it much superior to common calcareous matter, as a top-dressing for every kind of grass.

It seems probable, that these ashes will be found of most benefit on soils that abound largely with undecomposed vegetable substances, upon which the alkaline salt will act powerfully. Charcoal also, wherever found, may be rendered miscible with water, which will produce a considerable effect. The ashes proving highly beneficial on peat-moss, and on low spongy meadows, seems to be a confirmation of this fact. On calcareous soils they may not produce an equal result, as one third of the mass of these ashes is composed of lime. They can scarcely be recommended on dry burning sands.

Such farmers as are in the habit of making composts, will probably use these ashes as a material in forming the heaps; and so far as earth is concerned, there can be no objection to the practice; but, in respect of dung, it may admit a doubt. In proportion to the quantity of alkaline matter left in the ashes, it will tend to shorten the duration of the effect of the dung; and as the addition of ashes will render stirring and mixing necessary, it merits consideration, whether the better system be not to use these manures separately. It seems advisable, in the application of these ashes to arable crops, to sow and harrow them in previously to sowing the seed, which will prevent the action of any acrid or caustic quality on the germination of the young plants. The same circumstance will point out the autumn as the proper season for applying them on grass lands, though experiments may be tried with them early in spring. Mr. Hawes, from the information which he has received, particularly from Liverpool, where they are eagerly sought after, states, that they are mixed with pond, ditch, and river mud, and used in about four months. This also agrees with the practice of Robert Thornton, Esq. of Clapham, who has used them about four years, and has thereby greatly improved a very sour pasture. In Cheshire they plough them into the land; but an Essex farmer remarks, that these ashes are of so heavy a quality, that the tillage should be shallow.

Effect.—In Surrey, these ashes have been found infallibly to kill insects, (*Malcolm's Comp.* vol. ii. p. 173.) The effect of these ashes admirable both on grass and arable (*Adam's Essay on Agriculture*, vol. i. p. 167.) Destroys slugs and vermin of every description (*Museum Rusticum.*) Mr. Mansfield, near Epping, on a poor sour pasture that would not mow, nor would stock eat it, four wagon-loads per acre effected a total change; soil strong, wet, and heavy (*Essex Rep.* vol. ii. p. 246.) Mr. Sherwood, of Abbots-Langley, Herts, has used these ashes with very great success mixed in composts. They are very serviceable in new plantations, particularly where the soil is cold. A noble lord, a member of the Board of Agriculture, possesses a grass field in Wiltshire, which was manured with soap-ashes near twenty years ago, and the improvement was very great, and has continued so ever since. Two principal farmers near Ealing, Mr. Thorne and Mr. Knivett, have used them for many years for arable land, with great success and advantage. Robert Thornton, Esq. of Clapham, in some experiments amounting to seven acres, found that these ashes added a load of hay per acre to the crop. The Marquis of Abercorn's bailiff says, his father always considered one load of soap-ashes equal to five loads of rotten dung, and particularly improved the soil and verdure. The Reverend Mr. Dudley formed, in Essex, composts of these ashes with marsh banks, which were mixed well together, and spread on grass land with great effect. Hence there is considerable reason for believing, that there is scarcely a manure to be procured, that will be found so profitable (price considered) as these ashes, and that the farmers in the vicinity of London, and of all the navigations leading from it, may embark largely in the use of this manure, without the smallest apprehension of loss by so doing; but that, on the contrary, they will find the profit decidedly great, and, by the use of them, may prevent the continual advance of all sorts of manure. Barges bringing lime, chalk, timber, bricks, malt, and corn to London, can get a freight back at twelve hours' notice.

Conclusion.—It is evident, from the preceding observations, that the use of soapers' waste is well known in various parts of the kingdom; but as the quantity of this valuable manure is likely considerably to increase owing to the more extended use of kelp in the soap manufacture, it would be desirable to have the following particulars ascertained, in a more satisfactory manner than hitherto has been the case.

1. The soils and the crops for which this manure is best calculated?
2. The quantity that should be laid on each per acre?
3. The proper period of the year for laying it on?
4. Whether any mixture should be used with soapers' waste—what is the best mixture—and the best proportions?
5. What are the effects of this article compared with other manures, and its relative value?

Any information regarding these particulars, transmitted to the Board of Agriculture, 32, Sackville street, London, will be particularly acceptable.

SOME ACCOUNT OF THE SILK CONVENTION.

To the Editor of the Farmers' Register.

In advance of a more detailed report, I propose to give you a sketch of the proceedings of the late National Silk Convention, which met in Baltimore, on the 11th of the present month.

The convention was a numerous and highly respectable and intelligent body of men, composed of delegates from a number of states. Judge Comstock, of Connecticut, was called to the chair—the duties of which he discharged with promptitude and ability. His long devotion to the objects which brought the convention together, entitled him to this mark of distinction; and the dignity and amenity of his manners fully justified the propriety of the choice.

Previous to the assembling of the convention, it was supposed by many persons, and feared by a still greater number, that it would be mostly composed of speculators in multicaulis, anxious to keep up the mania which has for some time past astonished the sober-minded portion of the community. It was thought that the ruling passion would be a desire to reap another harvest from the sale of plants, which have been sought after with an avidity proportioned to the high prices which have been demanded for them. But though there might have been, and probably were, some members of this description; yet the great majority consisted of persons anxious to promote the culture of silk, and to introduce a new and useful branch of industry into our young and thriving country. The indirect effect may, and no doubt will be, to extend the demand for the multicaulis; for the two cultures are inseparably connected; but if the multicaulis can be beneficially appropriated to its legitimate purposes, instead of being made an article of speculation, its merits will then be appreciated as an auxiliary to the silk culture; and, however extensive the demand may become, its value will no longer be factitious. This is certainly the basis on which it should be placed.

After the organization of the convention, a committee was appointed to suggest and introduce proper subjects on which its action should be had. These will appear at full in the journal of its proceedings, which will be published in the course of a few weeks. There was one subject, however, which gave rise to considerable debate, and indeed to some feeling, which it may not be improper to advert to. This was the propriety of adopting a standard reel, and recommending it to the silk-growers of the United States. The importance of this was first suggested by G. B. Smith; and upon his explanation, and that of others, it passed the committee with entire unanimity; but it was opposed in convention for a length of time, and at last was only sanctioned after some modification of the resolution. It was contended by the opponents of this measure, that it would be restricting the exercise of American ingenuity, which was believed to be fully competent to invent any machinery which the future wants of the silk-grower might require. The propriety of the recommendation, however, was fully sustained by Mr. Smith and other practical men, whose arguments, it is hoped, will be reported in full, as a stenographer took notes of the debate. The reel recommended was the *Piedmontese*, or any other combining the same principles and dimensions. And now, in the infancy of the business in this country, before we have any long-rooted prejudices to contend with; and with a view to the ultimate export of silk to Europe, it was the proper time to fix upon a standard. It was shown that before such standard was fixed in France and Italy, reels of various dimensions were in use—the result of which was so much confusion, that it was impossible manufactories could flourish. Until some specific principle was recognized in the construction of reels, no set of manufacturing machinery could be adapted to such a total want of uniformity as the raw material exhibited. At length, the subject was acted upon by the government, and the Piedmontese reel was adopted and the use of it enforced upon silk-growers by legal penalties. So accurate is this reel in its proportions, and so simple in its principles, that it was contended by Messrs. Smith, Whitmarsh and Cobb, all of whom had invented some modification of that reel, and by other gentlemen who had also been exercising their ingenuity in making improvements upon it, that the wit of man could invent nothing more simple or more perfect. The hanks reeled upon it are all of the same size; the threads of every skein are precisely of the same length; the basin and furnace are at such a distance, that the silk becomes dry by the time it is wound on the reel; and by means of the traverse bar, each filament is laid on in such a manner that it never comes in contact with the preceding one, except in crossing it. A commodity is thus produced, which, in the factory is unreeled with the same facility that it was originally reeled, and without any loss to the manufacturer. An illustration of the importance of such a standard was happily adduced by Mr. Whitmarsh, who said that he recently saw a lot of silk in New York, of very superior quality, which was brought from Brussa near Constantinople, but for which no purchaser could be found, owing to the large size of the skeins. They were eight or ten feet in diameter, and so unwieldy that no machinery in this country could work it up.

One of the leading objects of the convention was to form a "National Silk Society," to hold its meetings annually at Philadelphia, Baltimore, Washington, or some other nearly central place. The next meeting is to take place in Washington, on the 2d Tuesday in December, 1839. All the members of the convention are entitled to membership in the national society, by the payment of one dollar per annum, or membership for life, by the payment of ten dollars at any one time; and, in future, members are to be admitted on the same terms on the recommendation of the executive committee. After the formation of the national silk society, and the appointment of the executive committee to prepare business for its action, a resolution was passed authorizing the establishment of a paper to be devoted to the silk culture, and to be called the "American Silk Journal." It is to be published in Baltimore, under the editorship of J. S. Skinner, Esq., so well and favorably known to the agricultural community, as the founder and editor of the old American Farmer. The first number will probably be issued during the winter; and as the members of the silk society will make it the medium of their communications on the subjects to which it is devoted, and as it will possess facilities for concentrating silk intelligence which no other paper perhaps can enjoy in the same degree, it is anticipated that its circulation as well as usefulness will be very extensive. It will probably be a monthly of 16 to 32 pages, at one dollar per year. The surplus funds, after paying the printer and paper maker, will, in the form of premiums, be devoted to the encouragement, under proper regulations, of experiments going to establish the value and practicability of various branches of silk industry. The question, however, whether there would be any "surplus funds," and, consequently, whether this mode of encouragement would not be very likely to fail, formed the subject of considerable discussion in the committee, as well as in the society. And to remove all doubt on the subject, and to attain the ends which the committee had so anxiously in view, a liberal and very responsible gentleman of Massachusetts authorized the committee to draw upon him for the amount of any deficiency which might be found to exist. The certainty, therefore, that liberal premiums will be offered in a short time, will serve, it is hoped, to stimulate many competitors to enter the lists, not only from the north, but the south also—where, if we have the disadvantages of inexperience, we have greatly the advantage in climate. If, in this laudable contest, a generous spirit of emulation should be excited throughout the country, a variety and extent of information will be elicited, which will be interesting not only to silk-growers, but to the community at large—and which will serve to dispel all doubts in regard to the value of the silk-culture.

In addition to the establishment of a journal and the publication of the proceedings, it was ordered that an address to the people of the United States be published, the preparation of which was entrusted to an able committee, of which Mr. Smith, of Baltimore, is chairman. From the character of Mr. Smith, as well as that of the other members of the committee, the public may expect not only a well written document, but one, in the arguments and statement of which, every reliance may be placed.

The subject of bounties offered by the state legislature was also discussed, and a resolution was passed, recommending the propriety of applications to that effect, in states where no encouragement has yet been given to the silk culture. It was conceded, on all sides, that it would be improper and inexpedient to make any application to Congress; and, amongst other considerations, perhaps not the least forcible which operated against an adjournment of the convention to Washington, was an apprehension, that it might be supposed there was a desire to solicit congressional action in furtherance of their object. But, whilst the propriety of congressional legislation was repudiated, the propriety and beneficial effects of state encouragement were concurred in with great unanimity. Not that the silk-culture is supposed to stand in need of permanent fostering and propping up; but now, in the infancy of the business, when there is not sufficient skill and experience in the country to insure, in all cases, successful results, it would be manifesting nothing more than a paternal regard for the promotion of important interests, if state governments were to enact such bounties as would provide against the discouragements of total or even partial failures. The operation of these bounties might and ought to be limited to a few years, by the expiration of which time, the necessary skill and information in conducting the business, would be acquired—and at the moment when the drafts on the treasury might begin to be felt, they would cease by limitation of the act. Such bounty laws have been passed by a number of state legislatures; and the good effects have been already felt in the attention and emulation which have been thereby excited, whilst the inconveniences to the state exchequers have been scarcely felt.

During one of the sessions of the convention, a resolution was offered in compliment to the pioneers of the silk culture; and particularly to G. B. Smith, whose services were admitted by all to be pre-eminent. This resolution was passed, not only with entire unanimity, but in a manner which must have been highly gratifying to the feelings of a man of Mr. Smith's disinterestedness and modest deportment. In connexion with this expression of gratitude, I take the liberty to advert to the deep interest which was manifested by many members of the convention, in the success of the "Smith fund," according to the proposition which you recently submitted in the pages of the Farmers' Register. This was a subject which could not properly be brought before the convention; but at an informal meeting of many of its members, an opportunity was offered of presenting it to the public attention; and several influential gentlemen have undertaken to obtain subscriptions. A very important point was gained in giving it a start, and a handsome subscription was made in the course of a few moments. It is now hoped and believed that a considerable degree of success will attend the efforts of those who have interested themselves in the matter; and that the growers of the multicaulis, who have realized so much, either directly or remotely, by Mr. Smith's writings and exertions, may not now withhold the manifestation of their gratitude, which the occasion so happily offers. If the subject could only be presented in a proper point of view to each individual who has been engaged in the culture of the multicaulis, it can scarcely be supposed that he would withdraw from all participation in the offering which it is proposed to make. Many of those who have but recently engaged in the culture, may not so readily appreciate the obligations they are under to Mr. Smith, from the fact that he was strictly a pioneer in the business—and his peculiar merits, therefore, are in a great measure unknown to such as have no correct historical information of the early efforts to introduce the silk and multicaulis culture into this country. But that they are as much indebted to him as the cotton planters are to Whitney, or the country at large is to Fulton, can admit of no doubt. Mr. Smith is emphatically one of those benefactors, who, with entire disinterestedness, have devoted their energies to the public, rather than to their own particular welfare. Let not those then, who have profited by his labors—who have grown rich by his exertions and discoveries—who have reaped full and abundant harvests where he has sown the seeds; let them not in the "pride of life," forget the true author of their prosperity, and turn away from him, but for whom they might never have had their days of rejoicing.

During the recesses of the convention, there were several meetings of the members for the purpose of imparting and collecting information on the utility, advantages, and practicability of the silk-culture. These informal meetings admitted of such a latitude of discussion, such a free comparison of opinions, and practices, and results, that they were undoubtedly the most interesting and most valuable seasons which the members had the pleasure of enjoying. Those who possessed practical knowledge and wisdom, "freely gave,"—whilst those who were inexperienced, were eager to catch every word, and as "freely received." The capability of the country to produce silk of a superior quality—the relative value of the several varieties of mulberry and of silk-worms—the proper management of the latter—the practicability of rearing successive crops—the product per acre of raw silk—together with a history of the early efforts of some of the pioneers in the cause, were all enlarged upon in a manner satisfactory, impressive and frequently eloquent. In addition to which, there was a considerable exhibition of some very creditable silken goods and fabrics, manufactured from American silk during the past summer. It were wished that many others could have been auditors and spectators, on these interesting occasions. But the addresses of the various members who favored the company with their knowledge and experience, will no doubt be given very fully to the public in the report of the proceedings, which will shortly be ready for extensive circulation, and probably contained also in first number of the Silk Journal. In this expectation, there is no necessity, even if the occasion were favorable, to give even a brief abstract of the contents of the addresses.

On the whole, there is every reason to believe, that this convention will be productive of great good—that an impulse will be given to the silk-culture which will be more or less felt in the remotest parts of our country—and that it will form an epoch in the history of silk-culture, which may be remembered with emotions of satisfaction and even pride. Its practicability has been fully proved—our soil and climate have been shown to be eminently adapted to its success—and the superior intelligence of our people will no longer permit it to remain a mere matter of theory and speculation. Already have cautious and not visionary men, fixed upon the time when we shall have silk for commercial export—for it will be a much longer period before we shall have manufactories of our own for its various manipulations—and some of our contemporaries may live to see the day when we shall receive the splendid fabrics of Lyons and Spitalfields, in return for the raw silk of America. ——— ———.

AN ESSAY, PRONOUNCED BEFORE THE CUMBERLAND AGRICULTURAL SOCIETY, NOV. 30TH, 1838.

By William B. Smith, M. D.

"Can the culture of Tobacco be dispensed with in Eastern Virginia."

Mr. President, and gentlemen of the Cumberland Agricultural Society.—Before entering fully on the subject proposed, I shall take the liberty of giving a history of the tobacco plant, Nicotiana Tabacum, its medical use, &c.

Secondly, a short account of the tobacco culture in the West Indies, about the beginning of the seventeenth century.

Thirdly, the demoralizing effects of the culture of tobacco, as a staple in Virginia.

Fourthly, an attempt to prove that the time has arrived when we are under the necessity of giving up the culture of tobacco.

1st. Tobacco is an annual plant in Virginia, but in the West Indies and some parts of South America, two crops are taken from one planting. "Nicotiana Tabacum" is a native of America, and was first introduced into Europe, about the middle of the fifteenth century, or, to be more accurate, in the year 1540. Since that period, tobacco has been cultivated in various parts of Europe, for medical use, chewing, snuffing, and smoking. It has also been cultivated on the coasts of Asia and Africa; indeed we find the plant cultivated more or less throughout the whole world.

Large crops of tobacco are grown in the U. States, and exported to Europe annually. According to the Philadelphia commercial list, October 13th, the stock of Kentucky and Virginia tobacco in Europe, on the 1st January, 1837, was 40,904 hhds. In 1838, 23,464 hhds., decrease 17,430. Stock of Kentucky and Virginia tobacco in the United States, 1st January, 1837, was 26,310 hhds., in 1838, 15,835 hhds., decrease 10,475 hhds. Total deficiency of stocks in Europe and the United States, of Kentucky and Virginia tobacco, January 1st, 1838—27,905 hhds. The quantity of American tobacco required by Europe annually is one hundred thousand hogsheads. Of this quantity, from thirty to thirty-five thousand hogsheads, are of the light descriptions, or Maryland and Ohio; consequently from sixty-five to seventy thousand hhds. of heavy or Kentucky and Virginia are required to meet the consumption in Europe."

Virginia has, for the last century, furnished the European markets with the richest and best tobacco, Maryland with the finest and most delicate of fibre, and the West Indies grow tobacco remarkable for delicacy of flavor. The leaves of a well-grown plant of Virginia tobacco, are from 2 to 3 feet long, of a pale green color when fresh; and when properly cured of a yellowish cast; having a strong narcotic smell and acrid burning taste. The active constituent or principle of the plant is an essential oil, obtained by distillation. When this oil is taken in the stomach or applied to the surface of the body, it produces nausea and vomiting; it often proves violently cathartic, attended with alarming vertigo, great debility and general relaxation.

The system, however, becomes easily habituated to the use of tobacco, and it is used in large quantities as a luxury, without experiencing any other bad effect than what arises from individuals being unable to relinquish its use, after the habit of chewing is formed. When chewed in substance, it causes an increased flow of saliva, and in many instances relieves sore eyes and tooth-ache. When reduced to powder and snuffed up the nose, it proves an excellent sternutatory. The tincture of tobacco acts powerfully as a diuretic and has proved successful in dropsy and dysuria. It is also applied externally for the cure of obstinate cutaneous diseases. In the form of smoke, and infusion, it has been used with great success by way of injection in obstinate constipation of the bowels, and in the reduction of scrotal hernia.

2ndly. As we are acquainted with the culture of tobacco, in Virginia, I will pass it by and give a short account of the West India culture, one hundred and forty years ago. I do this for the purpose of showing the great difference in the Virginia and West India mode of cultivation: the latter is cultivated with far less expense, inasmuch as it will be shown, that the tobacco crop in the West Indies requires no fire in the curing process.

"After sowing tobacco seeds, the ground is watered every day, and in hot weather covered to prevent its being scorched by the rays of the sun; and when the plants are grown to a certain pitch, they are transplanted into a soil well prepared for their reception: care is also taken to keep the ground clear of weeds, and to pull off the lower leaves of the plant, that fifteen of the finest leaves may have all the nourishment. When these leaves are ripe, which is known by their breaking when bent, the stalks are cut, and left to dry 2 or 3 hours in the sun; after which they are tied together two and two, and hung on ropes under the shade to be dried in the air: and when the leaves are sufficiently dried they are pulled from the stalks, and made up in little bundles; which being steeped in sea-water, or for want thereof, in common water, are twisted in manner of ropes, and the twists formed into rolls by winding them with a kind of mill around a stick: in which condition it is imported into Europe, where it is cut by the tobacconists for smoking, chewing, formed into snuff and the like."

3dly. I will now make some remarks on the demoralizing effects of the tobacco culture in eastern Virginia. What I might ask, has produced the wretched and deplorable state of things observation presents to our view in the tobacco region of Virginia? I speak with reference to the exhausted state of our farms; lands naturally the best in the world; have become worn and exhausted by the culture of tobacco. The bitter weed has laid the forest low and left us nothing but galls, gullies and dwarf pine! If our system of agriculture be correct, how does it happen that our lands have deteriorated; and how are we to account for the fact, that in the tobacco region of Virginia, we have much steril surface; one half being unfit for cultivation, and the other half affording a scant return to the agriculturist? Let those answer the question who have cultivated tobacco. The great object heretofore has been, to get as much forest cleared as possible, make a few crops of tobacco, to be followed with grain; until the soil by hard culture and frequent washings becomes exhausted, and the land abandoned. This Virginia can witness; the system, to say the least of it, is wasteful, unproductive and immoral. Cut down, wear out and walk off, has been the system pursued in the tobacco region for the last century. The cultivation of tobacco, has not only exhausted our lands; if this was all, we could bear it, but it has left us poor; its influence is felt in eastern Virginia, and extends to our slaves, horses, cattle, sheep and hogs, and I might say down to the cats and dogs. Our ridges have become so barren, that they do not afford cover for the partridges, and they have followed the soil down branches and creeks, hovering in the flats. We should all mourn over such a state of things. Poor old Virginia! She once stood high, the pride of man, the pride of fame; now fallen. She gave birth to all that was great and good in America, she gave birth to American liberty, history, eloquence and religious freedom, and shall Virginia, the mother of 25 states, the land of Washington, the boast of Jefferson, Monroe, Madison, Marshall, Henry and a host of worthies, be reduced by injudicious culture to a CAPUT MORTUUM? Her forest has been swept away, and her great men of genius and worth, together with the hard cultivators of the soil, the bone and sinew of the land, have, by thousands and tens of thousands, been driven out of the state, in search of better lands.

Where are the talented sons of Virginia now? a few linger in the state unnoticed, many have wended their way to the north, south and west. New Jersey can boast of an Alexander, one of the most distinguished theologians in the United States. Pennsylvania can boast of a Chapman, a Gibson, and a Horner, men that do honor to the state, and the profession to which they belong, Ohio can boast of a Harrison, Kentucky a Clay, South Carolina a Waddill, and Tennessee, and all the western states, are indebted to Virginia for their distinguished men.

But we can only boast now of what Virginia has been, and the remains of her Washington and other worthies. They rest in her lap, entombed in her soil; yes, their bones are now mouldering in silent clay, and when we forget Virginia and her distinguished sons, we shall cease to live; for we are bound to the old Dominion by the tenderest ties of love and affection; the mind dwells on her scenes, with mingled sensations of pleasure and pain; but as near our hearts, and as tender as these recollections are, like all temporal things, they must be dissolved.

Perhaps Virginia has answered the great purposes for which she was intended; she may have effected her object in raising up distinguished sons, for great and mighty purposes; some of whom are now adorning other states. I am constrained to say that if a correct system of agriculture and education could have been kept up in Virginia, emigration would have been trifling in comparison to what it has been, and the old Dominion would number at this time between two and three millions.

Virginia has lost her forest, and exhausted her lands. Since the declaration of independence, 62 years ago, she has perhaps grown two millions six hundred thousand hogsheads of tobacco,* which would, if placed lengthwise, touching each other, form an extended line from New York to Liverpool, and if the average be $50 per hhd., the gross product will amount to the enormous sum of one hundred and thirty millions of dollars; deduct half for cost of culture, and there will remain sixty-five millions net. A very large portion of this money has been paid out of the state; while Virginia was engaged in making tobacco, neglecting her institutions of learning, other states were educating her sons, and the hard earnings of the planters have gone to northern schools and colleges. The old Dominion has paid in the last 50 years five millions of dollars for the education of her faculty, every dollar paid out of the state; half has been given to the Jefferson college and University of Pennsylvania; and the other half to medical schools throughout the United States and in Europe. If Richmond 50 years ago had had a university, the high character of the state would have filled the various chairs with distinguished professors; Virginia's sons would have been educated at home, the northern drain cut off, and emigration stayed, and why? Because the university would have had the support and patronage of Virginia, North Carolina, South Carolina, Georgia, the western states, and indeed the whole union; millions would have been saved, and the population of Richmond this day would exceed one hundred thousand souls.

But let us turn from this gloomy picture; has Virginia fallen never to rise again? I am not entirely prepared to answer the question, but this I will say, that the old Dominion can yet boast of distinguished, enterprising sons, men that would do honor to this, or any other age; and although she has fallen from her high estate, I say high, for her soul reached high, notwithstanding she has fallen apparently; I look forward to the time when she will rise again with renovated soil, and her worn hills and dales, galls, gullies and steril fields yield, in abundance, wine and oil, milk and honey, the finer fabrics of cotton, flax, wool and silk, together with grass, grain and lowing herds, giving to the agriculturist "a feast of fat things." Yes, this great revolution will take place; the tide of emigration will roll back, and the tobacco region in eastern Virginia, become studded with manufacturing villages and towns, and Norfolk the New York of the east. But it may be asked, what will bring about such a revolution? I answer internal improvement. Our numerous rivers, the finest in the world, connected with railroads throughout Virginia, extending their branches and arms into other states, giving facilities of travel throughout the extended bounds of the union, all connected directly with the great Atlantic seaboard, must and will produce a wonderful revolution, and that in a short time. Independent of this, eastern Virginia was intended by nature for farming and manufacturing purposes; for surely no part of the habitable globe is more highly favored with water power, or more favorable to the production of grass, grain, vines, pulse, roots and fruits. Manufacturing establishments are found at this time throughout eastern Virginia; they have taken root in Petersburg, Richmond and Alexandria, and we can but hope their march will be onward.

4thly. We come now directly to the subject before us, can we dispense with the culture of tobacco in eastern Virginia? My answer to the question is, that we can, and must give up the tobacco culture; the time has arrived when we are under the necessity of looking out for a new staple. What shall we substitute for tobacco? If called on to answer the inquiry, I would say that the silk culture in all probability will succeed the tobacco culture, and become the staple in eastern Virginia. We are in want of a permanent staple, one that will support us and reclaim our own worn and exhausted farms. I know nothing better calculated to effect this great object than the silk-culture and growing the Chinese mulberry, the MORUS MULTICAULIS.

I will now attempt to prove, that in the present exhausted state of our lands, little or no profit is derived from the cultivation of tobacco.

I shall confine myself principally to one acre of ground, and one laborer, and in making my calculations, have not taken any account of plantation tools, teams, or the value of land. Tobacco will be credited at $8 per cwt. lugs $4 50, wheat $1 per bushel, corn 80 cts. per bushel, potatoes 75 cts per bushel, pork $7 50 per cwt. beef 750 per cwt., silk $4 per lb., labor 25 cents per day.

I am aware that the prices and calculations will be found incorrect, they are given for what they are worth, with many grains of allowance. My tobacco, wheat and corn calculations are taken with alterations from similar estimates made by an able intelligent writer over the signature of "E," in the April No. of the Farmers' Register for 1837.

* Three millions hhds. is probably nearer the truth than the above statement, the gross product of which would be, at the same rate, one hundred and fifty millions of dollars. Deduct one half for cost of culture, there will remain seventy-five millions of dollars net profit. W. B. S.

I will now make an estimate of the probable expense in cultivating one acre of ground in tobacco.

Calculation 1st.

Expense of tobacco culture.

To clearing ground for plant bed 20 yards square and cutting wood four days' labor, at 25 - - - -	$1 00
To burning plant bed, hoeing, manuring and covering, four days' labor, 25	1 00
To one day's labor in fallowing -	25
To one day's labor before hilling -	25
To making 4000 tobacco hills -	1 50
To drawing 4000 plants, cutting off 4000 hills and planting, three days' labor - - - -	75
To one day's ploughing - -	25
To two days' weeding - -	50
To two days' hilling - - -	50
To one day's ploughing - -	25
To worming, three days' labor -	75
To two days' hilling - -	50
To three suckerings, three days' labor	75
To topping and priming, two days' labor - - - -	50
To cutting 4000 plants, hanging on sticks, scaffolding and housing, six days' labor - - -	1 50
To cutting and hauling wood, three days' labor - - - - -	75
To four days' firing - -	1 00
To striking down and bulking two days' labor - - - -	50
To stripping 900 pounds of tobacco eight days' labor - - -	2 00
To re-hanging, two days' labor -	50
To re-striking two days' labor -	50
To prizing 900 pounds of tobacco, six days' labor - - - - -	1 50
To carriage to market - - -	6 50
To one tobacco cask - - -	2 00
To warehouse expense - -	75
To nine cords of wood at 60 cents -	5 40
To board and clothing laborer sixty-eight days at 13 cents - -	8 84
	$40 49

Credit.

By the sale of 750 lbs. of tobacco, at $8, is	60 00	
By sale 150 lbs. of lugs at 4 50	6 75	
		66 75
Deduct expense of culture -		40 49
Net profit		$26 26

Calculation 2d.

Expense of wheat culture.

One acre of ground that will produce 900 lbs. of tobacco, will yield 20 bushels wheat.

To fallowing one acre of ground, one day's labor - - - - -	25
To harrowing same, half a day's labor	13
To one bushel seed wheat - -	1 00
To cutting and shocking, one and a half day's labor - - -	38
To hauling to barn, one day's labor	25
To threshing and fanning 20 bushels of wheat, two days' labor - -	50
To marketing 20 bushels of wheat, at 12½ cents - - - - -	2 50
To boarding servant six days -	75
	$5 76

Credit.

By sale of 20 bushels of wheat, at $1	20 00
By sale of straw and chaff from 20 bushels, at $1 - - -	1 00
Deduct cost of culture -	5 76
	$15 24

Seven acres in wheat, can be cultivated with less labor and expense than one acre in tobacco.

Calculation.

To seven acres in wheat at $5 76 expense per acre, $40 32 cents.

By yield seven acres, 20 bushels per acre, is 140 bushels, at $1 per bushel, is - - - - -	140 00
Straw and chaff from 140 bushels, at $7 - - - - -	147 00
Deduct expenses of culture	40 32
	$106 68

If the price of wheat be reduced to 90 cents per bushel, the product, including chaff and straw, will be - - - 92 68

Calculation 3rd.

Expense of corn culture.

One acre of ground that will produce 900 lbs. of tobacco, will yield 40 bushels corn.

To one day's fallowing, one day's labor - - - - -	25
To one day's ploughing before planting, one day's labor - -	25
To one day's ploughing, at the time of weeding - - - -	25
To one day's labor in weeding -	25
To one day's labor in hilling -	25
To one day's labor in ploughing -	25
To two days' labor in pulling fodder and securing - - -	50
To one day's work in cutting and securing tops - - -	25
To two days' labor in pulling and hauling corn - - - -	50
To shucking eight barrels corn, two days' work - - -	50
To carrying 40 bushels corn to market, at 12½ cents per bushel -	5 00
To boarding laborer 14 days -	1 75
	$10 00

Credit.

By sale 40 bushels corn, at 80 cents	32 00
By sale fodder from eight barrels corn	2 00
By sale shucks and tops from same -	2 00
Amounts to gross - -	$36 00
Deduct expense of culture -	10 00
Leaves net profit -	$26 00

Four acres in corn can be cultivated with less expense and labor, than would be required to cultivate one acre in tobacco.

Calculation.

To four acres in corn $10 expense per acre is $40.

By yield of four acres, 40 bushels per acre is 160 bushels at 80 cents per bushel, is - - -	128 00

Fodder, shucks and tops from same -	16
	$144 00
Deduct cost of culture [four acres]	40 00
Leaves net profit -	$104 00

If the price be reduced to 70 cents, the product, including fodder, shucks and tops, will be $88.

Calculation 4th.

Expense of potato culture.

One acre that will produce 900 lbs. tobacco, will yield 100 bushels potatoes.

To one day's fallowing - -	$00 25
To two days' preparing ground and planting - - - - -	50
To six bushels potato seed (cut) at 75 cents - - - - -	4 50
To two weedings, two days' labor -	50
To two ploughings, two days' labor -	50
To two day's labor in digging -	50
To carrying 100 bushels potatoes to market, at 12½ cents per bushel -	12 50
To boarding laborer nine days -	1 13
	$20 38

Credit.

By sale 100 bushels potatoes, at 75 cents - - - - -	75 00
Deduct expense of culture -	20 38
	$54 62

Two acres in potatoes can be cultivated with the same expense and labor that would be required to cultivate one in tobacco.

Calculation.

To two acres in potatoes, at $20 38 expense per acre, - - -	40 76
By yield of two acres, 200 bushels, at 75 cents, is - - - - -	150 00
Deduct expense of culture -	40 76
	$109 24

If the price of potatoes be reduced to 63, the product will be $85 24.

Calculation 5th.

Swine husbandry.

Expense of swine husbandry, connected with root and grain culture.

One hundred bushels of potatoes, will, with 40 bushels corn meal, fatten 12 hogs, allowing eight and a third bushels steamed potatoes, and three and a third bushels corn meal to each hog, which is more than the northern allowance.

To expense in cultivating one acre of potatoes, carriage to market deducted - - - - -	7 88
To expense in cultivating one acre in corn, carriage to market deducted -	5 00
To 12 hogs, eighteen months old, if raised on the farm, may be charged $3 50 - - - - -	42 00
	$54 88

Credit.

By sale 12 hogs, weighing 200 lbs. each, 2400 lbs. at $7 50, is -	180 00
By sale 120 lbs. lard, at 10 cents, is	12 00
	$192 00
Deduct expense - -	54 86
	$137 12

If the price of pork be reduced to $6 per cwt., the product will be, including lard, $101 12 cents.

Calculation 6th.

Beef husbandry.

Expense of beef husbandry, connected with grain and grass culture.

One acre of ground that will produce 900 lbs. of tobacco, will yield between three and four thousand pounds herd's grass hay; which will, with 40 bushels of corn meal, bring five beeves taken from the grass to market; allowing eight bushels corn meal and 800 pounds herd's grass hay to each beef.

To one day's fallowing - -	25
To one day's sowing and harrowing	25
To one bushel herd's grass seed -	75
To two days' mowing - -	50
To six days' securing and shocking, at 25 cents - - - - -	1 50
To board laborer 10 days - -	1 25
To expense in cultivating one acre in grass - - - - -	4 50
To do. do. do. one acre in corn -	5 00
To five beeves, if raised on the farm, may be charged $20 each -	100 00
	$109 50

Credit.

By sale five beeves weighing 500 lbs. each, is 2,500 lbs. at $7 50 per cwt.	187 50
By sale 150 lbs. tallow, at 13 cents	19 50
By sale of five skins, at $3 - -	15 00
By sale five tongues, at 50 cents -	2 50
By sale five heads, five viscera and 20 feet - - - - -	12 50
	237 00
Deduct expense - -	109 50
	$127 50

If the price of beef be reduced to $6 per cwt., the product, including offal, will be $90.

Silk culture.

As I have ventured the opinion that the silk-culture in Virginia, will be substituted for the culture of tobacco, I beg leave to give the following statements from the most intelligent and distinguished silk-raisers in Europe. Average gross product of an acre of ground, according to Count Dandolo, is as follows:

To 198 pounds silk at $4 per pound -	792 00
Cost of culture - -	85 10
Net profit - - -	706 90

Average gross product from an acre of ground, according to Mr. John D. Homergue, is as follows:

To 243 lbs. silk at $4 per pound is -	972 00
Cost of culture - -	111 94
Net profit - - -	860 06

The following calculation, is predicated upon the statement of Gideon B. Smith, Esq., of Baltimore, that a full grown tree, (morus multicaulis) will yield foliage enough for 5,000 worms, and as 108 trees at 20 feet square apart will stand on an acre, so will that number of trees support 540,000 worms, and as 3,000 worms will make a pound of silk, so will 540 thousand make 180 pounds at $4, which gives $720, the gross average of an acre.

We will now state an account current, by which the net profit of an acre will be clearly demonstrated, and we beg leave to make this explanation, that with a view of providing against all possible contingencies, we have taxed 540,000 worms, with the expense of the labor of one million, which will more than cover all drawbacks arising from mortality among the worms or any other unforeseen casualties.

Expense of silk culture.

To interest on one acre land, valued at twenty dollars - - - - -	1 20
To interest on laboratory valued $500	30 00
To hire two men five weeks at $6 per month - - - - - -	15 00
To their board one and a half weeks	15 00
To hire two women four weeks at $3 per month - - - -	6 00
To board two women at $1 50 per week - - - - - -	12 00
To hire four women three weeks $3 per week - - -	9 00
To their board $1 50 per week -	18 00
To hire 12 children from 7 to 14 years old, two weeks, at $1 per week -	24 00
To their board at $1 per week -	24 00
	154 20

Credit.

By sale 180 lbs. silk $4 per lb. -	720 00
Deduct cost of culture - -	154 20
Net profit - - - - -	565 80

As the above product of $720 gross is the work of five weeks only with two men, six women and twelve children, three crops of silk can be made in one year, if the culturist has 3 acres in morus multicaulis and supplies of eggs, kept in an ice-house, or some low temperature in order to prevent them from hatching until wanted.

To expense of three acres 154 20 per acre - - - - - -	462 60
Yield of 3 acres, at 180 lbs. per acre is 540 lbs. at $4 per lb. - -	2160 00
Deduct cost of culture - -	462 60
Net profit - - - -	1697 40

A table showing the actual profits of the mulberry culture, upon one, five and ten acres of ground according to the estimate of Mr. John D. Homergue.

Gross product of one acre - -	972 00
Cost of culture of one acre - -	111 94
Net profit - - - - -	860 06
Gross product of five acres - -	4,860 00
Cost of culture - - - -	559 70
Net profit - - - -	4,300 30
Gross product of 10 acres - -	9,712 00
Cost of culture - - - - -	1,119 40
Net profit - - - -	8,592 60

Estimate according to Count Dandolo, the Italian silk culturist.

Gross product of one acre - -	792 00
Cost of culture - - - -	85 10
Net profit - - - - -	706 90
Gross product of five acres - -	3,960 00
Cost of culture - - -	425 50
Net profit - - - -	3,534 50
Gross product of 10 acres - -	7,920 00
Cost of culture - - - - -	851 00
Net profit - - -	7,069 00

In a letter of the Hon. Ambrose Spencer of Albany to S. M. Hopkins, Esq., dated 7th April, 1835, he states, on the authority of the Burlington Free Press, that raw silk was produced in the town of Mansfield, Connecticut, to the amount of over $60,000 in 1834, and that the county of Windham produced silk annually valued at 500,000, and if reeled would be worth double that sum. This statement the judge believes to be substantially true.

"Near Boston, 420 pounds of silk, worth $3 50 per pound amounting to $1470 was raised by four girls, whose attention to this culture required but a small portion of the year. So says S. Blydenburg of Albany, New York. This fact contains one of the most powerful arguments in favor of the culture which we have yet seen. We find four girls—farmers' daughters, or helps, as hired persons are called to the eastward—successfully attending to four acres of mulberry trees, gathering the leaves, feeding the worms and performing all the labor incident to the business, and what is the result? Why at the depressed price of $3 50 per pound they made silk enough to bring $1470 or $367 50 to each hand; now if the present price which prevails in Massachusetts, $4 per pound from the purchaser, and 50 cents from the state, had then prevailed, each of these females would have averaged $472 25, or the whole have made, in the aggregate, $1,890, and independent of the state bounty, the 420 lbs. of silk would have brought $1680 or $420 to each of the females engaged in the feeding of the worms. And as on an average 3,000 worms completing their cocoons, will make a pound of silk, there were but 1,260,000 worms—thus it is evident, that the produce here recorded is far from being a large one, for had the orchard been planted to the extent of the capacity of the ground, 720 lbs. of silk might just as readily have been raised as the 420 lbs." But it may be said $420 to the hand is a high estimate, be it so, let us take half, which will give $210, if this is too much divide again and we have $105 to the hand, this is better than the culture of tobacco, more particularly when we consider that our worn lands are daily improving. A crop of silk is made in 5 weeks and will not interfere much with the regular business of a farm. In the silk culture all the members of a family may be employed, the young, the old, the maimed, the halt, the blind, all can gather mulberry leaves. Our tobacco barns throughout eastern Virginia will make the best laboratories or cocooneries, and nothing is wanting to prevent us from going heart and hand in the silk culture, but a few thousand mulberry trees (morus multicaulis) which may be propagated from cuttings in two years. The climate of Virginia is more favorable to the culture of silk than that of Europe, indeed it is as favorable as that of China, and the immense wealth of that country, by this culture is sufficient to convince every intelligent individual of the propriety of going into the silk culture in the tobacco region of Virginia. "We are told by a gentleman of good intelligence that the whole charge of making a pound of silk in China does not exceed more than five shillings, and almost every person, man, woman or child, may work at it, and a man or woman with a child to assist in directing the thread of the silk may with a proper machine reel from the cocoon or silk bag, 1 lb. in a day." "Now I should think the labor of slaves employed in this work would produce above twice as much as those that are employed in making either sugar, tobacco, or cotton." I wish it to be borne in mind the culture of silk in America first had its origin in Virginia, the attention of the colony was called to the subject by the British government early in the sixteenth century, and it is worthy of remark that the connoisseurs of Europe pronounced Virginia silk to be the best in the world; more glossy, soft and of a better staple than the silks of Europe or Asia.

"Mulberry trees, and printed directions were early sent to Virginia, to encourage the silk culture, and as the king, James I. had 'understood that the soil naturally yielded stores of excellent mulberries,' he gave special instructions to the Earl of Southampton to urge the cultivation of silk in the colonies in preference to tobacco 'which brings with it many disorders and inconveniences.' In accordance to which the earl wrote a letter on the subject to the governor and council of Virginia, in which he desired them to compel the colonists to plant mulberry trees. In 1623, the colonial assembly directed that they should be planted, and in 1656 the culture of silk is described as the most profitable commodity for the country, and a penalty of three lbs. of tobacco is imposed upon every planter who should fail to plant at least ten mulberry trees for every hundred acres of land in his possession. A premium also of four thousand pounds of tobacco was at the same time given to a person as an inducement to remain in the country, and prosecute the trade in silk, and the following year a premium was offered of 10,000 lbs. of tobacco to any one who should export two hundred pounds worth of the raw material of silk, and five thousand pounds of the same article to any one who should produce one thousand pounds of wound silk in one year. The act coercing the planting of a given number of trees was repealed in 1656, and renewed two years thereafter; but the system of bounties and penalties was continued until 1666, when, owing to the success of the culture, they were deemed unnecessary. While Sir William Berkley was in England on the occasion of his re-appointment as governor, in conversation with the king, his majesty strongly recommended the culture of silk, and as an inducement to the colonists to attend to his advice, mentioned that he had formerly worn some of the silk of Virginia, which he found not inferior to that raised in other countries. The encouragement given by the colonial legislature had the desired effect, a spirit of generous enterprise and emulation was infused into the minds of the agriculturists of the old Dominion, mulberry trees were generally planted and the raising of silk worms was made a part of the business of many of the farmers. Indeed so zealously did the larger planters and farmers enter into it, that many were found to come forward and claim the premium offered by the legislature; and among them was a Major Walker, a member of that body, who produced satisfactory testimony of having seventy thousand trees growing in the year 1664. The eastern part of the state abounds with white mulberry trees at present, thus affording the inhabitants the means of promptly taking up the silk culture as a portion of their system of husbandry."

Silk has been cultivated more or less in every state in the union (except Maine.) Early in the seventeenth century, silk was exported to Europe from Virginia, North Carolina, South Carolina, Georgia, Maryland, Pennsylvania and the New England states, and in 1750, two thousand five hundred lbs. of silk were raised in the neigborhood of Philadelphia.

In conclusion, I would respectfully suggest the following, for the consideration of the cultivators of tobacco in eastern Virginia—viz.: Curtail the tobacco crop one-third in 1839, two-thirds in 1840, and continue one-third for the purpose of paying for taxes, smiths' bills, iron, salt, sugar, coffee, &c. Let each tobacco culturist purchase 1000 cuttings of the Chinese mulberry (morus multicaulis) which will cost $40, to be planted as we do corn, the 1st of March, in good ground, and as there are two eyes to each cutting, under the most favorable circumstances, those cuttings will become 2000 trees from 4 to 6 feet high in November following, yielding 20 cuttings to each tree, amounting to 40,000; and if planted in like manner in March, 1840, there will be an ample supply of mulberry trees for the purpose of feeding and raising silk worms. Go into the silk culture in 1839 with the native mulberry (morus rubra,) which will give the young tyro a useful lesson in the management of silk worms. In 1840 the leaves from the scions of 2000 roots with the leaves of the native mulberry, will give a good crop of silk. In 1841 the supply of leaves will feed millions of worms and the culturist may go largely into the silk business.

MORE OF THE INTRODUCTION OF THE MORUS MULTICAULIS.

To the Editor of the Farmer's Register.

Linnæan Garden and Nurseries,
Flushing, Nov. 1, 1838.

My attention has been this day called to an article in the Richmond Enquirer, of the 12th inst., on the introduction and dissemination of the morus multicaulis.

My father, Mr. Wm. Prince, more than half a century ago, devoted great attention to the silk culture, and having, at that early period, reared many bushels of cocoons—a pair of gloves manufactured from which he still possesses—and, on my part, having imported the morus multicaulis *before it had a name*, and having urged the subject of the silk-culture for the last fourteen years—combatted its revilers in every stage, and contested for its adoption as part of the *true American system*, besides losing about $5,000, in one importation of the morus multicaulis trees, I am not content to let such flimsy statements as the one referred to, pass without a suitable rebuke; and you may calculate on receiving, in due course, a full and explicit communication on the subject.

Yours, most respectfully,

Wm. R. Prince.

December 22d, 1838.

P. S. Since writing the preceding short letter, touching the morus multicaulis, I have seen Mr. John Carter of Richmond, who, in a conversation with Mr. Garretson of this place, and myself, and without our introduction of the subject, explained to us how he first obtained the morus multicaulis. He stated, that Dr. Norton received *a tree from us in the spring of* 1838—that during the summer, he spared him a branch, with which he budded some white mulberry trees—and that this was his commencement of his culture of the tree. This is precisely as I some time since suggested to Gideon B. Smith, Esq. At that period, we were in the habit of receiving from Dr. Norton, and his friend, Dr. Hening, many native plants, collected in the vicinity of Richmond, and of transmitting them. in return, such trees or plants as they desired; and I believe I can produce from among our old papers, the original invoice of trees sent them in the fall of 1828, or spring of 1829, in which was comprised the "Philippine Island mulberry," it not having, at that early period, received the title of "morus multicaulis." Most respectfully yours,

Wm. R. Prince.

The first portion of the foregoing communication, was held back, in expectation of the more full statement, therein promised, being furnished for publication. That not having been received, the piece is now inserted, together with the postscript of a much later date. The piece in the Enquirer, which called forth this letter, was that signed "J. W.," which gave to Dr. Norton so large a share of the merit of introducing and spreading the morus multicaulis; which pretension was examined in a former article of the Farmers' Register, (No. 8,) and its total emptiness then fully exposed.

But though Mr. Prince was fully justified in his expressions, upon all the lights before him, it is proper, and but doing justice to Dr. Norton, here to state, that we have heard from a private source of a fact, of which neither Mr. Prince nor any other person who has engaged in this controversy had heard, until after the last article referred to had gone to press. This fact is, *that Dr. Norton received his first tree direct from France, in* 1828, as we understand he stated to a highly respectable gentleman, in answer to the inquiry, as to the manner by which the first plant came into his possession. This fact is one of some interest in the history of the introduction of the tree; but, if ever so well established, it would not add one particle to the strength of the claim of merit before made for Dr. Norton, if the importation was not ordered by him upon *knowledge of the plant and its value*, or if it remained long afterwards in his possession before he knew either its character or value. On these points, information is desired from Dr. Norton, or others; and if it should appear that he has not received his due credit in our former remarks and deductions from the then known facts, we shall take pleasure in rendering to him full justice.

There was an evident mistake of the pen, in the latter part of the foregoing letter, where the time of sending Dr. Norton his tree is stated by Mr. Prince to have been in "1838." The time meant to have been written, was doubtless 1828; and even in this, we infer that Mr. Prince was mistaken, as was Mr. Smith, in his former statement of the time of receiving his first tree. On this subject, the following explanation was sent, and which now can be appropriately offered.

Baltimore, Nov. 20, 1838.

I have to ask the favor of you to correct my statement as to the year when I first received the morus multicaulis. My former statement was made from memory, not supposing at the time I had any paper by which I could ascertain the exact date; but on looking over a large bundle of old letters last night, I found the letter from Mr. Prince, containing *the invoice*, in which the multicaulis tree is included. The letter is dated 11th November, 1829, and the following is the invoice:

"Morus Tartarica
"Morus alba lucida lobata
" latifolia obscura lobata
" constantinopolitana
" ovalifolia
" *Chinese*, (very large and new.)"

The "Chinese" is the one now called morus multicaulis. I was strongly under the impression that it was first sent to me under the name of "Philippine Island mulberry" by Mr. Prince; but it seems that name was given to it afterwards; and that even after that the name "morus multicaulis" was given to it. That it was not known *then* as morus multicaulis, and that its good qualities were not then known, is proved by the following remark of Mr. Prince in a letter dated October 21, 1829, advising me that he intended to send me the above trees.

"I hope, however, I may be able to aid you a little in the *silk cause*, by sending you some of the finest sorts of mulberries, particularly the celebrated *Tartarian*."

The packet that brought these trees to me sailed from New York on Saturday the 7th of November 1829; I consequently received them about the middle of that month. But you see that Mr. Prince does not allude to the Chinese tree, except in the invoice, as being any thing extraordinary; but particularly mentions the Tartarian. My old tree, therefore, has been in my possession but nine years instead of ten, (as I supposed,) and therefore it is now but ten years old.

On the 12th July, 1830, Mr. Prince wrote me as follows:

"I should have been pleased if you had stated that your Chinese mulberry tree came from me. I don't believe one tree exists in the country but yours and mine—we have about twenty."

On the 17th September, 1831, Mr. Wm. Kenrick, of Massachusetts, wrote me as follows:

"I notice you cultivate the morus multicaulis. Mr. P. wrote me last spring, (spring of 1831,) to the same purport. I have or rather am beginning to cultivate them since—*since last spring*—(spring of 1831,) otherwise except Mr. Cobb procured two plants last June of Messrs. P., it is not in New England. * * * Do you then really think that this people will ever enter into the business of raising silk?"

The above, my dear sir, fixes the date of my reception of the trees exactly. It takes off one year from the date fixed upon in my former statement, or rather makes the date one year later. I regret having fallen into the error, and hope it may be attributed to the proper cause—I could have no motive in misstating the date; and I hope this prompt correction of it will be received as evidence that I had no desire to do so. I have quoted Mr. Kenrick's letter merely to show at what time he commenced the culture of the tree.

GIDEON B. SMITH.

In addition to the above new, or supposed facts, as to the early introduction and early want of knowledge of the morus multicaulis in this country, we have obtained information of another, and previously unknown source of supply, from which alone the southern states might have been already stocked, if the value of the plant had been better known. The statement is in the following extract of a letter received from a correspondent in Georgia, dated November 11th.

"Some 8 or 10 years since, a gentleman who commenced a vineyard in Harris county, 22 miles above Columbus, sent to France for a vine-dresser; and the person engaged, M. Besson, thought it would not be amiss to bring out a few morus multicaulis, which he planted adjoining the vineyard. Owing to the worthlessness of the vines, or want of proper energy, or both, or some other cause, the vineyard was suffered to go to decay, and the Frenchman to other business. The plantation was subsequently sold to various persons, till it fell into the hands of Dr. J. W. Turner, who being a man of some taste and zeal in such matters, has revived the place to some extent, and propagated the mulberry trees left by the Frenchman, until there are 100,000, or more. A short time since, the owner's zeal growing cold, and not finding a market for his trees, he sold the land, consisting of 1000 acres, with three improvements (or settlements,) thereon, including the old vineyard and the mulberry trees, for $16000, to a gentleman of Columbus, who has a brother in Baltimore, and therefore was better informed as to the then demand for the trees. The purchaser will shortly leave here for Baltimore, to make sale of his trees, thinking he will get more there than here. Many of our citizens have lately become very anxious to procure the trees, and there is no telling where the excitement will end.

"Poor Besson is dead, and his widow lives in obscurity and indigence. So goes the world. I like your suggestions relative to G. B. Smith, and the "Gratitude" farm, and hope our fortunate citizen may be induced to contribute something; at least I hope he will not forget the poor widow of the man who laid the foundation of his fortune."

PREPARATION OF METALLIC CANDLE WICK.

Melt 100 parts of tallow, or wax, or any mixture of these, and add 5 to 10 parts of carbonate of lead well pulverized. The materials easily unite by stirring. Steep the wicks in this composition while warm and fluid. When cold the candles may be made upon them by dipping or moulding. In burning these candles, the carbonate of lead is decomposed by the heat, and little globules of lead collect on the top of the wick, which bend it out of the flame and thereby increase the beauty and brightness of the light.

[*Jour. de Conn. Usuelles.*

For the Farmers' Register.

ROUGH FIELD NOTES.

No. III.

Philadelphia and Columbia Railroad.

This work is highly important, being a link of the great improvement which is now in successful operation, connecting Philadelphia with the west. It is 83 miles long, and connects the waters of the Schuylkill at Philadelphia with those of the Susquehanna at Columbia. The highest summit crossed in this distance is the Mine Ridge, elevated 600 feet above tide, and distant 54 miles from Philadelphia. The descent to each river is made by means of an inclined plane worked by stationary power. The one at Columbia rises ninety in 1980 feet, the other at the Schuylkill is 180 feet high and about half a mile long. At the latter place the stationary engine with its room, is a model for neatness and order. The train is let down gently and safely by means of a rope three inches in diameter. The Schuylkill is crossed by a handsome covered bridge 900 feet long, on which are laid no less than four rail-way tracks.

A double track has been laid throughout the entire length of the road. The superstructure consists principally of the edge rail, supported every three feet on stone blocks, about one foot cube. Wooden sills are substituted for these cubes of stone, at intervals of 15 feet, which pass under both rails and act as ties. At each point of support the rail rests in a heavy cast iron chair, and is fastened in it by means of a small iron wedge on each side. The chair is previously fixed to the block, by means of wooden plugs driven into holes drilled into the stone. The sills and blocks are all firmly bedded on broken stone. On many of the high banks, the blocks of stone are entirely replaced by sills of wood, no doubt, to prevent inequality in settling. A portion of the road which was once laid with stone and iron plate, they are now ripping up, and substituting the superstructure just described, except that the ties are made of stone instead of wood. Though many errors of location, as well as of construction, are perceptible, yet this work may justly be placed in the first class of railroads.

The Philadelphia and Columbia railroad belongs to the state. The state owns also all the motive power. Individuals or private companies put their own coaches and burthen cars on the road, and pay to the state tolls, just as boats do on a canal. The state owning the engines which propel these wagons, has of course the regulation of the hours for starting, &c. so as effectually to guard against accident from the meeting of trains. The transportation on this road is immense. In passing over it, we met two long trains of coaches filled with passengers, and two heavy produce trains—we also overtook two long trains laden with produce and merchandise. According to the last report of the canal commissioners, this road yielded 5 per cent. while the canals of the state yielded only 3 per cent on their cost, and in addition to this the engines on it cleared $20,000 in 12 months.

It is worthy of note, that a locomotive manufactured by Norris of Philadelphia, ascended the inclined plane near the Schuylkill.

Lancaster and Harrisburg Railroad.

This road is 36 miles long, and, as its name indicates, leaves the Columbia railroad in the vicinity of Lancaster, and strikes the Susquehanna at Harrisburg. It is remarkable only for its tunnel near Elizabethtown, which is 900 feet long, and intended only for one track. This tunnel has only one shaft, which is 90 feet deep. It passes through a soft red sandstone, and is arched with brick and stone its whole length. There is evidence of much carelessness in its construction. The superstructure of this road consists of sills, bedded 5 feet apart, with rails of pine and oak, measuring 9 by 5 inches. The iron plate is $\frac{3}{4}$ inch thick. The whole road is much out of order.

In going from Philadelphia to Harrisburg, the traveller passes through the finest, and most highly cultivated portion of Pennsylvania. The fertile fields, and large substantial barns, bear mutual evidence of the annual use and convenience of the one, and great productiveness of the other.

Stonington Railroad.

Stonington is hardly known in the south, and was but little talked of, until the projection of its railroad. It is a beautiful village, containing more than 3000 inhabitants, and situated nearly in the south-eastern corner of Connecticut, on the sound opposite the eastern extremity of Long Island, and is distant 120 miles from New York. Its situation is highly pleasing. Fisher's Island is in sight to the south, and to the south-east is seen the "ocean's wide expanse." The coast is completely rock-bound, and hence the name of Stonington.

The traveller from New York to Boston has the choice of two routes. He may either take the steamboat for Providence, in which case he doubles point Judith, and encounters the roughness of sea peculiar to that promontory, or he may take the steamboat for Stonington, and thence go by the Stonington railroad to Providence, and thus avoid all the *disagreeables* of Point Judith. From Stonington to Providence the distance is 48 miles. Only one track is down, though the grading was done with a view to two. There are no large structures, though many small bridges. For twenty miles, the road passes over rocky barrens or uncultivated marshes. The country, however, improves, and thence to Providence, presents the appearance of being moderately well cultivated; the soil being light and sandy, without much scenery that is very interesting. The grading, after passing through the rocky country near Stonington, is light until the road approaches Providence. This is a new road, and the superstructure is in excellent order. It consists of the T rail, supported every three feet on wooden sills. The cross section of the rail presents a base 4 inches wide—the rail is 3 inches high.

Probably the stock of no railroad in our country is more variable than that of the Stonington road.

Boston and Providence Railroad.

This road receives all the travel both from the Stonington road and from the New York and Providence boats. Large passenger trains pass each way three times every day, and the stock is considered a permanently good one—it is paying now 12 per cent. This road is 41 miles long, with one track, laid on the same plan as the Stonington road. The chair on which the rail rests is a flat piece of iron $5\frac{1}{2}$ by 8 inches, and the rail is let into it 3-8 of an inch and confined by 4 spikes, 2 on each side. Both these roads are free from bold curvature, and no pains are spared to keep them well drained. Besides the longitudinal drains on the sides, there are little cross grips every 15 or 20 feet. Besides the wooden bridge across the Pawtucket near Providence, and a stone one about 14 miles from Boston, there is no other structure of moment. The grading is light, through a soil generally sandy. I passed from Stonington to Boston, 89 miles, in four and a half hours, and never travelled more smoothly. The railway throughout is in the finest order. After leaving Providence, the country continues uninteresting, until near Boston, elegant country houses and fine gardens are seen all around.

Boston and Lowell Railroad.

The Massachusetts railroads are decidedly the finest in this country. The necessity of obviating the ill effects of the severe frosts, causes them to be built in the heaviest and most permanent manner. Like all the other railroads leaving Boston, this crosses the marsh, which makes Boston so nearly an island, by means of long trestle work. From Boston to Lowell, the distance is 26 miles, and there are two tracks nearly all the way. Both the T and fish-bellied rail is in use; the former preferred. The rail rests on stone sills, firmly bedded, 3 feet apart. These sills or sleepers are 8 to 10 inches wide, and at the joints of rails as much as 12 inches, and in some cases, rest on parallel walls of masonry, sunk sufficiently low not to be affected by the frost. The sleepers sometimes alternate with cubes of stone, but not often. When the fish-bellied rail is used, it rests in chairs on every sill, like those used on the Philadelphia and Columbia railway. The T rail is let into the stone sill 3-8 of an inch, and confined by spikes. Between the chair and stone, thin slips of wood have been introduced, but this does not prevent the disagreeable jarring which seems incidental to all stone and iron roads. All the road bridges across this road, as well as the Stonington and Providence roads, have expensive abutments of masonry. There is no viaduct or other structure of moment. The grades are very gentle, probably in no case exceeding 10 feet to the mile.

The income of this road is derived from travel, and from the transportation of the raw material to, and of the manufactures from Lowell. An idea of the business of this road will be best formed from the statistics of Lowell.

Lowell is a new looking town, with unpaved streets, which has sprung up on the banks of the Merrimack, to the water-power of which it owes its origin, as well as its rapidly increasing population. Its manufactures are so extensive that it has been termed the "Manchester of America."

There are not fewer than 26 extensive establishments for the manufacture and printing of cotton goods, and the manufacture of carpets and other woollen goods, whose agregate capital is not much short of $10,000,000, and which engage not many less than 10,000 operatives and superintendents. There are nearly 5000 looms and more than 160,000 spindles in continual operation, which produce, annually, the rise of 51 millions of yards, and consume more than 16 millions of pounds. Nearly 4,000 barrels of flour are annually consumed to make starch, of which 500,000 lbs. are used in sizing, &c. The wages of the operatives amount each month to more than $100,000. The manufacture of locomotives and divers other smaller matters is also carried on. Lowell now contains upwards of 20,000 inhabitants, and it was only about 16 years ago that the first factory was established.

Query. Had Richmond, with its unlimited water-power, (a water-power as far superior to that of the Merrimack as the energy of the people of the north is to that of the people of the south,) been in the hands of the citizens of Massachusetts for the last 30 years, what would now be its extent, its wealth, its resources, its population?

At Lowell a stranger, particularly a southerner, meets with no difficulty in gaining admission into any of the factories. I found this the case throughout the north. The general appearance of good health and happy looks among the hands are no less a source of gratification than the extensive factories themselves.

When we consider the immense intercourse which must exist between Boston and a place of this sort, only 26 miles distant, the quantity of material and manufactures, and merchandise, which must be carried from one to the other, we may form some idea of the business of the Boston and Lowell road. It is regularly dividing 12 per cent. and could easily divide more, but for the folly of the state legislature, (fully exemplified in this case,) which requires that the dividends shall be limited to 12 per cent. and that all over and above that amount shall be paid as a tax to the state. The company, however, waste all the surplus revenue in making alterations, &c., in their road, which are not called for, or so little so that they would never be made, were the stockholders permitted to pocket what they justly consider ought to be their own.

Lowell and Nashua Railroad.

On arriving at Lowell, I found this road just opened. It extends from Lowell along the southern bank of the Merrimack, 15 miles to Nashua, which is a village just within the southern border of New Hampshire. The lattice bridge by which the road is to cross the river to reach Nashua, which is on the opposite side of the river, is not yet finished.

This road, 15 miles long, cost $300,000 and is built on an excellent plan, and is now in good order. The superstructure consists of wooden sills, placed as cross ties, 3 feet from centre to centre, and resting on two parallel string pieces of 3 inch chestnut plank, placed longitudinally beneath each rail. Where these planks abut one against the other, the joint comes over the centre of a board four feet long, giving a lap of two feet to each plank, and thus effectually preventing the extremity of one string piece from settling below that of the other. On the cross sills rests a heavy T rail, the cross section of which is 4 inches high, and has a base 4 inches wide. This rail weighs at least 2 lbs. to the lineal yard, more than any rail which has been yet imported. The chair by which it is confined to the sills is the same as that used on the Providence and Stonington roads. The grading was light, and there is no heavy structure besides the bridge mentioned at Nashua.

Boston and Worcester Railroad.

Like the other roads radiating from Boston, this ranks with the first class of railroads in this country, both in point of construction and the amount of its business. It is 42 miles long—route direct—curvatures easy, with some deep cuts, but principally through sand. The edge rail is used, supported every 3 feet, generally on wooden sills, but sometimes on stone blocks. The rail rests on a chair similar to that in use on the Philadelphia and Columbia road.

From Worcester, the present termination of this road, a railway by next summer will be in operation, extending westward to the banks of the Hudson, by which means a new route will be opened for travellers from New York to Boston, viz. by steamboat up the Hudson to the terminus of this new road, (which will most probably be Hudson City,) and thence by railway through the heart of Massachusetts to Boston. By this means the Boston and Worcester road will be enabled to come into competition with the Boston and Providence road for this immense travel, and its revenue, already large, will be greatly increased. The eight-wheeled coach does not seem yet to be much in use in this state, but on all the roads the coaches, though on the four-wheel principle, are elegant in point of style, and delightful in point of comfort.

The three great and important roads, namely, the Providence, Lowell and Worcester, were chartered in 1830 and 1831. They cost a great deal of money, but have been completed in a style which will render them permanent and useful. They do credit to their projectors and constructors, and are justly the pride of Massachusetts.

ANSWER TO "PRINCEANA." REMARKS ON MULBERRY AND SILK-CULTURE.

To the Editor of the Farmers' Register.

It was not until to-day that we saw the article in your paper, signed "Anti-puff," and which bears some marks of having emanated from a source, where the writer was not disinclined to benefit your sales of trees, &c. A question may, perchance, arise in some minds, whether it is the most especial duty of an editor to admit communications to his paper, which are particularly calculated to advance his own personal interest, by attacking those of his subscribers and advertisers, whose business avocations may happen to come into collision with his own; as there may be some persons so ill natured as to presume, that he is not totally adverse to their admission. Your paper has always received from us what little aid we could bestow by recommending it to our friends, and it has been with pleasure that we have marked its rapid advancement—but permit us to say, that since its editor has entered the arena, as a vender of mulberry trees, we have had a suspicion that he did not manifest quite as much of that absolute disinterestedness for which he was formerly so distinguished. One might suppose that with his commendable spirit, he would feel contented at pressing forward so rapidly to the goal, and with being on the point of seizing the golden prize, without caring to cast any Parthian arrows on his less worthy and less successful competitors, who seem almost concealed by the obscurity of their distance. Permit us, sir, in illustration, to quote from the advertisement in your "Country Advertiser," in which you say as follows: "The great superiority of the multicaulis plants and cuttings, (referring to those you advertise,*) in luxuriancy of growth and as stock to raise from, is now universally acknowledged by the northern dealers, and that ground of preference is stated in their advertisements of southern plants for sale." Now, sir, we will not adopt the words used in your paper, and state that this assertion "is grossly and manifestly false," but we do appeal to the silk culturists of Burlington and Philadelphia, and to other northern dealers generally, whether it is not notorious that the southern trees offered for sale the last season, could not be sold for near the price of northern trees, arising from the great preference given to trees of northern growth, and so far from its being stated in the advertisement of southern trees "as a ground of preference," it would have been a manifest injury, and we have never yet seen any but *southern* advertisements that ventured such an assertion. We wish not to undervalue the trees grown in Virginia, they are among the best of their kind; but it is yourself, who, from erroneous conceptions, have become the aggressor, in seeking to benefit your own sales, by depreciating, as you say in your advertisement, "the whole crop raised north of Philadelphia;" whereas, for our part, we act only on the *defensive*, and seek but to counteract your erroneous denunciations, made in the double capacity of advertiser and editor, and this we do without attacking any one, and without entitling them ***Ruffiniania.*** In our plantations, which the last season covered about twenty acres, we did not use one southern tree or cutting, and the southern plantations, we presume, have all originated from the trees first imported, propagated, and disseminated by us. Now, sir, as to the wager and competition, which "Mr. Anti-puff" might much better have accepted than to have ingeniously eluded by an attack, we are willing to meet him on what he declares to be the worst position. We will take 2000 trees of one year's growth, without any selection, from a parcel *grown in Connecticut*, and which are now just as they grew; and he may take a similar number of trees, of the same age, grown in your state by him, by you, or any of your friends, he also taking them as they grew, without selection; and we will agree to measure the average girth and height of the main stalk or body, and the length and number of buds on the branches, and the parcel which possesses the superiority in a majority of these points, shall be entitled to the benefits of our proposition. This is a plain offer, and although we may be unsuccessful, it will at least serve to show that the valley of the Connecticut is not to be despised, and that the writer in your paper is ignorant of the fact, that the average growth of the morus multicaulis, in that valley, the present season, was equal to the growth in Maryland and Virginia. You will perceive we spoke but of Rhode Island and Connecticut in our notice, but he equivocates and contrasts *all New England* with Virginia, to give a semblance of what is not the fact, that we had included it all in our assertion.

Having now gone through the actual business part of our communication, we will make some few general remarks on the mulberry culture. It is well known that climate is greatly ameliorated when in proximity with the ocean, and our remarks relative to Rhode Island, Connecticut, and Long Island, were based upon this fact. We did not at all refer to the country in the interior, and you will perceive, therefore, that there is not so much difference in our views, as might at first be supposed. The peach, which is a native of Persia, has made growths here of 9 feet in a single season. Trees of the morus multicaulis, planted in our grounds after the 10th of June, attained in many instances a height of 6½ to 7 feet, and although our trees and cuttings were planted very late, and not completed till the middle of June, we have raised above 200,000 trees, measuring from 4 to 7 feet in height, and there were several other plantations in this vicinity in which the trees were 6 to 7 feet in height. Trees, like mankind, become by degrees acclimated, and we, this summer, saw some large morus multicaulis trees in the garden of Mr. Bestor of Suffield, Connecticut, which occupied a high exposed position, and had been growing there for years, without the least injury, and we witnessed the same fact at Mr. Kenrick's nursery, near Boston. The more completely a tree becomes hardened to climate, the more sure it is to succeed. The Catalpa, Ailanthus, Pride of India, &c., brought from the south, are prone to continue their growth to a much later period than the same kinds of trees of northern growth, and consequently are injured by our frosts before their wood is matured. But northern trees sent to the south are sure to succeed, and to attain their utmost development. The difference between the climate of Maryland and Virginia, and of this vicinity, is very trivial, and we refer more particularly to South Carolina, Georgia, and the states south of them in our preceding remarks. In those states where the contrast of climate and seasons is very great when compared with the north, the multicaulis will of course attain a greater height and development than in the more northern states. This is a point on which I presume there exists no actual difference of opinion.

* *None* were advertised for sale, and therefore the writer's shaft is entirely misdirected. In the advertisement in question, (which may be seen also on the covers of the 7th and 8th Nos. of Far. Reg.) it was merely proposed to cultivate buds or cuttings on shares for the owners—offering to return either 3 for 1 furnished, certain, or two-thirds of the whole crop. Either of these bargains Mr. Prince would do well to make for his own cuttings with any careful cultivator in lower Virginia; and we suspect that there would be insuperable objections, with both parties, to such a contract being made for cultivation in the *Linnæan Gardens and Nurseries.*—Ed. Far. Reg.

We will now conclude, by a word to our fellow-laborers in the same pursuit, the silk culture; the field for our operations is immense and wide enough for us all. The object is a great national one, and forms part of the *true American system*. We approve of the argument recently advanced, that every one who derives profit from the cultivation of his trees, is bound to do more, and to expend a portion of earnings in a cocoonery, at least, if not in a manufactory. *We intend to do both*, and we wish none other but that friendly and rational competition which shall develope itself by presenting the most plainly and satisfactorily to the American people, the ease and simplicity of every department of the silk culture. You have yourself been a most efficient and valuable pioneer in the cause, and no one is more willing to render you homage therefor than ourselves. Your paper has diffused the most useful information far and wide, and has awakened in enlightened Virginia, that spirit which was but latent, and which it required only your pen to illume. Our friends Gideon B. Smith, Dr. Norton, T. S. Pleasants, John Carter, General Cocke, Luther J. Cox, E. P. Roberts, Rev. D. V. McLean, the Messrs. Cheney, and a host of others have thrown the whole weight of their talents into the general cause, and what results may we not anticipate from their exertions, and from the spirit which now pervades all classes? Do Americans, when they undertake a great object, allow themselves to be surpassed by any other nation. Does our mighty country, embracing every variety of climate that all the silk countries of the world can boast, shrink from a competition calculated to develop her immense advantages, and to render her independent of foreign importations, which have in a single year drained her of above twenty millions of dollars? We answer firmly in the negative, and declare our absolute conviction, that such are the advantages of our climate, such the energy and industry of our citizens, such their tact in the invention of suitable machinery, and last, though not least, such the advantages of the multicaulis tree over every other variety in accomplishing that most important point, *the economy of labor*, that within five years our country will command the balance of the silk trade in its favor, and become a great silk exporting country.

Yours, most respectfully,

WM. PRINCE & SONS.

Linnæan Gardens, Flushing, Nov. 17, 1838.

P. S. We hope soon to have a paper on the silk culture published here, and we are preparing a lengthy article explanatory of the silk culture, *to be distributed gratis*, in which we shall comment also on the introduction and dissemination of the morus multicaulis, and show the immense numbers we have imported and propagated, including 54,000 that were thrown into the New York dock, in the winter of 1835—36, on account of their being totally rotten from the voyage.

To the Editor of the Farmers' Register.

THE MARL INDICATOR.

I beg leave to call your attention to a striking difference between the drawing, in your November number, of the plant which you call "*The Marl Indicator*," and the decription of it by one of your botanical friends. It seems that both he and the artist who drew it had the plant itself before them. One or the other, therefore, must have examined it too carelessly, or such a mistake could not possibly have happened. But the consequence is, that those who never saw the plant are no wiser now, than they were before your paper came out. Again, your friend, Mr. Gideon B. Smith, has made the matter rather worse, by declaring, (as you quote his letter,) that "*the description of the plant and the drawi g agree perfectly*," &c. Now, what is the fact? Why, the description says, it has "*leaves opposite amplexicaul*," whereas, the drawing shows leaves connected with the stalk or stem, in the common way, at a point.

Probably, my good sir, I should never have found out this blunder, but being no botanist myself, yet very desirous of knowing every thing about this extraordinary plant which I could understand, I set to work, with a botanical dictionary, to hunt out, as well as I could, the meaning of all the cramp, puzzling words which I found in your friend's description. When I came to "*amplexicaul*," the dictionary thus explains: "*having the base surrounding or embracing the stalk;*" but on turning over to the drawing, I could make out nothing like it—unless, indeed, the words "*surround*" and "*embrace*" mean something very different in botany from what they do in common parlance. In this annoying quandary I have deemed it best to submit the matter to your arbitrament, in the confident hope that you will beg your botanical friends, in behalf of all who have no knowledge of their truly delightful science, to take a little more pains the next time they undertake to indoctrinate such ignoramuses as your old friend COMMENTATOR.

[The error stated above really exists; but it was not made in the botanical description of the plant, nor by the engraver, but by the artist who designed and colored the picture. The very slight difference (to the view, though important as a botanical characteristic,) escaped his observation, as it did in the engraving that of all other persons, until subjected to the microscopic scrutiny of our friend Commentator.]

TO SUBSCRIBERS, AND THE PUBLIC.

The attention of the subscribers to the Farmers' Register, and of the agricultural community in general, is respectfully requested to be given to the annexed conditions of publication, for Vol. VII; and especially to the reduction of the cost of subscription, by one half, to every individual who may choose to comply with the easy conditions annexed to that benefit. Each subscriber now on the list, who has paid \$5 in advance for Vol. VII, or who shall pay in due time and the manner specified, may order, and have sent to the address of a *new* subscriber, a second copy of the same volume, without further charge. And for a like remittance of $5, made in advance, or at the time of the order, any two new subscribers will be furnished with a copy for each. Thus, while no single subscription or payment will be for less than $5, the price, in effect, will be reduced to $2 50 the copy, to every subscriber, old or new, who will unite with one other new one in a joint payment for two copies.

This offer, if ineffectual, will be the last of several different attempts made by the proprietor, for the purpose of inducing the agricultural public to aid his efforts to furnish the Farmers' Register at a lower price than any valuable publication has ever been issued in the southern states. Heretofore these offers and efforts have met with no effectual response. This one will, and must be, final. If fully availed of by subscribers now, and also hereafter, upon similar conditions, the proprietor will be sufficiently compensated for the great reduction of price, by a greatly increased issue, and the publication can be continued to be obtained hereafter, on the like conditions, at half the regular cost, heretofore. To furnish the new subscribers now expected, it is necessary to commence, and continue, even if that expectation should not be realized, an additional and extra impression of the work of more than double the amount of its present and usual issue; and it will require that all this additional supply shall be absorbed by additional and increased demand, to prevent loss to the publisher from the change. Nevertheless, he has determined to encounter the risk of such loss; and having commenced the course, and taken the first step, he is fully committed to the completion; and cannot, without still greater loss, retrace his steps, or avoid bearing the full expense. Should the offer be properly appreciated by the agriculturists of the southern states, and the necessary support be offered for so cheap a publication, then both its permanency and its continued cheapness will be secured. But if less should be the result, it will be the last of the risks and many and heavy personal sacrifices made by the editor and proprietor, for the purpose of bringing into existence, and establishing, and maintaining the usefulness of the Farmers' Register, through all difficulties, and all the numerous sources of vexation and annoyance which can scarcely be compensated by pecuniary profit, and which have been increasing more and more from the commencement of this enterprise to the present time. The most important of these inflictions, the costly and most disagreeable connexion with hundreds of non-paying subscribers and "*patrons*," it is hoped will be effectually removed by the sacrifice now offered to be made in greatly increased expenditure for advanced or prompt and sure payments.

From the first commencement of this publication, reduced prices have been fixed for joint and advanced payments, and especially for such as brought in new subscribers. The last and most considerable reductions, offered last year, were by some old subscribers so misconstrued, as to be considered as bearing unjustly and disadvantageously on their class. As the like misconception, however groundless, may attend the still more liberal, and more easily available deductions now offered, the editor asks leave, for full explanation, and for the first, and as he hopes, the last time, to obtrude upon his readers in general, some of the small matters of personal and private interest and concernment, which must necessarily, and at length, he brought forward.

Ever since this publication has been in existence, it has been the object of its conductor, to extend its circirculation, by every honorable and proper means. But he has not resorted, and will not resort, to other means that are deemed almost essential to the prosperity, if not existence, of many periodical publications. He has scorned to beg or buy, or exchange or sell puffs and undeserved praises; and therefore has gained nothing in popularity, or extended circulation, from the operation of that very general system, and nothing of favor or of money has been gained in the still more dirty profit that would have been perfectly available, by making this journal a puffing machine for all who would pay, directly or indirectly, for its use.

Neither are regular travelling agents employed to procure subscriptions by personal solicitation, and who, for some periodicals gain a hundred names by such importunity, where one would have voluntarily offered his support, upon mere knowledge of the existence and character of the works. There is nothing in the business itself of an agency to procure, in a proper manner, subscriptions to any publication, which is otherwise than respectable and honorable, or wanting in delicacy and propriety. But so many persons totally deficient in these qualifications, have been employed by northern publishers, and they have acted so much more like sturdy beggars, (to whom the solicited subscription money would be given as alms, and merely to get rid of their importunity,) than like gentlemen offering an exchange of equivalent values, that this kind of agency business has been long stamped with discredit; and few persons who have a proper degree of self-respect will risk incurring the suspicion and odium now attached to the business, by seeking subscriptions to any work, amongst strangers. Hence, the market is open only to publishers and agents who have no such scruples; and accordingly they profit well by the virtual monopoly. For such is the indolence of most men, and their unwillingness to refuse what is asked; (and especially does the remark apply to the people of these southern states,) that twenty subscriptions are made to publications, which are neither wanted or prized, because urgently begged for, face to face, where one would be gained without such personal solicitation.

Being debarred, by proper and sufficient considerations, from these modes of obtaining support for, and extending the circulation of the Farmers' Register, there remained one other, which is also usual, and which seemed free from any objection, save the cost in money, or possible risk or loss, to the publication. This was to spread abroad gratuitously specimen numbers, and to offer inducements to subscribers themselves, old and new, to render this good service, and to accept the profits, (for themselves or for others,) of the agents and the collectors whose employment for this publication has been abandoned. In many cases, the putting out some one volume as a specimen, even at a loss if considered alone, may gain subsequent and profitable circulation to a number of volumes. Acting upon this plan of making known the work to persons who would not of themselves seek the knowledge, thousands of separate numbers have been distributed gratuitously; and in pursuance of the same system, and from the beginning, and in the earliest and all the publications of conditions, new and joint subscribers have been invited by reduced terms, upon the expectation that all such who, after trial, might approve the work, would continue as subscribers at the regular and necessarily higher price of single subscriptions. Independently of the private interest and gain of the publisher, it is manifestly a gain to the public, and of course to each individual subscriber, that the circulation of the work, (if it be valuable,) should be extended as far as possible, to insure its stability and increase its usefulness.

But because the work has been, in this manner, and for these reasons, offered on certain conditions at prices much reduced below the regular and usual rate of single subscriptions, it has been erroneously and strangely inferred that the publication could have been afforded to all paying subscribers at the lowest named rate; and that those who did not choose to avail of the conditions of reduction, suffered the injustice and disadvantage of being over-charged.

If the means proposed and offered, had, before the commencement of the printing of vol. vii, induced a quadrupled or even trebled subscription, then, indeed, the price might have been reduced, and profitably, by one half to all subscribers, and with no other conditions than the making the reduced payments all advanced, and all sure, and thus relieve the publication of the heavy charges of collectors' commissions, postage, discount on uncurrent paper money, and all the numerous other pecuniary losses which are of daily occurrence, and enormous in their total amount. Such a change would be a most happy one, for the interest of the publisher, as well as for that of all his *paying* subscribers. It was in the hope of reaching this desirable end that the latter offers of deduction were made, and that a still more liberal offer is now risked. And without succeeding in some means of making payments more prompt and secure, the publication must sink—not for want of subscribers—but for the entire disregard of so many of them of their obligations to the publisher. Had no subscribers' names been stricken from the subscription list, except by their own proper order of discontinuance, the number would have been every year still increasing, and the publication would have been thrice as rich as it is, *in debts* from its negligent patrons. But the list has been diminished and would continue to be diminished under the former system, by the publisher's erasure of the names of debtors.

There are circumstances, not sufficiently (if at all) considered by the public, which cause heavy expenses to a magazine like this, which is and ought to be taken by subscribers only in entire volumes, which do not attend newspapers. Subscribers to the latter begin and discontinue at any times; and the publishers can expand or contract their issues precisely to suit the most fluctuating demand. Not so with this and similar publications. With the printing of the first sheet of each volume, the entire number of copies must be fixed; and the opposite dangers are threatened, of printing too few, or too many copies, for the subsequent demand. Heavy losses from both these opposite causes have been already sustained in conducting this publication; and were necessarily incurred, to make sure of supplying the actual demand. It will be plain enough to any who will reflect, that to supply a certain and previously known demand, 4000 copies of a volume could be afforded to be printed at a rate of subscription price, which if doubled, might be less profitable, for an impression of 1500 or 2000 copies, issued for an uncertain demand.

Upon all the grounds stated and referred to, it is earnestly desired by the publisher that every individual subscriber will avail of the offer made to him; and thus bring to the work directly a doubled subscription, and probably, indirectly, twice as many more.

Before quitting this subject of personal and private interest, the writer will use the occasion to remark on another erroneous opinion, which he has reason to believe is prevalent. This is, that this publication has been very profitable to the proprietor, and so much so that a large abatement from the former price and income, would still leave abundant profit for the capital invested, labor and risk.

It is very true that, if considered alone, and as a mere publisher's speculation, and not in its bearing on any other business or capital of the actual proprietor, this publication has been throughout productive of good profits upon its cost. And much larger have these profits been than the early expectations of the proprietor, or those of any of his friends, when he first proposed, and when he commenced the work. No one with whom he consulted then expected any considerable profit to be reaped, and nearly all predicted that loss would be the almost sure result of the undertaking. This is certain—that not another individual in Virginia would have incurred the actual and great risk of failure, and pecuniary loss, by making such an attempt. The incurring of such risk should not be overlooked in the estimate of what profit is justly due to the adventurer; but it is not denied that the pecuniary returns from the publication, if considered alone, have amply compensated both the risk and the expenses. If the public pay a sufficient price for the publication itself, the publisher has no right to count on more, upon any other account. He has no claim on the public for losses incurred thereby in other things. But these losses are not the less important to himself; and he will presume here to say, that if he had attended properly to his private affairs and previous employments, (which have been necessarily and greatly neglected,) and had never commenced the business of editor and publisher, he would have made much more profit and with much less toil and difficulty. He will never cease to prize highly the honor of having been the editor of the Farmers' Register—nor to value, beyond any amount of private profit, the public services which that work has been enabled by its supporters and contributors to perform. But so far as *money* is the value in question, the conducting of the Farmers' Register has not brought enough profit to pay for losses in other business thereby neglected, and the waste of other funds, caused by the necessary change of residence and of habits, as well as of pursuits.

RECEIPTS FOR THE SMITH FUND.

The subscriptions already made towards the "Smith Fund," proposed at page 500 of this volume, amount to about $1200. The editor will acknowledge in the Farmers' Register in the following manner, the several sums as received, and for which he will be accountable, until expended under the direction of the committee.

Subscribed and paid by

ED. RUFFIN, Petersburg, Va.	$100
GEN. JOHN H. COCKE, Fluvanna, Va.	75
THOMAS S. PLEASANTS, Chesterfield, Va.	100
REV. SIDNEY WELLER, Halifax, N. C.	100
WILLIAM J. DUPUY, Petersburg, Va.	30

Committee to manage the Fund.

EDMUND RUFFIN
JOHN H. COCKE
THOMAS H. PLEASANTS.

The fund, to the extent received, will be disposed of, without much more delay; and therefore those who may design to aid the object, are desired to act speedily. All contributions must be placed in charge of Edmund Ruffin, Petersburg, Virginia.

LEGISLATIVE AID TO AGRICULTURE.

No. 3.

Agricultural periodicals and school books.

According to the test which was adopted in the first of these numbers, which merges all the proper governmental action for aid of agriculture, into the providing and conveying of instruction, there can be few better modes than the causing the publication and general diffusion of cheap books and papers on agriculture. It is not designed here to argue in support of the value of reading, to all practical cultivators—nor to defend what is contemptuously called "book-farming." The observations which will follow are offered on the supposition that the value of the knowledge of agriculture to be derived from books, and the improvement to be achieved by the aid of the press, are fully acknowledged by all. The question is merely as to the cost at which such advantages may be conferred; and in this respect of cheapness, this mode of governmental action will bear comparison with any other.

Most of the agricultural reading furnished in this country is by periodical magazines and newspapers; and this is decidedly the most attractive and cheapest, and altogether the best mode for the small proportion of the agricultural community who have enough of the desire to be thus informed, to pay even so small a price for the benefit. But, in Virginia and the south, this demand is so limited, that probably not three individuals in a hundred landholders, either enjoy or have learned to appreciate this advantage. In the northern states, the more general demand has rendered printing much cheaper than in the south, and the consequent greater cheapness of agricultural papers serves to induce a greater number to buy and to read. But here, there exists not enough public spirit to cause a large demand, and without such demand, no periodical publication can be issued at less than double the price which would be ample under opposite circumstances. If the state government could beneficially aid in producing here the desirable results of a very cheap and very abundant supply and wide diffusion of such works, there would be few more efficient means for spreading the knowledge and stimulating the improvement of agriculture. A mere insurance against loss for a year or two, might be sufficient to induce a publisher to issue a journal at the lowest price: and when the large issue was once taken up by subscribers and readers, the measure might be safely left to its own support. There might, however, be difficulties in adopting measures for such a scheme: and there is an obvious difficulty in discussing them in this place. This branch of the subject will therefore be dismissed from further notice.

But there is another mode by which the state might well and easily interpose, by spreading abroad agricultural and other useful publications, to great extent, and with the most sure operation, and yet save money to the treasury, or to the fund for education, by the measure, instead of paying more for the benefit so derived.

For a long time there has been paid from the Literary Fund, for the expense of tuition in the primary schools, $45,000 annually. More recently, the annual appropriation for this object has been raised to $70,000, which sum is pledged to be continued. The school commissioners are limited to an expenditure of five per cent. of the whole appropriation, for the purchase of books for the pupils, which is $3500 a year; and, from that limitation having been found necessary, it is fair to presume that the whole of the five per cent. has been, and will be, generally so expended. Now the books bought for this purpose are, of necessity, of the same kinds of northern publications which are used to supply all the other schools of Virginia—proceeding from the fertile sources which every year send forth new editions, (or at least new title pages so marked,) and for which perpetual changes, as well as for the distinct works, every parent is taxed so heavily and incessantly during the time of the tuition of each of his children. These books must also be bought by the school commissioners at retail prices; and these prices, as will be afterwards shown, are at the least four times as high as the like or better selected works could be printed and sold for in Virginia. This last assertion, will, at first, appear incredible; nevertheless, its truth shall be clearly established.

Of the $3500 of the Literary Fund thus expended annually, one half may be supposed to be for books designed for pupils to learn to read. For this, the main object in view, they serve as well as any would. But the subject matter contained is generally useless, and in some cases hurtful; for this is one of the channels through which northern abolitionists have distributed their false doctrines, and endeavored to impress them upon the tender feelings and weak minds of young children. But put aside this ground of objection, and let it be supposed that no more evil than good matter of instruction is conveyed by these books, and that, in these respects, the opposite sides of the account stand balanced; still, their only good purpose, that of enabling the pupil to learn to read, could as well be effected through other books which would also convey useful information, and instruction. For example, suppose that all the reading books used for the younger pupils in the primary schools, were on subjects of practical agriculture, the mechanic arts, and things useful in domestic economy. The subjects read and studied in books during childhood and youth make the most lasting impressions; and while the boy was learning to read as well as by any other means, he would also be storing up information which would be of value to him throughout his future life and labors, and which might otherwise never come within his reach. But this would not be all. The attendance and devotion to study of the pupils who are sent to schools at the expense of the state are, unfortunately, very slight, and their services very irregular and short. Their books cease to be school-books as soon as the owner leaves school; and this probably happens in every case on the average, after one year's tuition. At present, the books are then useless; but in the supposed case, they would continue to be useful, in whosever hands they might fall. Even when carried home by a diligent and continuing pupil, the contents might attract the curiosity, and serve to instruct the father, as well as the son. In this manner, the waste and loss of the books so furnished by the state, (and such waste and loss must always be great under the very bad existing school system,) would conduce much more to the general good, than the direct and designed uses, as mere school books, have ever done. If only half of the appropriation, or $1750, were expended in the kinds of books recommended, small as that amount is, it would be as the distribution of widely but regularly dispersed seed, which would produce a future growth of knowledge, (which is both power and wealth,) exceeding in value a thousand fold, all the cost of the sowing. Even the amount of agricultural reading which this small annual expenditure would pay for, when fully used and well studied, (which this mode of distribution would insure,) could not fail to cause a great increase in the spreading of agricultural knowledge. But this gain will be the more highly appreciated, when it is considered that the whole of this new supply of instruction, would be furnished to a class of cultivators who otherwise would read nothing on the subject. In this manner, to create and diffuse a new desire for such reading would be another important operation of the plan; for when an interest was once felt, and an appetite for information excited in such readers, they would, at their own cost, continue to seek and to profit by the instruction which is to be gained from similar sources, and at so cheap a rate.

So much for the worth of the results of this humble plan; now for its expense and its economy, considered merely in a pecuniary point of view.

Because books printed in the northern states, especially school-books, almost exclusively supply the demand of Virginia, and because the few books which are printed in this state are usually higher priced, and yet yield but little (if any) profit to the publisher, it is therefore, and generally inferred and admitted that books cannot be here printed and furnished with fair profits, as cheaply as is now done by northern publishers. This is very far from being true. The only reason why books are not printed in Virginia, at lower prices than those of the like kinds sent here from the north, is because there is not sufficient sale to pay for the enterprise, whether at the lowest or the highest prices. The principal publishing booksellers of the north possess a virtual monopoly of all the southern market—a monopoly, which, though created by circumstances, and not by law, is much more operative, and will be more difficult to break down, than any made by legal enactments and designed governmental policy. The manner in which this monopoly is fixed and operates upon the consumers, has been already treated of in a former part of this journal, (at page 263. Vol. VI,) to which the reader is referred. It will be enough here to show, and that will be done clearly, that if sufficient demand of purchasers existed, such as the northern publishers for southern supply now enjoy, that printing, and the manufacture of books, can be executed so cheaply here, as to furnish like work at prices far below those now paid for the present and usual supplies, and for which hundreds of thousands of dollars, are every year paid from the south to the northern publishers.

It is not necessary to fatigue the reader with explanatory details of the business of printing, to obtain his conviction, and ready admission, that the cost of printing books will be diminished, and in a greatly increased ratio, according to the extent of the impression, or number of copies printed for each edition. The "composition," or arrangement of the types, and putting them in proper manner on the press, in a small edition, or number of copies, forms the far greater part of the whole cost. But that element of cost is precisely the same for an impression of 300, or for 30,000 copies of the work. Therefore, the item which makes the principal part of the expense of each copy of a small edition, sinks to the least, and to almost nothing, in one of a very large edition. Thus, a volume, for which the mere printing would cost 50 cents, if one of an edition of 500 copies, would be as well paid for at 5 cents, if 20,000 had been contracted for.

For the purpose of making these statements more clear to the readers who may be well inclined to aid in correcting the existing evil—and also the more open to correction to any others who may be disposed to question or deny the results—some particular estimates have been obtained from a printer of the best qualifications, so as to show at how much lower prices the cheapest of northern books might be printed here, provided there existed a certain demand for editions of 10,000 copies.

One of the ordinary reading books now in common use in the English schools of Virginia, was taken, at hazard, for the purpose of estimate. It is the 'Eclectic Reader' of 324 pages. It is plain print, (without illustrations or engravings;) and in plain binding, it sells in our bookstores, at retail, at $1 the copy. This particular description of so unimportant a book is deemed necessary, because, according to usage, it will scarcely remain in existence a year hence. It will by that time have performed its intended office, of being *sold* to supply every school whose accommodating teacher will require its purchase; and it will then be superseded by a newer edition, or some other compilation of like purpose and value, and of like transient reign. We speak not of its contents, which probably, like its price, are about a fair average of the general supply. Of this work, to be printed as well and on as good paper, a printer in Virginia, could furnish in sheets an edition of 10,000, for $1527, which is less than half a mill per page, or per copy, about - 15 cents.

Add for binding, suppose - -	12
	27
Retail price of the northern copies -	100
Difference per copy - -	73 cents.

Another still more striking comparison will be offered with other northern publications which are universally known, and which have been generally supposed to be sold at a loss by the religious and benevolent institution which furnishes them, and to have reached the *ne plus ultra* of cheapness. These are the religious tracts published by the American Tract Society, in Philadelphia. The standing price of these publications, in pamphlet form, in small quantities, is 1 cent for 10 pages; and by large quantities, 1 cent for 15 pages. Similar work can be executed in editions of 10,000 copies, under all the present disadvantages of the printing business in Virginia, and would afford ample profit to the printer, at the still lower price of 1 cent for every 20 pages. When it is considered that the heretofore limited and uncertain demand for printing in the south necessarily makes the labor more costly to the undertaker, and the best services and talent more difficult to be obtained—and that with enough enlargement of business, the expenses of printing could be as much reduced as they already have been in the northern cities—the foregoing comparison of prices will be still more remarkable. The estimate of expense and of pri e, here, is made at the necessarily higher rates heretofore and usually charged for book-work in Virginia, executed by small hand-presses; and the northern editions, and particularly those of the American Tract Society, are produced at less cost by one third, by means of cheaper materials and better and cheaper workmen, large presses, worked by steam or by horse-power, stereotype plates, and editions which sometimes extend to 100,000 copies, or more. A printer in Virginia, after acquiring these additional and great facilities, (which certainly will follow sufficient increased demand for his products,) could, in proportion, still more reduce his prices, without lessening his profits. But at present, and under all the existing disadvantages caused by the peculiar existing circumstances, a printer in Virginia could make greater profits than any of his brethren here have ever done, by printing and selling works in the form and manner of the publications of the American Tract Society, at prices lower than these are sold for. Thus will appear, (what few persons who have subscribed to aid this great benevolent and excellent plan would have suspected,) that the works of this society are, or ought to be, very profitable to the publishers, as well as benefical to the consumers.

From these general statements, (to which no contradiction is feared, and of which the truth can be tested by reference to any intelligent printer,) it will sufficiently appear, that nothing but sufficient demand is required to make the trade of manufacturing books in Virginia highly profitable. But it is impossible, in the present state of things, for any individual to break through the existing monopoly possessed by northern publishers, or even to venture to compete with them. Suppose one were so bold and imprudent as to incur this risk, and were to publish some good school-book, which is the kind for which there would be the best chance for selling. If he prints a small edition, the price must necessarily be higher than the prices of those already in possession of the market; and of course his work could not come into competition. If he issued a very large edition, and with the view of being enabled to sell at a lower price than any other, still, for want of all the arrangements and means so long and systematically used by others, he could not by possibility sell as many copies as would pay half the cost. These truths are so well known to all connected with the trade, that it is very rarely, and under some very peculiar circumstances, that any printer in Virginia will dare to publish a book for sale; and even every southern author, to get his work before the public, either for his honor or his profit, must, of necessity, submit to have it issued, and introduced to his own state, by a northern publisher, even though he could have the printing done as cheaply, and more faithfully, at home.

It may be considered that the means of remedy proposed for this evil condition of things, are very feeble, and would be but slightly operative. This is admitted; but nevertheless, as an auxiliary or even single means of diffusing agricultural knowledge, the measure would be as important as its exercise would be cheap. Suppose the exercise of governmental encouragement and economy united, was limited to the expenditure of the regular annual cost of books, of $3500, which might serve to supply enough agricultural reading books to all the primary schools for four years use, and (supposing books for reading to be one-half of all furnished,) this would save to the fund just half that amount, or $1750. So much of the effect, the saving of expense, it is presumed would not be objected to by the most frugal and sparing, or most fastidious of legislators. Suppose for greater cheapness, the agricultural tracts to be issued in the usual form of the religious tracts, or as neat and well covered pamphlets, and at the ample price of half a mill per page, and $3500 would pay for 10,000 copies of as many works as would amount to 500 pages altogether; or any one book of 100 pages would cost only five cents the copy. This would be for one, and so small a matter, a great saving to the education fund, and to agriculture a great benefit, in the wider diffusion of so much instruction.

Further: if the books to be thus republished by order of the state, were judiciously selected by a competent tribunal, (which of course ought to be done,) and were as suitable for the use of schools as any others, their great cheapness and high character would insure their being received into all schools of the state, if not of other southern states. And for the chance of meeting this additional supply, the publisher could afford to issue many thousands of copies more than the state had contracted for. Thus the joint benefits of spreading agricultural instruction, the guarding against unnecessary expense on the part of thousands of private individuals, and the building up a profitable manufacture, and both a home and export trade, would all be aided, by the same measure, and more and more with the continuance of the system. Views of economy and profit would alone soon make manifest the advantage of extending such a mode of publication to the best of other kinds of books needed in schools; and even if public spirit did not forward the result, private interest and economy would soon cause these cheap and standard books to be sought for, and used in every southern school. Putting aside the more important considerations of aiding the diffusion of knowledge, and especially of agricultural knowledge, this anticipated result would be highly important and valuable to the manufacturing and trading interests of the state. In very large editions, the mere cost of the blank paper becomes the greater part of the whole expense; and, therefore, if the gross amount of $100,000 should ultimately be so received by the publishers of cheap books, more than $50,000 of that amount would be paid to our paper manufactories. This is also a matter of no small importance to the manufacturing and commercial interests of Virginia; and well worth the consideration and care of the legislature, even if the interests of education and of agriculture are altogether disregarded.

EXTRACTS FROM THE ADDRESS TO THE AGRICULTURAL SOCIETY OF FREDERICKSBURG, ON ITS 21ST ANNIVERSARY.

By James M. Garnett, President.

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Another experiment was with the Irish potato, by drawing the shoots from the whole tubers when they were about four or five inches long, and setting them as is now generally done in the Carolinas, with the sweet potato. The drought and heat again prevented me from ascertaining more than the following facts: that the shoots or sprouts will grow with as much certainty as cabbage plants—will produce quite as much (at least they did so in this trial,) as the whole roots; and that the practice will save both some seed and labor; for the shoots can be drawn and set somewhat sooner than the whole potatoes can be cut into small pieces, dropt and covered. In regard to this crop it is worth mentioning, that it failed in every part of the state from which I have received any accounts, except in two cases in my own neighborhood. In both these, after the ground was well prepared, the potatoes were deeply covered with straw or leaves, and left undisturbed until they were dug. Both produced, as I have been assured, quite as well as usual, and the fact, I think, proves conclusively, that this method is best; at least to the extent to which our own farms will furnish straw and leaves enough to cover the potatoes, since the mere labor of collecting and covering will not exceed, if indeed it will equal, that of the culture usually given in any of the other methods. The covering plan saves all work, but the first, at the same time that it manures the land, and secures that degree of moisture without which no cultivated crop can long withstand the effects of those frequent and excessive droughts to which our climate has been subject for several years past. Our sufferings from this agricultural scourge, especially during the past season, have thoroughly convinced me of the following facts: that guinea-grass, lucerne and orchard-grass, (as in the order named,) resist drought better than any others yet known to me; and that the single coulter, freely used, during the early growth of corn, is worth all other implements in present use, put together, for protecting it against the destructive influence of long continued dry and hot weather.

The experiment from which I expected most advantage was made with six varieties of white corn—all said by their respective admirers to be "the best in the world;" and one variety of the yellow kind called "Dutton," which seems to have borne off the palm of superior excellence "down east," and as far south as New York. All the kinds were planted alongside of each other, on the 10th of last April, and as well as I could judge, in similar soil of equal fertility. Although I knew they would mix from such proximity, and of course that the least productive would derive some benefit from that which was most so; yet I did not believe it would be so great, in one trial, as entirely or very nearly to equalize their products, or prevent a satisfactory development of their characteristic differences. But here again the excessive drought and heat disappointed me. All suffered so much that no conclusive comparison could be made in regard to more than one or two of their peculiar qualities. The Dutton corn showed tassels and shoots on the 20th of June and silks on the 29th. None of it grew more than four or five feet high, and gave so little promise for a general crop that all of it was used at our table. This single trial, I acknowledge, is insufficient to justify an unqualified condemnation; but so far as it goes, it authorizes the conclusion, that it will be far less productive in our climate than any of the large varieties yet cultivated among us. It is certainly what we southerners call a "dwarf corn,"—none of which kinds, although numerous, have ever yet proved very prolific, and are not cultivated, except for early use in the unripe state. The golden Sioux, first introduced among us by Mr. Skinner, the editor of the American Farmer, has heretofore proved the *earliest*. But the Dutton, for aught I know, may have a better claim to preference, and therefore I will say nothing to impede a fuller and fairer trial of a corn with such high pretensions—only adding the caution, not to try it on a large scale.

As to the white varieties tried in my experiment, a few tassels were seen, on the 9th of July, upon what I shall call the Carmichael corn, that being the name of a gentleman in Queen Ann's county, Maryland, who sent it to me, and who is the same that first brought into notice the twin-corn, which I have cultivated for three or four years, in preference to any other I know. This kind also began to tassel and shoot on the same day—the other four varieties not until seven or eight days later, and then so nearly together that I did not mark the difference in time, it being too small to be worth noticing. Of these last four, it is proper, by way of caution, to mention, that the Baden corn was one. It is the kind so widely distributed last spring by members of Congress, under the one name of "*Baden*," although in the parcel sent to me, I counted four distinct varieties, showing that little or no care had been taken in selecting the kind so called, although all perhaps had been sold, in the first instance, under that name, and at a higher price than common. I know well the difficulty of keeping any variety pure, for no grain mixes so readily nor at so great a distance as corn, but I also know that it may be done, as I have seen several instances of it, and the Dutton corn is one, for out of a quart of seed sent to me I did not find a single grain of a different kind.

I made no attempt to ascertain, as I had first intended, the relative productiveness of the different kinds used in my experiment—the drought having rendered it impracticable, as it did every other fair comparison I wished to make of their other qualities. In regard to the Dutton corn, I was satisfied from this trial, as well as by several others reported to me last year, that it never probably can become a general crop in Virginia. To judge however, from appearance, it is heavier than any of our white corns, except the Madeira, so called from the circumstance of its being cultivated many years ago, chiefly for the Madeira market. Why the culture is not continued, I cannot imagine, as it is a variety which is both very early and very productive, at the same time that it bears thicker planting than our common kinds. But since corn is the chief staple in the greater portion of Virginia, *the greatest produce per acre* is evidently the principal, although not the only thing to be diligently sought after and ascertained, for the most productive will always be found the most profitable. That this variety will be known in the course of a few years, I think there is every reason to hope, from the numerons trials now making to determine this point; and that it will be found among the white kinds, I have no doubt. All of these are early enough for the tide-water portions of the state, which is the corn region; and most of those that I have noticed are more productive than any yellow variety of which I have any knowledge. Those kinds have never, I believe, sold more than ten per cent. higher than the whites, and that only in the northern and eastern markets, whilst the best of the latter kinds will be found, unless I am greatly deceived, to exceed the yellow in productiveness, more than twenty per cent.; and in *taste*, (if southern palates were to be the standard,) double or treble that amount. Suffer me here, to give a word or two of caution to buyers, against those who claim to be the lucky discoverers of the best kinds of corn. If *they* ask some two or three hundred per cent. more than the general price of our common varieties, the purchasers may be perfectly sure—either that they are humbugged, or that the seller is one of those Shylock fellows who would see you and yours starve to death, without the least compunction, if he could only make money by it, and escape being tried for murder. * * * * *

(To be continued.)

For the Farmers' Register.

MONTHLY COMMERCIAL REPORT.

The business of the past year has terminated much more satisfactorily than that of its predecessor.

The commercial operations in Virginia have been peculiarly fortunate. Shipments of its principal staple, tobacco, yield larger profits than have been realized for any previous year since 1820, and more than counterbalance the heavy losses attendant on the convulsions of 1837. This result has been produced, however, by the extensive failure of the crop of 1838, and, from present appearances, the small quantity produced will yield as much money as a full crop would in ordinary times. The present range of prices is \$7 to 16, including all sorts.

Cotton has advanced about one cent in price; and the present quotations in Petersburg are $11\frac{1}{2}$ to $12\frac{1}{2}$ cts., including none of fine quality—the crop being inferior. A similar advance has taken place in all southern markets, founded on a belief that the crop will prove 200,000 to 300,000 bales less than the returns of last year exhibit. Foreign markets have also improved, but are not yet such as to warrant the prices paid here.

There has been little variation in wheat and flour. The former commands 160 to 170 cents. Flour (canal) \$7⅞ to 8. Petersburg mills \$8¼ and Richmond city 8⅜. Although prices are advancing in England, with a prospect of low duty, little disposition is evinced to venture to so precarious a market, where a slight decline in price subjects the importer to an enormous increase of duty. The product of the last crop in Virginia considerably exceeds the estimates which were formed at the period of harvest.

Corn is worth about 75 to 80 cts. Pork \$8¼ to \$9. X.

January 7, 1839.

CROPS ON THE EASTERN SHORE OF MD.

Queen Ann's county, Md. Dec. 14, 1838.

To the Editor of the Farmers' Register.

As you express a desire to know the state of the products of the year, in the different sections of the country, I can say that the crop of wheat, in the few upper counties of the Eastern Shore was good, as far as it was sown, perhaps above the ordinary product. The crop of oats very short—the crop of corn diminished by more than a half, and the root-crop hardly worth gathering.

TO CORRESPONDENTS AND CONTRIBUTORS.

It is unnecessary to repeat here what the editor has so often stated in former volumes, and which, moreover, is manifest to every reflecting reader, that the great and main value of the Farmers' Register has throughout consisted of the original communications of the many and intelligent contributors to its pages. Whatever the editor has written or done, or whatever any one man can do, even if possessed of far greater abilities, but confined and oppressed by the like unceasing toil, is comparatively of small account, and utterly insufficient to maintain, for a single year, the proper value and interest of an agricultural journal. All those readers who have so essentially aided this work formerly by their writings, and the very far greater number who *ought*, but have failed to render such service to the public, are earnestly requested to give full and proper consideration to these truths; and then to glance over the table of contents of this now closing volume, and see how little has been done, compared even to the former and always too scant aid of the fellow laborers of the editor in the great work of diffusing agricultural instruction, and thereby improving the condition and profits of agriculture. Those who have formerly so ably, and profitably to the public, offered to their brother farmers their lights and experience in agriculture, through the pages of this work, but who have since relaxed or suspended their exertions, must return to the task; and also invite, and bring in, new hands to share with them the labor and the honor. If every subscriber to this journal, would freely communicate whatever useful facts he knows, and which are not generally known to others, and if such course were pursued regularly, nothing more would be wanting to raise the Farmers' Register to the highest rank of public utility and value; and no greater benefit could possibly be conferred on agriculture, and agricultural interests, by any action of private individuals. Yet how easy would be the performance of such duty; and every one would be speedily and fully compensated for his own share of the labor, in the new value he would derive from the communications of others. Without such assistance, liberally furnished, no agricultural journal of character can long maintain its usefulness, or even its existence.

In looking back on the labors of the last year, the editor has not to reproach himself on the score of failure to do his part of that labor which he had hoped would have been, but has not been, fully shared in by others. The more that others have relaxed their efforts, the more has necessity required that he should exercise his pen; though without the encouragement and cheering aid of companionship in labor, or of any sufficient evidence of concurrent interest, or sympathy, on the part of those for whose benefit his efforts were made.

In addition to the seemingly growing apathy of most of the former contributors to this work, several among the most valued have been recently removed by death, within the space of a single year—and all from the generous south, to the liberality of which the Farmers' Register owes *so much*—but for literary or other labor, *so little*. One of these was that warm hearted and public-spirited old man, Nicholas Herbemont, whose kindly and benevolent feelings, no less than his intelligence, were conspicuous in all his writings. The fate of two others to whom this work also owes much, was the more to be lamented on account of the peculiarly distressing and horrible circumstances of their deaths. Both fell victims to that system of wholesale exposure and sacrifice of life, for private gain, which has been established by the owners of steamers. Hardy B. Croom, with his family, perished at sea by the shipwreck of the Home. Farquhar Macrae met a like deplorable death in the destruction of the Pulaski; and his life was sacrificed by his generous self-devotion, which made him yield his place of security, on a fragment of the wreck, (yet in vain,) for the purpose of saving an aged and feeble stranger and fellow-sufferer.

CONDITIONS OF THE FARMERS' REGISTER FOR VOL. VII. PRICES STILL MORE REDUCED, FOR PUNCTUAL OR ADVANCED PAYMENTS.

I. The Farmers' Register is published in monthly numbers, of 64 large octavo pages each, and neatly covered, at \$5 a year, payable in advance. Or, for \$5 may be purchased *two copies* of the same current or forthcoming volume, if so ordered and paid for in advance, (or at the time of making the subscription,) in current money, (as described below,) and without loss or deduction for postage, or any other charge to the publisher.

II. Subscribers now on the list, who have already paid the regular subscription price of \$5 in the manner above required, for a single copy, shall have the privilege, upon sending a *post-paid* order, of having a second copy of the same volume sent to any NEW subscriber, without further charge, for that volume.

III. A like privilege will be allowed to every old subscriber who has not yet paid, but who shall do so, as above, before the issue of the 2d number of the 7th volume; thus in effect REDUCING TO HALF PRICE THE COST OF THE WORK TO EVERY SUBSCRIBER, OLD OR NEW, WHO MAY CHOOSE TO AVAIL OF THE OFFER.

IV. If, however, no more than one copy is ordered, the subscription price will still be, as heretofore, $5 the volume; as it is not designed to permit any subscription debt, or payment, to be made for less than $5. And if an order is sent for two copies, without compliance with the conditions annexed, only one will be sent.

V. The price of back volumes, as heretofore, is $5 for one alone, $10 for any three together, and in the same proportion ($3.34 cents for each,) for any number of volumes, except vol. I., which is at $6, and to be furnished only as part of a full set.

VI. ALL MAIL PAYMENTS MUST BE MADE IN NOTES, OR CHECKS, OF PAR VALUE IN VIRGINIA, or of a CITY and SPECIE-PAYING bank of the state in which the subscriber resides.

VII. The risk of loss of payments for subscriptions, sent free of postage, which have been properly committed to the mail, or to the hands of a postmaster, is assumed by the editor.

VIII. All letters to the editor in regard to the Farmers' Register must be post-paid—except such as contain articles for publication.

IX. If a subscription is not directed to be discontinued before the first number of the next volume has been published, it will be taken as a continuance for another year. Subscriptions must commence with the beginning of some one volume, and will not be taken for less than a year's publication.

X. The mutual obligations of the publisher and subscriber, for the year, are fully incurred as soon as the first number of the volume is issued; and after that time, no discontinuance of a subscription will be permitted. Nor will a subscription be discontinued for any earlier notice, while any thing thereon remains due, unless at the option of the editor—(or in obedience to the regulations of the Editorial Convention, copied below.)

General Regulations adopted by the Editorial Convention.

The following resolutions of the Editorial Convention of Virginia, will hereafter form part of the Conditions of the Farmers' Register, and will be strictly observed.

1. "All subscriptions shall hereafter be considered as incurred and due in advance, and for a year's publication, unless specially ordered for a shorter time, and paid for in advance for that shorter time, when so ordered.

2. "No publication shall be sent to the order of any new and unknown subscriber, unless paid for in advance, or satisfactory reference be made to some known and accessible person in regard to the subscriber or his payment. But, in case of an order for a publication, without payment, from a new subscriber who is unacquainted with the conditions, a single number may be sent, containing, or accompanied by, a copy of this regulation.

3. "The names of all subscribers, whose ability to pay may be unknown to the publisher, and who may remain indebted on open account at the end of two years, from the time when the advanced payment was due, shall be erased from the list of subscribers."

[*Resolutions of the Editorial Convention of Va.*

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