THE

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CONTENTS.

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PREFACE.

In commencing the fourth volume of their Agricultural Repository and Journal, the Trustees of the Massachusetts Society for promoting Agriculture have thought it to be their duty to make another appeal to the candour and attention of their fellow citizens. They deem it expedient to make an apology for the defects of their preceding publications, to vindicate the objects of their institution, and to excite, as far as may be in their power, their fellow citizens to co-operate with them in an object which they sincerely believe to be nearly connected with the best interests of society.

If the efforts of the society have been heretofore more feeble than could have been wished, or than the ardour of their own hopes and those of their friends had led them to expect, should it not be admitted as a sufficient apology, that the institution has been hitherto in its infancy, that it necessarily required much time to introduce it to general attention, to inspire confidence in its utility, and to draw forth the latent knowledge and talent of the country upon this interesting branch of human industry.

Its origin was at first obscure, confined chiefly to the vicinity of the capital. Its funds were small.

Its members few. A distrust in some cases, and a jealousy in others, obstructed and confined its early exertions. It has however survived the dangers and difficulties of all new establishments. It has increased its funds. It has attracted the attention and secured the support of a liberal and enlightened legislature. Other societies in various parts of the Commonwealth have risen up, and may justly vie with the parent institution in zeal and intelligence.

While the seed was in the ground, or just starting from its bed, it would have been preposterous and unreasonable to expect a harvest. Time and cultivation and labour were requisite to prepare it for a valuable and productive crop.

If we have heretofore confined ourselves in a very considerable degree to extracts from foreign publications, it has resulted from two causes which we trust an intelligent publick will duly appreciate. First, from the unwillingness of our own citizens engaged in agriculture to furnish us the result of their own experiments and discoveries; and secondly, from a conviction that knowledge in those parts of science which depend on experiment can be best obtained from those who have made the greatest progress towards perfection. Hence it has been deemed useful to present to our fellow citizens, the result of the inquiries of intelligent cultivators in every part of Europe.

Many years must elapse before it can be expected that we shall rival those nations, in which capital and leisure and education have all contributed to the advancement of agriculture. We have as yet but few farmers who can afford to make experiments on an extensive scale. The risk is too great for men of small or even moderate capital. We must therefore content ourselves in this as in all other arts, to borrow from others, and to avail ourselves of the intelligence and skill and capital of other countries.

Still however we flatter ourselves that the efforts of this society, yearly increasing, and we hope as constantly improving, will not be without their use. Our publications, though noticed in foreign countries, are very far short of what they ought to be, and of what they might become, if we could only acquire so much of the confidence of our fellow citizens as to induce them to communicate all the improvements and new experiments which they may have made.

It is not to be admitted that a people so remarkable for their ingenuity in the mechanick arts, their improvements in navigation, their enterprise and industry, are incapable of extending the same skill and talent to the first of all arts, agriculture.

There may be some who, for want of due reflection, or competent knowledge of the history of agriculture, may consider it as a heaven-taught art; as one for which no talent is required, and no knowledge beyond the meanest practical education requisite.

To such persons we would remark, that although it has been the oldest of all the arts, and therefore it is more difficult to trace its history than that of any other, yet if we examine the implements of agriculture, and the various modes of cultivation, we shall be convinced that it owes as much to genius and invention, and a spirit of improvement, as any one of the whole circle of human inventions.

Its progress is necessarily more slow, because the persons who exercise it are more confined in their pursuits, and have fewer opportunities to read and profit by the discoveries of others, than any other classes of the community.

But when we consider, that the introduction of the potatoe into agriculture can be carried back only to two or three centuries, that its introduction may be fairly attributed to commerce, and to the exertions of scientifick men, that it was first rejected as an useless if not a poisonous plant, and that it did not receive a general encouragement in Europe, till within the last century, we must be constrained to admit that agriculture is greatly indebted to science and commerce.

The Southern States in like manner, owe to the same cause a culture which is calculated to render them permanently prosperous. The introduction of the cotton plant, in no case indigenous or natural to our country, but which now forms its most important and valuable staple, was owing to the spirit of cultivation, and to men of enlarged minds and scientific attainments.

There may be some persons who, although they would admit the general utility of philosophical and experimental inquiry in matters of agriculture, may still be suffered to doubt the efficacy and utility of Agricultural Societies in promoting these objects.

To this objection we proceed to answer :—First, That no art would ever be improved by individual skill in any ratio equal to that to which it would attain by mutual communication.

The greatest genius that the world ever produced would find himself much benefitted, and his schemes much corrected and improved, by submitting them to others.

All improvements are gradual. One man invents something useful. Another, much inferior to him, improves it. Some institution is wanting in all the arts to extend the knowledge of these improvements.

The press has been the instrument of spreading the knowledge of these improvements within the last century. But the press is not always open to the inventor, or if open, he has not in every case the talent or the confidence to display his discovery. Hence it would happen, as it always has happened, that an improvement, especially in agriculture, might remain for many years confined within a very limited sphere.

Suppose a new plough to be invented, or a thrashing or winnowing machine, abridging labour two thirds, it might take twenty years to spread the knowledge of it through such a state as Massachusetts. Yet by means of a society and its annual publications, if properly dispersed, it would be known to all at the end of a single year.

This conviction it must be presumed was the cause of originating the societies in Europe. The British society, entitled the "Board of Agriculture," was established about thirty-five years since. Parliament granted to it about $25,000, and an annual grant. Establishments on the same principle spread throughout the kingdom. Whether any and what effects have flowed from them, sceptical men may doubt. One fact is certain, that not only the ablest men in the kingdom have lent their aid to it, but the agriculture of that country has improved in a ratio far exceeding all calculation.

There are several hundred societies of the same sort in France, and not a country in Europe can be found in which the example has not been followed.

If schools and colleges are requisite to promote one species of knowledge; if military and naval academies have been patronized to promote another; if academies are formed to advance the cause of science and of the fine arts, is it true of agriculture alone that it requires no aid—that art which of all others is the most important and contributes most, and in the most direct and visible manner, to the happiness, wealth and prosperity of society?

If you have a common organ, with friends and means of publication, and zeal and intelligence, new discoveries may be rapidly circulated to the remotest parts of the country.

In a recent instance, a respectable cultivator of Nova Scotia sent to the Massachusetts Society for its numbers, having been impressed with their value and importance from a single number which he had seen. He requested at the same time to be considered a subscriber for the future publications.

If it be asked why its utility has not been heretofore more obvious, our answer is, that it was unknown to our citizens, that its funds did not enable them to circulate so extensively their publications, but above all, that the state of the country was less favourable to general improvement.

But it may be said, as we learn it has been, that "your society is confined to the capital and its vicinity."

This is a mistake, we have extended it through the Commonwealth. "But your Trustees are chosen from the neighbourhood of Boston." This is true, and how could it be otherwise? Of what value would a body of Trustees be, whose members lived at fifty or one hundred and fifty miles asunder? They could only meet annually. Our meetings are monthly, and still too few for general usefulness.

We have laboured to remedy this defect in part, by soliciting the establishment of sister societies in various parts of the State. If they are not extensive, and so active as we could wish, and as we earnestly hope they will be, it is not our fault. We could most seriously wish, and we most respectfully suggest the propriety of establishing societies in every county in the State. That they should correspond with us, and we engage to give publicity to their suggestions, experiments, and speculations.

It is indeed the noblest and most important subject, except religion, on which men can be employed; and we hope to see our fellow citizens realize it, and act according to that conviction.

Our funds, which are almost entirely the produce of private munificence of gentlemen in the capital, are exclusively devoted to the publick.

Not one cent is employed in paying an officer, or in the expenses of the society at their meetings.

The whole expense is borne by the members, and their whole efforts are directed to the great object of the institution. If they have any regrets, they are only that a correspondent zeal is not in all parts of the Commonwealth manifested.

Much however has been done, and is doing. It would be desirable to have statistical, geological, and agricultural returns from each county, on the plan of those which have been made to the society in Great Britain.

The population, state of industry, arts manufactures, soil, natural history, and mode of cultivation in each county, collected and published by this society, would not only be useful in a very high degree, but would contribute much to the gratification of all intelligent men.

In the hope of fostering a spirit of improvement, this society, as will be seen by the publication in this first number, propose to establish a Cattle Show. In expending the whole, and perhaps more than the whole of their income on this object, without diminishing their other premiums, they offer the best pledge of their devotion to the common cause of agriculture.

Interested only in common with their fellow citizens in these great objects, and feeling no other zeal than what would naturally arise in the breasts of men anxious to fulfil honourably a publick trust, they submit their conduct and their publications with diffidence to the candour of the publick.

MASSACHUSETTS

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EXTRACTS FROM THE INVALUABLE WORK OF SIR HUMPHRY DAVY, ENTITLED "ELEMENTS OF AGRICULTURAL CHEMISTRY."

I HAVE extracted the following pages from the sixth Lecture of Sir H. Davy, on the "Elements of Agricultural Chemistry," which treats principally of manures of vegetable and animal origin. As there are many facts therein contained, not much known, and opinions not generally received in this country, particularly respecting the use of green vegetables and animal matter before any fermentation has taken place, I have considered the subject of sufficient importance to communicate them to the Trustees of the Massachusetts Society for Promoting Agriculture to publish if they think proper. With respect,

AARON DEXTER.

THAT certain vegetable and animal substances introduced into thé soil accelerate vegatation and increase the produce 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

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.

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 endeavoured 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. One hundred and twenty 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. One hundred and twenty grains of the roots of the mint which had grown in common water yielded three grains and an half of extract, which was of a deep olive colour; its taste was sweetish, but more astringent than that of the other extract, and it coagulated more freely with alcohol.

Vegetable and animal substances, as is shewn by universal experience, are consumed in 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 gasses 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 plants; and that in a slow and gradual manner, so that it may be entirely consumed in forming the sap or organized parts of the plants.

Mucilaginous, gelatinous, saccharine, oily, and extractive fluids, and solution of corbonic acid in 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.

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 hydrogene 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, hydrogene and oxygene.

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 oxygene, 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.

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.

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 matters.

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.

Sea weeds consisting of different species of fuci, algœ and confervœ are much used as a manure on the coasts of Britain and Ireland. By digesting the common fucus, which is the sea-weed usually most abundant on the sea 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 its 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.

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.

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 indiscriminately be adopted.

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.

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 oxygene so as to become carbonic acid.

Manures from animal substances in general require no chemical preparations to fit them for the soil. The great object of the farmer is to blend them with 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 on which they lie, and a considerable portion of it employed in giving off noxious gasses 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 quick lime 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 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.

It is easy to explain the operations 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.

Among oily substances, *graves* and *blubber* are employed as manure. They are both most useful when mixed with soil, so as to expose a large surface to the air, the oxygene of which produces soluble matter from them. 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 hydrogene 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 neighbourhood 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.

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.

Hair, *woollen rags* and *feathers* are all analogous in composition, and principally consist of a substance similar to albumen, united to gelatine. This is shewn by the ingenious researches of Mr. Hatchet. 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 manure; such as the shavings of the currier, furrier's 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 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 neighbourhood.

Blood contains certain quantities of all the principles found in other animal substances, and is consequently a very good manure.

Among *excrementatious* 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.

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 putrify more quickly.

The species of urine that contain most albumen, gelatine and urea, are the best 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.

Amongst excrementatious 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. 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.

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, hydrogene, azote, and oxygene. 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 quick lime; and if exposed to the atmosphere, in thin layers strewed over with quick lime, in fine weather it speedily dries, is easily pulverized, and in this state may be used.

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 marle, 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. 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 dung of *domestic fowls* approaches very nearly in its nature to pigeons' dung.

The dung of *cattle*, *oxen* and *cows* has been chemically examined by M. M. 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 oxygene and producing carbonic acid gas.

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 neighbourhood 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 propotion 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 a degree of fermentation is however, very prejudicial to the composite manure in the dung-hill; it is better that there should be no fermentation at all before the manure is used than that it should be carried too far. 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 among 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 cut easily with the spade. Independent of the general theoretical views unfavourable to this practice, founded upon the nature and composition of vegetable substances, there are many arguments and facts which shew 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 also of a 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 are capable of becoming an useful nourishment of plants. 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 liable to disease; and the fermentation of manure in the soil must be particularly favourable 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 while 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.

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 will certainly germinate; but it is seldom that this can be the case to any extent; 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 dung hill: 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 alluded to.

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 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 æriform matter flying off. If the temperature is higher, the dung should be immediately spread abroad.

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 size of a dung hill 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,* principally formed from the combustion of pit coal, coal, generally contains 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 great basis is charcoal in a state in which it is capable of being rendered soluble by the action of oxygene 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 seems 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

* In England.

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 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.

ON SOILING.

IN A LETTER FROM THE HON. JOSIAH QUINCY TO THE CORRESPONDING SECRETARY.

Boston, 27*th December*, 1815.

SIR,

A WRITER, in the last number of the Massachusetts Agricultural Repository, (page 318) having invited the attention of our farmers to the subject of "the relative advantages of feeding cattle in the stable or farm yard, or sending them to pastures," I have thought it would have a tendency to attract still further attention to this practice, were I to state that all my milch cows have now for two years past been kept wholly in the mode by that writer suggested;—that is they have been, as it is technically called *soiled*. During the whole of that time they have never been allowed to run upon any pasture, but have been fed on green food, cut and carried to them in the stable or barn yard. I have thus kept during that period seven or eight cows, and I can thus far unequivocally express my conviction of the economy of the system. I am so entirely satisfied not only of the practicability, but of the advantage of it, that unless future experiment shall differ from the past, I shall never allow cattle of any kind to pasture upon my farm; and I am preparing to apply a modified system of soiling also to the keeping of Sheep. A practice of this kind cannot of course be advisable to that class of farmers, which unquestionably constitute the greater number in Massachusetts, whose farms contain tracts of land suitable for nothing else than pasturage, but to that class, whose farms are small, and who are stimulated by that correct ambition of possessing a little land highly cultivated, rather than a great deal miserably managed; to that class, also, whose entire farms are capable of being tilled or mown, particularly where their situation does not place them within any easy access to manures, the practice above proposed presents advantages of the most decided and unequivocal character.

My own experiments on this subject have been hitherto conducted upon a scale, which does not permit me to state any precise calculations on which my opinion of its advantages might be estimated. I am however perfectly satisfied of the following points :

1. That cattle may be kept and fattened equally well, and that they give as much milk, in this mode, if well conducted, as by any pasturage. Of this I am certain. Were I to express the full strength of my conviction, I should say they keep better, they fatten better, give more milk, and are far less liable to accidents of any kind.

2. That twice, at least, the same number of cattle may be kept, and better kept, upon the product of the same extent of land in this mode than could be if in pastures.

3. That the manner and the economy in land is an ample compensation, to say the least, for the labour.

All these and more advantages resulting from this practice are illustrated and enforced by very many European writers on agriculture. And I should not think of communicating any thing on the subject of this small experiment, were it not, that experiment and success in our country naturally strike the minds of practical men, with more force, and are likely to give more encouragement to other trials, than is possible to result from what is written in foreign countries.

The subject is well worthy the experiment of such farmers as I have above alluded to.

Whoever undertakes this practice should remember that preparation should be made of a regular succession of succulent crops, when the grass and clover begin to fail. Experiment upon this point is greatly to be desired so as to show what is best suited to our climate, and what species of food best intervenes between the early and later succulent crops of our farms. This period I have supplied by Indian corn, sown broadcast or in drill, cutting it when the tassels begin to shoot, and giving it green daily. This with the suckers, and tops taken from my Indian corn intended for harvest, with occasional aid from carrot and turnip tops at harvesting, have been sufficient for the purpose of my experiment. But before attempting this practice on any considerable scale, a greater knowledge of the vegetable food best suited for a succession of summer crops is desirable. And if any practical farmer has made any experiments upon the subject, he would undoubtedly render a service to our agriculture by communicating them.

[We have extracted the following additional information on this subject from an English Journal. The reputation of the writer, (T. C. Curwan, Esq.) entitles it to all the weight a single experiment ought ever to have. It will moreover be found to accord with the statements of Mr. Quincy in favor of this system of feeding, and the prevailing opinion, we believe, in England.]

The Society instituted for the encouragement of Arts, Manufactures and Commerce, having approved and sanctioned the system of soiling, I trust it may be satisfactory to them to receive a further proof of its utility than has hitherto been brought before the public. I am not acquainted with any experiments made to ascertain the practicability of rearing stock in the house. If such exist, they are without my knowledge.

I have to state to the society that my heifer was calved the 5th February 1812, and was reared in the house.

For the first five weeks it had a gallon of new milk daily. From that time to the middle of May two gallons, and from thence to the 16th June one gallon, and hay tea. It had grass and clover to the middle of October, and from thence to midsummer last was fed with turnips, mangel wurtzel, and wheat straw: during the remainder of the summer and autumn with refuse grass, and from October to the time it was killed in March last, it was fed with turnips and wheat-straw. As my purpose was to breed from it, every means was taken to check its progress to fatten; finding this could not be done, it was thought adviseable to slaughter it on the 15th March last. The following is the statement of its weight:—

When taken from food it weighed 72 stones, of 14lb. each. After fasting 48 hours, it weighed 68 stone.

Blood weighed - - - -	2 stone	7 pounds,	
Bag, - - - - - - -	9	3	
Hide, - - - - - -	4		
Feet, - - - - - - -	1	2	
Puddings, - - - - -	3	12	
Head and Heart, - - - -	2	8	
Tallow, - - - - - -	6	6	
Carcass, - - - - - - -	38	4	
Total	68	0	or 952lb.

Sale.

Carcass at 9*s* per stone, -	£17	4	6	
Tallow, - - - - - -	3	4	0	
Hide, - - - - - - -	1	7	0	
Sundries, - - - - -	0	5	0	
	£22	0	6	$ 97,77

Expense.

Value when dropped, - -	£2	2	0	
Feeding, - - - - -	12	18	6	
Gain, $31 11 cents, or	7	0	0	
	£22	0	6	$ 97,77

The manure should more than compensate for the labour. If the object had been to feed it, a greater weight might have been obtained at little or no more expense. The colour of the meat was beautiful, and the grain and flavour could not be surpassed. As this is the first instance of beef being produced in so short a time, it has occasioned a good deal of speculation.

The heifer was of the short-horned breed. The success of this experiment has determined me to try it on a pretty extensive scale; if cattle can be stall-fed from their birth, and slaughtered at two years old, the farmer and the public will both be benefitted.

I am very sanguine in the success of my experiment in rearing cattle. I have thirteen calves, and expect two more that shall be reared on the soiling system.

[*Repertory of Arts*, *October*, 1815.]

FIELD CULTURE OF CARROTS.

[From the Same.]

Boston, 10*th December*, 1815.

SIR,

In compliance with the wishes of the board, I communicate some statements relative to the subjects, suggested at its last meeting.

The field culture of Carrots, for the purpose of providing a succulent food for winter's stock, begins to be, very deservedly, more and more an object of attention. I have had experience of several modes. But that which beyond all others I prefer, is the one, for which I am indebted to our associate, Samuel Wyllys Pomeroy, Esq. I regret that his engagements have not permitted him to make a communication upon the subject. But as I have been several times called upon to transcribe my mode of proceeding, I am confident that I shall have his consent when I transmit an extract of a letter, which he wrote to me in December 1811 upon this subject, and which contains the principle suggestions I have to make upon it.

"I will state my general practice in cultivating carrots. Plough as deep in the fall or spring as the state of the land will permit. Cross plough in the spring and harrow level. Put on fifteen, twenty or twenty-five buckloads of the most rotten compost to the acre, as the heart of the land may be. Spread and harrow it fine. Then with a horse-plough strike it into two-bout ridges, as near together as four back furrows will make them, and if the two first back furrows are narrow the other two being deep, the ridge will be nearly to a point, and should be eighteen or twenty-four inches from the bottom of the furrow if it be well cleared out. To do which make another bout in the furrow, if necessary. Then with the head of a rake strike off the crown of the ridge, till it is three or four inches wide, and with it, or a hoe, open a drill in the usual manner. Sow the seed pretty thick. Cover and press down a little with a hoe or shovel. When the weeds appear, run a small plough through the furrows. Hand-weed the crop, and hoe the weeds from the sides of the ridge. The orange carrot is the best."

In harvesting, a plough with one yoke of oxen should be run as near the side of the range of carrots, and as deep as possible. This loosens the dirt and clears one side of the carrots almost entirely from the earth. The labourers then with great facility take them by their tops out of the beds, and throw them into carts, with only an occasional use of the hoe to plants which the plough has not loosened. For field culture of carrots, I think there can be no question that this mode is of all the most preferable. Perhaps by cultivation in beds, a greater quantity may be raised on the same extent of ground, than is possible in this mode. This however, I think is doubtful, considering the size to which they grow when the plants are set at proper distances, (which ought to be three or four inches at least). The great advantage of this mode is in the economy of labour. I raised the last year, about eight hundred bushels on two acres of land, notwithstanding that neither the season, nor other circumstances, were favorable to the expectation of a great crop. It is not in my power to present the Board with any precise statement of the expense. I have no question, however, that conducted in this mode, a carrot crop may be made more productive and much less expensive than the potatoe crop usually is. In sowing, I use a small hand drill, which lays the seed with great regularity, a circumstance very important both to facilitate weeding and harvesting; since if the carrots stand straggling and not in a line, the plough, when harvesting, leaves the more to be loosened by the hoe or the fork, and thus makes the harvesting proportionably more expensive.

Another subject which engaged the attention of the Board, was the *Model of a Rack for feeding Sheep*, transmitted to the Board by Mr. Wilder of Bolton, and which he obtained from some great sheep-farm in England. If I mistake not, Lord Somerville's. Having erected a range of racks on that plan, and it being, in my judgment, superior to any other, which I have either seen, or of which I have read, I enclose, according to the desire of the Board, an outline of the plan laid down to a scale, with a statement of the admeasurements of the different parts of it.

Fig. 1, Represents one of the side pieces, which may be of board, but is best of plank. It consists of one entire piece, sawed into the shape as represented by A, K, D, O, F, E, C, G, H, I.—Two such pieces form the sides of the rack, and may be placed at any distance from each other which may be chosen. Six feet is perhaps the best length, both to give due stiffness to the rack, and to make the feeding trough easily manageable, which must be as long as the distance between the side pieces.

By nailing boards from the points A and K, of one side piece to the corresponding points of the other side piece, the front of the rack is formed as is represented in *figure* 2*d.* at A, A,—K, K. G, G, is a piece of plank two inches square, into which the bars of the rack (*a*, *a*, *a*,) are fixed, which are also inserted into the front board, which extends from K, to K.—These bars are at three inches and an half distance from centre to centre.

By nailing boards from the points I, H, and H, G, of one side piece to the corresponding points in the other side piece, the back of the rack is formed. On the inside, both of the front and back, cleats are nailed for the purpose of stiffening the boards, and for the same purpose a small strip of board is occasionally made to extend from the inside of the front to the beams or rafters of the shed. Both of the side pieces at E and F, are also nailed to the floor.

By nailing boards from the points D, O, and O, F, of one side piece, to the corresponding points in the other side piece, the front bottom part is formed.

The effect of this construction is that the hay is placed at a proper distance, (G, D,) about the average length of the neck from the breast of the sheep, which obliges them to feed in a great degree straight before them, and prevents them, as is usual with them when they can get close to the rack, from pressing the breast against one part of the rack, and feeding the whole length of the neck from another part. The bars of the rack being also only one foot in length, presents no inducement for the sheep to get upon their forefeet, as is usual with them in racks with long bars, and so pulling the hay over the necks and backs of their neighbours.

But the great advantage of this form of rack is the saving of the hay, which sheep usually waste or may refuse. All the space between the corresponding points of the two side pieces

Fig. 1.

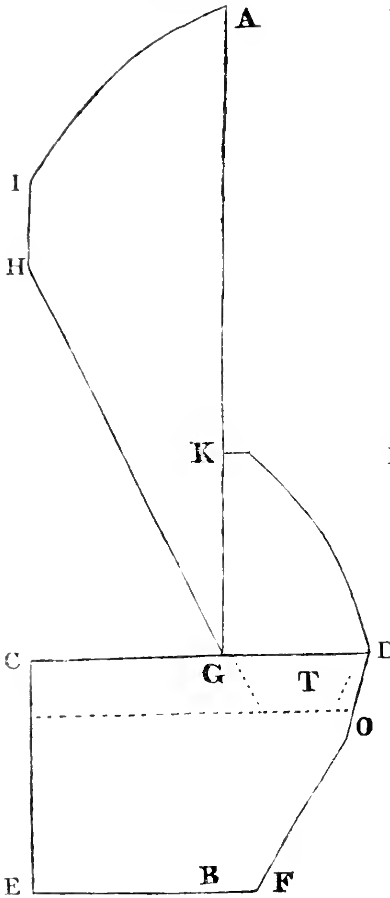
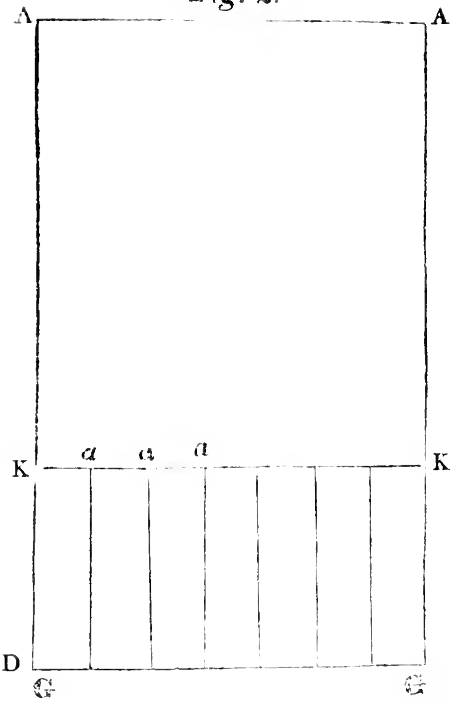


Fig. 2.



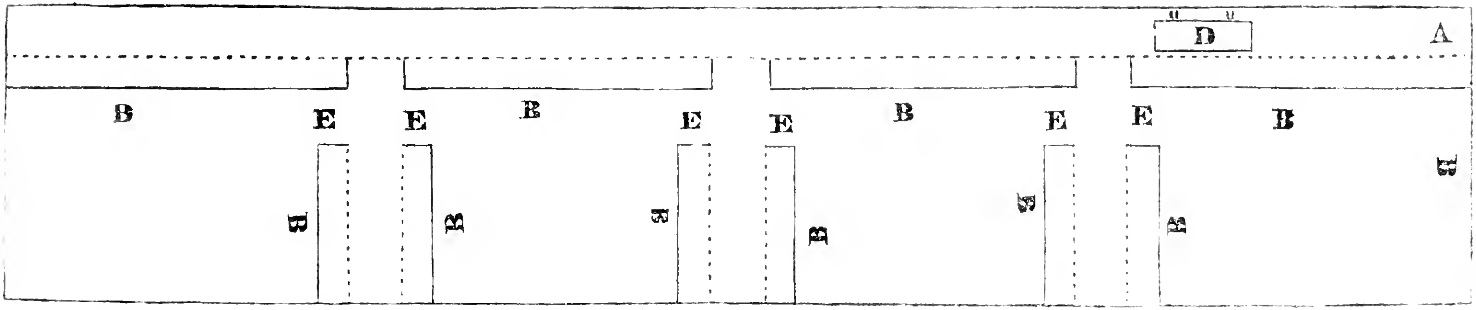
Scale. One inch to a foot.

		Feet.	*Inches*
A to	B	4	9
A	K	2	5
K	G	1	1
C	E	1	3
E	F	1	2½
F	O	0	11½
O	D	0	5
C	D	1	9½
C	G	1	0
G	D	0	9½
G	H	2	4
H	I	0	5
a	*a*	0	3½

T, Feeding Trough ;—3½ inches deep, 8 inches wide at top, 5 inches wide at bottom. Its length is determined by the distance between the side pieces.

Fig. 3.

Back.



Length 100 feet—Width 16 feet.

Front.

G, and D, is open. Indeed all the space between the corresponding points of the two side pieces, C, E, F, D, is open. The consequence is that whatever the sheep drop in feeding, falls through the space at G, and D, and by the slanting boards, D, O, F, is determined out of the room, in which the sheep are feeding, into the passage way behind the rack. So that of all that falls, nothing comparatively is lost, and nothing is injured by being mixed with the dirt and manure of the sheep. The saving in this respect is very great. My farmer, who has been much used to feeding sheep, not only in racks constructed in the usual mode, but also in that, which seems to be more approved, in cribs without racks, expresses his most decided opinion on the superiority of this construction. His language was, "not a straw is lost. The saving in two seasons will pay for the whole expense of the racks."

The facility and saving in feeding is another advantage resulting from this mode. The feeder passes in a passage way behind the racks, with which the sheep can have no communication. This passage way ought not to be less than two and an half feet wide, in the clear. If economy in room be not regarded, three feet would be better. But two and an half feet is, for all necessary purposes, sufficient. The effect is that the feeder fills the racks without any disturbance of the sheep, and without that sort of waste and scattering of fodder among the manure, which never fails to occur when large flocks are fed by carrying their food into the space, in which they are kept. The height of the front board A, above the back board I, prevents the feeder from throwing the hay over the rack upon the necks of the sheep. All the offal, or refuse fodder, is daily taken from behind the rack, and upon an average eight cows may be principally kept on this offal, or refuse, of two hundred sheep.

Not only hay, but corn and vegetables are given the flock from behind the rack, and without going into the space occupied by the sheep.

The dotted line, parallel with the line C, D, represents the cleat nailed on the inside of each side piece, on which the trough T, traverses. At the back of the trough are two handles by which it is moved. When the flock is fed with hay, the trough is drawn back to C. Here it is filled; and when the flock is fed with corn or vegetables, is pushed forward to D, where it completely fills the space between G and D. This feeding is also done without any disturbance of, or from the flock, and when ready, the whole is presented to the sheep at once, which prevents, in a great degree, all struggling for place and priority at the trough.

Upon the whole, I know of no one practicable advantage, which this form of rack does not attain. Certainly it comes nearer to being perfect for its purposes than any I have ever witnessed.

The only objection I have heard made to this mode of rack is, that so much space of building is expended in a mere passage way. But I consider this as amply compensated by the convenience and economy of the plan. Besides the only loss of space relates to the exclusion of it from the mere occupation of the sheep. They have all the benefit which results from the extended area of atmosphere ; the communication for the air with the passage way over the racks being unobstructed. If any person wants more racks in a given space than one side of the building allows, he has only to make, at suitable distances, cross racks, by which he can increase the number to be fed as he may deem expedient.

It will not be perhaps amiss to present the ground floor of a shed or sheep house, accommodated for a rack upon this plan.

Fig. 3, Is such a ground plan. A, is the door, by which it is connected with the barn or the deposit of fodder. The spaces B,B, B, are those exclusively occupied by the sheep. The openings at E, are three feet so as to give space for the sheep to feed between the long rack and the small one. At E, may be doors. It is better however, that there should be a permanent partition at least four feet high, so as to prevent any communication between the sheep and the passage way. The plan in this figure is not laid down to any scale, but is intended to represent a sheep house 100 feet long and 16 feet wide. The area being 1600 square feet. Of this space, the back racks and passage way occupy five feet wide of the whole length, or 500 square feet ; and the side racks with the intervening passage ways occupy each eight feet in length and seven and an half feet in width, or in the whole 180 square feet,—making a gross deduction of 680 square feet from the whole area for racks and passage ways, and leaving an area of 920 square feet for the exclusive occupation of the sheep.

The back racks are in length 91 feet; the six side racks eight feet each, or 48 feet—making a total length of rack of 139 feet. This will well accommodate 120 sheep. This gives more than seven square feet for the accommodation of each sheep within the area, exclusively devoted to their occupation. And the area of the whole building, which is the area of their atmosphere, is upon a surface of above thirteen square feet for every sheep. This mode of building enables the proprietor to keep his flock in subdivisions of thirty each if he chooses.

If however sheep feeding upon a larger scale be contemplated, the proprietor will find his purposes, both of economy and convenience, better answered by a building of two stories, each six feet high. The upper story to be boarded on the outside three feet, leaving a three feet opening on all sides, accommodated with sliding, or hanging shutters, to be closed occasionally in storms. A cleated stairway, which shall connect with the upper story about three feet from the back racks, and which shall extend without the building four feet, is a passage sufficiently commodious for the easy ascent of the sheep. In this way 240 sheep may be easily kept under one roof, in a shed 100 feet by 16, and if the proprietor pleases to arrange his yards for the purpose, in flocks of thirty each. If the upper floor be well double boarded, the upper covering the joint of the under boards, the flock above has no injurious effect upon the flock below. By a trap door at D, the feeder ascends to the upper flock; and feeds both equally commodiously. There is nothing of theory in this. The plan suggested is conformable to that on which my own is constructed. My farmer is now in the practice of feeding about 180 sheep in a building of that extent, in flocks of about twenty-five each, and they might easily be extended to the number suggested. In point of health, comfort and convenience the arrangement is unexceptionable.

I know not but that I ought to apologize for this long elucidation of so simple a subject. But as it seemed to be the wish of the Board, I have thought that nothing which might have a tendency to make every point clear should be omitted.

ON THE WORM IN THE HEAD OF SHEEP.

BY GENERAL HUMPHREYS.

WORMS in the head of *sheep* in consequence of which, many of all breeds without discrimination have died, particularly in the neighbourhood of Boston, during the last winter, appear from the observation of several intelligent farmers and others, to derive their origin from the same fly, which produces bots in horses. If not the same, they have much similarity in every respect. The fly is supposed to deposit its eggs in the nostrils of Sheep. From these eggs it is thought that nature, in her wonderful economy, gives birth to those reptile animals, which are thought by instinct, to insinuate themselves into the interstices of the brain.

This fly exists in greater or smaller numbers, in different summers and different situations; perhaps, according to the different degree of heat and moisture; or, otherwise from some unknown cause. It is asserted to be a fact, that in some years, these pernicious insects do not make their appearance in some places, which they had formerly infested.

In the heads of numbers of sheep, which have been killed by these worms, where the heads have been opened after death, the worms have been found to resemble exactly bots in horses, but of various sizes and colours: the smallest, which were not much larger than knitting needles, were of a whitish colour; the others, as they approached in size to the bigness of bots, from an olive or greenish brown, to almost black.

In several instances, a handful, at least, has been taken from one head: the brain having been mostly consumed, and the skull containing scarcely any thing besides a small quantity of mucilaginous matter and the brood of worms.

Sheep have lived after a considerable part of the brain had been eaten up by them; and until the skull had become so thin and unsupported from within, that it might be indented, by the pressure of the finger, like a paper box. It is not known how long sheep may live, after a large portion of the natural substance in the inside of the head has been consumed: or, provided the worms could be got rid of, at how late a stage of the consumption they might be restored to health.

Early in the month of April 1811, a mixed blooded Merino Ewe, having horns like our common breed of Sheep, was discovered to be diseased. This happened at the time, when several of the same flock had died, in consequence of worms in the head. The owner, on taking hold of one of the horns, accidentally broke it off at the root; thus opening a hole towards the brain, and pulling out in the act of avulsion, a number of worms with it. The other horn was immediately sawed off, as deep in the head as possible, and spirits of turpentine poured on the nest. The worms were all killed. The Ewe recovered and is now well. Since that period she has yeaned three times and brought up the lambs.

More than a month after the horn had been broken off, I saw a number of these animals (I think not less than half a dozen) alive in it. They had apparently been nourished by the mucilage in the cavity; and were extremely difficult to be destroyed. After several experiments had been made, they were finally killed by spirits of turpentine.

In the case here stated, fortunately, the worms lay in the upper part of the head, in such an exposure, that the remedy might easily be applied.

Whenever the worms make their residence in the crevices or cellules in the front part of the head, or lower down towards the nostrils, where it is impossible to reach them, I know of no cure; unless they can be ejected by some applications of the sternutative kind; or destroyed by trepanning. By the former many sheep have been preserved. Snuff or any thing conducive to sneezing may be used with success.

The perforation of the skull (with the second mentioned object in view) I have not seen attempted. But I am credibly informed, that the lives of a considerable number of sheep in Connecticut have been saved this spring, by trepanning them. This is said to have been performed successfully on the side of the head, towards the cheek, near the eye.

The symptoms of the disorder occasioned by this fatal worm are often displayed in the whole organic system, and vary so much, that our common farmers, who are generally their own shepherds, are not unfrequently led by them, to attribute the loss of their sheep, to almost any other, rather than to the real cause.

A defluxion of *mucus*, visible in the nostrils, is commonly one of the first symptoms of the disease. This is frequently attended by a cough.

And unusual dulness and humidity are observable in the eyes; together with an appearance of heaviness and sadness in the general aspect; lassitude and restlessness in all the movements.

In many cases, a refusal of food takes place; or, at least, the appetite becomes fastidious, and continues to be more and more vitiated. Debility ensues, and is termenated only by a lingering death.

In other instances, the appetite remains good to the very last.

In others, the facility of digesting the food appears to be in a great measure lost; and they are carried off suddenly by a kind of dysentery or incurable scouring. Sometimes they are observed to stagger and have convulsive motions; their strength having been greatly impaired and their joints become very weak. In a small number of cases, their nerves as well as their muscles have been quite differently affected, in an extraordinary manner. A few sheep, while yet their appetites remained good, have had their necks so turned on one side of a right line, and so stiffened in that direction, that they could not but with the greatest difficulty, resume a straight position; nor stoop their heads to the ground.

In the part of the country where my flock is kept, no instance of mortality from this cause has come to my knowledge during the last year. If the fly existed there, in the course of the last summer, probably the calamity has been prevented, by the precautions adopted to keep that pernicious insect from the nostrils of the sheep.

If *antidote* be preferable to *disease*, *prevention* better than *remedy*, it will be worth the while for holders of flocks, to have recourse to a simple and cheap process; to which the exemption from this evil may probably, in a great measure, be ascribed.

It is recommended, that they would cause a sufficient quantity of tar, mixed with sulphur or any thing offensive to the smell, to be provided; and to have this put with a brush, on the lips or the noses of all their sheep, at shearing time; and to have it repeated, a few times, in the course of the summer. Scattering tar in as soft a state as it can be easily made, in the troughs and on the boards where the sheep take salt, is likewise practised by our farmers.

It is believed that these precautions will deter those destructive insects, from their instinctive pursuit of depositing their eggs, in the nostrils of Sheep: and thereby prevent the future mischief.

When Sheep are seen running from place to place, as it were distracted with agony, and rubbing their noses against any thing they can meet, for the purpose of getting quit of the flies, which sting them, it may be too late, to begin to think of an *antidote* or *remedy*.

Boston, *June 8th*, 1815.

[Same subject continued, in a letter from E. Ticknor, Esq. to the Hon. Josiah Quincy.]

Boston, *6th December*, 1815.

SIR,

SINCE the conversation I had with you yesterday and the statement you made to me of the loss of several of your sheep, I am induced to detail to you certain facts and circumstances, which took place during the last spring or winter in New-Hampshire, in the neighbourhood, where I am now keeping my flocks of Merinos. The complaint of which your sheep died appears to me to be the same as that, of which Capt. K. who is now keeping a flock of Merinos for me, lost several of his fine native sheep the last season. The complaint made its appearance by their lopping their ears,shaking their heads,stupidity and loss of appetite, which at length ended in consumption and death. This gave him great uneasiness, not being able to discover the disorder, which made such havock among his sheep. He was very well convinced he should lose his whole flock, if no remedy could be found. When the last was taken however, he left it in his sheep-fold to die without much care or trouble, not knowing what farther to do; as he had done before, as he thought, every thing in his power. While it thus lay, a swine came along and bit off its nose, which excited the owner's feelings so much, that he directed his man to knock it on the head with an axe, which he did. The first blow forced out, say, a handful of large, full grown maggots which very much astonished him, as he had never before seen the like. The disorder of the others was now satisfactorily demonstrated before his eyes, and he was convinced more than ever, that a cure was beyond his reach. It being, however a very singular complaint to him and which excited much of his curiosity, he was led to inquire of all his friends, who had been in the habit of keeping large flocks of sheep, whether they had ever discovered the same disorder among any of theirs, and, if so, what remedy they had found to be the most efficacious? He soon learnt, that a large flock in a neighbouring town had been attacked by the same complaint and as a remedy, which proved effectual, vinegar was forced by a squirt gun (which every boy in the country can make,) through the nostrils into the cavity of the head, which so disturbed the nest of maggots, that it produced a heavy convulsion and sneezing of the animal, by which it disgorged the contents of the head, which had been so long tormenting and vexing it. The Sheep afterwards I understood, grew healthy and well and had no return of the complaint for that season, which shew, that the vinegar was effectual and the cure perfect. Of the manner by which these maggots find their way into the cavity of the head as a proper and safe resting place for growth and subsistence, the public have often been informed. Every one, who is acquainted with rearing and managing sheep, knows that nothing is so vexatious and troublesome to them as flies, which are frequently lighting upon and disturbing their noses and faces. Upon the mucus, which runs from their noses, the flies lay their eggs, which they snuff up and which lodge in the head, and there live and grow, till the animal dies, or by some great convulsive exertion, discharges them from the head and it then revives and grows into health and vigour again.

Knowing the great interest you take in agricultural improvements and preservation of the breed of sheep called *Merinos*, I have taken the liberty of addressing to you the above facts and circumstances, which are seldom discovered, except by accident, *even* by the most attentive and sagacious shepherds in the country.

SUCCESSFUL USE OF PLAISTER OF PARIS AS MANURE ON THE SEA COAST. MEADOW LAND REDEEMED BY RIDGING.

[To Thomas L. Winthrop, Esq.]

New York, December 8th, 1815.

DEAR SIR,

I AM favoured with yours of the 28th, ult. requesting to be informed of the result of my experiments with Plaister of Paris on lands in the neighbourhood of salt water. Having plenty of manure on the shores of my farm, I have had little occasion for any other. To satisfy myself however, of the effect of Plaister so near the salt water as my farm is situated, I sowed an acre or two on the highest part of it on tough sward, leaving as much ground adjoining unsown; that part on which the Plaister was sown produced nearly a double crop to the other; it grew about ten days longer before it was fit for mowing, leaving the surface in an open mellow state.

I intend making use of a considerable quantity the next season. My farm is nearly surrounded with salt water. Plaister has a wonderful effect on high gravelly soils, destroying the frails that grow upon it, bringing in the first season a fine crop of clover. I have not made any experiment on this kind of land myself, not having any of this character on my farms. Plaister has no good effect on low moist lands.

The greatest improvement I have made and am now making on my farm is, in turning swampy, boggy lands into the finest of English meadow, producing three tons to an acre the second year after preparing it, which is done (after the brush, stones, &c. are cleared off,) by ridging.* It costs about 100 dollars per acre to complete the operation. In its natural state it was not worth twenty dollars an acre. It now brings me the interest of 300 to 400 dollars per acre. There is a great deal of this kind of land laying almost in a useless state in our country.

W. ROGERS.

P. S. I should advise to sow from one and an half to two bushels of Plaister per acre.

* I make my ridges a rod wide, in the manner of turnpike roads, leaving them very smooth.

BENEFICIAL EFFECTS OF PLAISTER OF PARIS AS MANURE.

[To Thomas L. Winthrop, Esq.]

SIR,

Agreeable to your request, I transmit to you all the information I have been able to collect from the farmers in my neighbourhood, and all that has resulted from the experiments I have made in the use of the Plaister of Paris. I think that on our moist hill land we receive the greatest benefit from it, but it is difficult to ascertain exactly what the increase of the crop is in consequence of the use of the Plaister. In some instances I believe on grass land the increase has been one half, and on corn nearly as great, but the average increase would however be much less. As to the mode of using it and the quantity used on the acre people differ very much. I should say with us the usual quantity sown on grass land is from one to three bushels per acre, and on corn about the same quantity, which is either put into the hill, when the corn is planted, or put round the corn before the first hoeing. But as we have not used so much in the vicinity of Charlton as in many other places, you, no doubt, will be able to obtain better information from some other source than I am able to give, but all I am possessed of I give you, sir, with pleasure.

I am, &c.

SALEM TOWN, Jun.

OBSERVATIONS ON THE CULTIVATION OF POTATOES.

[From the Farmer's Magazine for 1801.]

Having long entertained an idea that the formation of apples upon potatoes was detrimental to the crop, by drawing away a large and valuable part of the nourishment from the roots, I this year made an experiment which I think goes a great way to solve the question. Having planted some of different kinds, I had the flowers carefully picked from several of the drills as soon as they appeared, leaving, between every drill so picked, a drill with the flowers untouched. In some cases I allowed the flowers to expand and even to make some progress towards setting, in others, I suffered the apples to form, and pulled them off when they were half grown. In the drills where the flowers were gathered as soon as they appeared, the crop was doubled to what it was where the apples were allowed to come to maturity; where the flowers were allowed to waste themselves the crop was less abundant, and where the apples had made some progress it was still less, though greatly better than where they had been left untouched. In short, from the time of the flowers appearing, and as long as the leaves continued green and the stems growing, there appeared an advantage from gathering both the flowers and apples gradually, diminishing however as they approached the ultimate period of their growth. I remarked also that the stems of the potatoes in the drills, where the flowers had been picked off, continued green and vigorous much longer than where they were suffered to grow, and also where the apples were gathered at an early period. I, at the same time, made trials as to the effects of cutting the *haum* at different stages of its growth, all of which I found ruinous, the deficiency of the crop being in exact proportion with the earliness of the cutting, with this addition, that the potatoes were ill ripened and of a very bad quality. I also made a careful trial, as to the advantage of drawing up the earth to the stems, which I find greatly superior to that of cleaning away the weeds without giving them any earth at all. In this last case, I not only found the crop less abundant, and by being exposed to the depredations of vermin and weather, quite spoiled, I found also that no benefit arises from early planting, as they do not vegetate till a certain period, and in the mean time are exposed to every injury from the frosty and wet weather. Potatoes may be produced a month earlier by putting them in a warm place early in the spring, allowing the shoots to grow an inch or two, leaving the top of the shoot nearly above the surface. They may the first year be brought to their utmost perfection, by gathering the apples early in the season, hanging them in a dry place till new year, and then cutting them to pieces with fine dry sand, after which they may be sown in a hot bed, or in a box placed upon warm dung. As soon as they have put out the rough leaf they should be transplanted in drills richly dunged, and put pretty deep into the earth, leaving only the top uncovered. Where this is done at an early period of the season the crop will be considerable, and every property, possessed by the different kinds, ascertained the first year.

ON SHEEP TICKS.

BY GENERAL HUMPHREYS.

Some discouraging circumstances having occurred to the breeders of sheep, in the loss they have sustained by diseases and casualties, until lately but little known in their flocks, it is judged expedient to point out some of the antidotes and remedies, which may have a tendency to prevent the recurrence of so great a misfortune ; and thereby to relieve the farmer from his disheartening apprehensions.

It is true, that during the present year, a larger proportion of sheep than usual, have been tormented with ticks ; and that, in all instances, they have proved extremely distressing and injurious ; in some, fatal.

Generated after their kind, and not passing through different forms and characters in the different stages of existence, as is the case with some vermin and insects ; *predisposing causes and timely precautions*, may, doubtless, occasion an increase or diminution in the procreation and spread of this instinctive enemy to the wool-bearing tribe.

Attention to the essential articles of food and cleanliness, it is apprehended, will generally prevent ticks from multiplying so fast, and becoming so numerous, as to be very detrimental. They are more frequently found on lean, dirty, and young sheep, than on others.

The constant irritatation and itching pain excited by these blood-suckers, whenever permitted to take undisturbed possession of their prey, will cause those sheep, and particularly those lambs which were poor and feeble when first attacked, continually to lose their flesh and to become daily poorer and feebler, and will not suffer any others which were in somewhat better condition, to thrive or even keep their condition, under the most careful treatment, and with a plentiful supply of the best kinds of nourishment.

The cure must be radical, or the evil will increase. No palliatives will be able to restore the declining flock to health and vigour.

According to my general information, merinoes have been less frequently annoyed by ticks, than other breeds of sheep.

If such be the fact, probably the partial exemption from this afflictive visitation, may be attributed, at least in some degree, to the more attentive management of merinoes; the other breeds having been neglected, from an opinion of the inferiority of their value.

Whenever ticks begin to be discovered on any small portion of your flock, or even on a single sheep, they must be destroyed immediately, or the whole flock will be in danger of being overrun and greatly injured by their rapid propagation. Few animals seem to increase so fast.

Various methods have been proposed for destroying ticks. Tobacco, snuff, corrosive sublimate and solution of arsenic, if so thoroughly applied by any process as to reach them, are effectual. The two first are deemed preferable, as being less liable to be attended with unfortunate accidents in the use, and equally efficacious.

Chancellor Livingston's mode is explained in page 180 of his Essay on Sheep. The smoking machine of Mr. Charles Edwards, for killing ticks, is described in the 113th page of the Massachusetts Agricultural Journal, for the month of May, 1814. Both these processes are thought well of, by practical men as well as theorists, as capable of being successfully put in practice.

In large towns the refuse or waste tobacco, possessed of sufficient strength to kill every tick to which the effluvia can extend, may usually be procured from the manufacturers of snuff and cigars, for about one dollar a hundred pounds weight. Damaged snuff, equally well adapted to the same purpose, may also be obtained cheap. Whenever this shall be the case, it will perhaps be unnecessary to resort to any other expedient. The *expense* of this remedy and the application, in either way, including *that* of the time employed, is very small; probably not more than from half a cent to a cent apiece for the flock.

The principal obstacle will consist in the imaginary or real difficulty of being provided with the apparatus, however easy and simple the instrument and machine may be in their construction; as well as in the awkwardness and reluctance, which men almost always manifest in new undertakings.

Whenever these requisites cannot be had, or the processes be tried without incurring so much difficulty or inconvenience as to deter the common farmer from the attempt, it is understood, that other substances, deleterious in their nature, applied in a different manner, will produce the same effect.

My chief design in this paper is, to state a few strong, and perhaps, interesting facts.

In the neighbourhood of Humphreysville, for some years past, for the purpose of preventing sheep from being infested with ticks, the farmers have tried an experiment which has been attended with complete success; that is to say, they have been in the habit of immerging them annually, (not far from the shearing time) in a decoction of the herb, vulgarly called Poor Anna, or Bear Weed; known amongst our botanists by the name of American *white hellebore*. For a description of its growth, appearance, and properties, I refer to the annexed note.*

* The Poor Anna, or Bear Weed, (*Veratrum Viride,*) Ait. (*Swamp Hellebore,*) (*White Hellebore,*) (*Poor Anna,*) (*Bear Weed,*) &c. a large, green leafy plant. It is found sometimes in swamps, but more frequently by the sides of brooks. The stem is erect three or four feet high. This plant when in flower, bears some resemblance to the maize or Indian corn. The leaves are numerous, about three inches broad and nine inches long, plaited and nerved embracing the stem. The root is perenial. The skunk cabbage, (*pollios fetida,*) has sometimes been mistaken for the hellebore. A very little attention of a person, not in the habit of examining plants, will be sufficient to distinguish them. The skunk cabbage puts forth its vegetating appearance earlier in the spring than the hellebore. The flower of the skunk cabbage appears in March and April, much sooner than those of hellebore. The skunk cabbage has no stalk. The flower of the skunk cabbage is directly upon, and often half buried in the ground.

These plants resemble each other much more in the roots. They both have a main root and radicles much alike. The root of the skunk cabbage is larger, the radicles are also larger and more spongy, and terminate more abruptly than those of the hellebore.

The *veratrum viride* has long been a popular remedy for the itch. It is a very acrid plant; its acrimony resides in every part, but more espe-

The experiment has been made in conformity with the following instruction.

Take as much of the roots, stalks, and leaves, as can be grasped in both your hands, with the fingers loosely extended, and sufficiently curved to embrace them; boil the mass in a quantity of fresh water, proportionate to the number* of sheep to be dipped therein, (varying the measure of the herb and water according to circumstances,) continue boiling this vegetable substance over a brisk fire, until the whole essence of the plant shall have been extracted, and the water tinged to a dark brown colour by the commixture of the juice. Then let the liquor cool in a suitable vessel.

A convenient vessel or tub may be provided by sawing a hogshead asunder in the middle, and appropriating one of the halves for the purpose.

The preparations having been made, seize the sheep or lamb by all the legs at once, or if too heavy, let two persons take hold at the same time, one by the legs before, the other behind,

cially in the root. It has been used for all the medicinal purposes, for which the European species has been recommended; viz. for gout, rheumatism, cutaneous affections, as a purgative, and in powder, to excite a discharge from the nostrils. It is unquestionably one of the most powerful vegetables contained in the catalogue of the articles of the *materia medica*, whether given internally or applied to the surface. Dr. Herberden, speaking of the root of the white hellebore and the seeds of the staves-acre (a species of larkspur) says, "when applied externally they are safe and effectual, in a degree which may make it probable, that besides their acrimony, they have some specific powers in cleansing the skin from foulness."

For the cure of the itch, the hellebore may be used, in the proportion of three drachms of the root to a quart of boiling water. No ill effects follow the external use of this article, except that if made very strong, it excoriates.

The farmers frequently soak their corn previous to planting it in a decoction of the hellebore roots, for the purpose of destroying crows. It is peculiarly destructive to the feathered tribe; and from late experiments it has been found very efficacious in destroying insects.

N. B. The writer is indebted for the description of this useful plant, to Dr Ives, one of the professors in the Medical Institution of Yale College.

* The quantity thus taken has served for any number from 50 to 100.

and plunge the animal with the back downwards in the decoction, taking care to keep the head above water, so that none of this impregnated liquid enter the mouth, or contiguous orifices. On taking the sheep from the tub, squeeze the fleece gently, and suffer the liquor to drip off into the vessel: thus proceeding, one by one, with your whole flock.

In the fleeces of 130 yearlings, which were treated in this manner, when full of ticks last summer, only two ticks were living when dipped this season; but a vast number of dead ones were discovered mixed with the wool.

It is a well known fact, that after shearing of sheep the ticks pass directly from the sheep, thus bared of a covering, to the unshorn lambs, in such great abundance as often to produce the worst consequences. Wherever this mode of prevention has been practised on the lambs, not one tick has been found on them for many months.

In collecting and comparing such facts as I have been able to ascertain, the result of my inquiries and reflections is, that in no other country are flocks less liable to suffer from disease or disaster, than in our own.

Humphreysville, June 20th, 1815.

P. S. Mr. Stone, an intelligent and attentive farmer in the vicinity of Humphreysville, who has been very successful in the cultivation of the fine-wooled breed of sheep, in the latter part of the month of June, 1815, tried the following *experiment.*

Mr. Stone selected twenty-five lambs of his flock, to which great numbers of ticks had resorted, after the shearing of his sheep, and immerged the said lambs in tobacco water, prepared by decocting stems and refuse tobacco, in common well water. On a careful inspection twenty-four hours afterwards, there was not one tick found alive on them.

The next day, at my suggestion, he plunged an equal number of lambs of the same flock, in the same predicament as to ticks, in a decoction made from *poor anna* or white hellebore, and on an examination twenty-four hours afterwards, discovered most of the ticks to have been killed, and the few that were living apparently struck with death. He thinks the decoction of poor anna or white hellebore was not quite so strong as he ought to have made it. Had it been otherwise, he is of opinion, that the same consequence would have resulted from it as did from the tobacco.

This mode of destroying ticks by a decoction of tobacco, instead of snuff or tobacco smoke, was suggested to him by Mr. Kneeland Towns of New Haven, an excellent breeder of merinoes, as being cheaper and easier in its application than any other method which he had attempted, and not less effectual.

Boston, July 3d, 1815.

AN ACCOUNT OF THE STATE OF THE SHEEP ON NANTUCKET ISLAND.

[To W. Hammatt, Esq.]

Nantucket, 6th month, 26, 1815.

Agreeably to thy request I shall now attempt to inform thee of what circumstances I can, relative to the sheep on this island, and the loss of them the winter past, and the causes thereof; after first taking a view of the state of the island and sheep sixty or seventy years past, as communicated to me by those who lived at that period—at which time the soil was much stronger generally than at the present time, (exceptions must be made,) as thou knowest, as well as myself, that many small tracts have been very much improved. At that period, it was a rule among the sheep owners, to take off half as many sheep and lambs, as their flock produced lambs; which rule they found would do to practise, and their flocks would maintain their number. Since that period the soil has been declining, principally owing to large fields being annually planted with Indian Corn, the succeeding year sowed with oats, without any grass seed being put on it; so that in lieu of the sweet grass, such as white clover, &c. there came up a wild sour kind, which sheep will not eat. This gradual depreciation of the soil, together with (as I think) the unskilful management of the proprietors in confining their stock to a small part of the land, with an intention of keeping the other part for winter, while the first growth was lost, has within a few years reduced the size and flesh of the sheep very much. At the commencement of last winter, also several preceding winters, they were in a very thin state of flesh, even below what they should have been in the spring. Even with moderate winters, they now barely hold good their number from year to year. The sheep of this island were very thin last fall, consequently poorly clothed, and not prepared to stand the rigour of the most severe winter ever remembered by our oldest men. The sheep which run at large on the common are at least three quarters of all on the island. As respects the ticks, I do not discover that they have done more than they have usually done to injure the sheep. The report thou heardest respecting them, probably arose from some of us who had our sheep by ourselves. Having learned by authors, that the ticks were injurious to sheep, we made some efforts to destroy them, by fumigating with tobacco, which, if thoroughly done, I believe is effectual. Thou wilt hereby discover my opinion relative to the destruction of the sheep; that it was occasioned by repeated snow storms, their thin state in the fall, the want of shelter and food—particularly the latter. The general loss was equal to the number of last year lambs and one half the sheep, so that the owners of the sheep sheared about half as many as they did last year.

That so many should have lived is unaccountable to me; as I cannot discover that they could have found food, equal to one good meal in thirty days. They could not have obtained any thing more than a little brush. My opinion was at the time that they would nearly all die, that were not taken up.

It never has been the practice to fodder sheep in the winter which are kept on the Common land of this island. We that had our sheep in Plainfield had sufficient fodder for a common winter, but not enough for the last; but we fed them all winter with a portion of stalks from corn, and with turnips,—but not enough.

I sheared in Quaise last year one hundred and thirty sheep, and killed or sold from the flock in the course of the season about sixty sheep and lambs. This year I sheared one hundred and twenty-four—notwithstanding, I came so nigh my last years number, after taking about sixty, yet I lost many; having had a large number of lambs, and those that I lost were mostly half merino blood.

If this incorrect statement will be of any use to thee or thy friends, it will gratify me ; the incorrectness I speak of is in the language, and not in the facts.

If at any time I can furnish thee or thy friends with information that will be useful, I shall be pleased in doing it.

I am, &c.

OBED MITCHELL.

INQUIRIES ADDRESSED TO FARMERS.

[With a view to collect the most accurate information on the principal branches of agriculture, as now practised, the following queries are addressed to intelligent farmers and to Societies instituted for the promotion of agriculture. The answers subjoined are from the DUNSTABLE AGRICULTURAL SOCIETY.]

Question 1. OF what quantity of land do the farms in your vicinity generally consist ?

Answer. From seventy-five to one hundred and fifty acres.

Q. 2. What is the quality of the soil ?

A. The soils are various and of different qualities ; some light sandy, some strong gravelly loam, some loam not gravelly, a pretty large proportion of fresh meadow.

Q. 3. Into what portion of pasture, mowing and tillage, orcharding and wood, are farms usually divided ? Are the orchards improving or declining ? Do they yield a competent supply of cider ?

A. About one tenth of the whole farm is used for tillage, one sixth for mowing, one fifth pasturing the remainder orcharding and wood-land, together with lands unimproved, and some unimprovable. Our orchards are declining through age, and the ravages of the canker worm.

Q. 4. How much land on each farm is annually (on an average of years) planted or sown with grain of any kind ?

A. About one tenth of the whole farm is sown or planted.

Q. 5. In what manner in the land prepared, manured, and seeded with each kind of grain, and what is a medium crop ?

A. The principal grains raised in this town are rye and corn; some barley and oats. The rye is generally raised on light pine land by the summer fallow; sowed the last of August and in September, (mostly in September,) and seeded about one bushel to the acre: the crop from six to ten bushels per acre. Corn is raised by ploughing in the spring, spreading coarse or winter manure on the ground, or putting compost manure in the hill: crop from fifteen to twenty-five bushels per acre.

Q. 6. In what manner is Indian corn cultivated, and what is the medium crop on an acre?

A. By ploughing in the spring once, sometimes twice; furrowing one or both ways, at from three to four feet apart; manuring as above; hoeing three times, and ploughing between the rows at each hoeing: crop as above.

Q. 7. What is the quantity and value of the straw on an acre of barley, rye, oats and wheat *respectively?* And to how much upland hay are they *respectively* equivalent for fodder?

A. Rye straw is the principal straw with us, and will produce half a small load to the acre, but it is little esteemed for fodder. Oats will produce a small load of straw per acre, and is equivalent to one fourth or one sixth its quantity of upland hay for fodder.

Q. 8. What is the value of straw of each kind, for any purpose, *other than fodder or litter?*

A. It is used for making cider, covering coal-pits, &c. but the value is small.

Q. 9. What is the value of the stover or stalks on an acre of Indian corn, and to what quantity of upland hay is it equivalent for fodder?

A. Value five dollars: equivalent to one third of a ton of upland hay.

Q. 10. What quantity of land, on a medium farm, is annually planted with potatoes? How is the land prepared? What quantity and kind of manure is applied to an acre, and in what manner? How much seed is used, and how is it selected? How are they cultivated, and what is the medium crop?

A. From half to a whole acre. Generally a piece of sward land is broken up, by once ploughing, then furrowed; manured by putting ten or twelve loads of coarse winter manure in the hills, per acre; seed, ten or twelve bushels per acre, sometimes cut into sets, sometimes used whole; crop from one hundred to two hundred bushels per acre.

Q. 11. How many bushels of potatoes are equivalent, ordinarily, to one bushel of Indian corn, for sale?

A. From three to four bushels.

Q. 12. How many days labour of a man are usually employed on an acre of Indian corn, including the getting in all the stover and stripping the husks from the ears?

A. From ten to twelve days.

Q. 13. What is the labour of shelling a hundred bushels of Indian corn, and in what manner is it performed?

A. The labour is performed with the flail on a floor, and the corn winnowed; and will take three or three and an half days to thresh and clean one hundred bushels.

Q. 14. How many days labour of a man are usually employed on an acre of potatoes, including the getting in the crop?

A From twelve to thirteen days.

Q. 15. Is there any order or succession of crops known to be beneficial or pernicious to the soil?—If any, what is it?

A. It is best to change the kinds of crops on land kept for tillage. All English grains have a strong tendency to impoverish the soils, unless the ground be ploughed soon after the crop is taken off, so as to turn in the weeds, grass and other stuff while green, before the frost kills and destroys them, which answers as a light coat of manure.

Q. 16. What is the usual course of crops?

A. Where lands are kept wholly for tillage, the crops are alternately a crop of corn and a crop of rye.

Q. 17. What is the medium quantity of hay produced on an acre of upland, and what is the labour of mowing, curing, and housing it?

A. Quantity from ten to twenty hundred: labour from two and an half to three days.

Q. 18. What is the medium product of hay on an acre of fresh meadow, and what is the labour of mowing, curing, and housing, or stacking it?

A. Quantity from fifteen to twenty hundred. Labour from one and an half to two days, if the weather be good.

Q. 19. What is the proportion of value which fresh meadow hay bears to upland hay, each being of a medium quality?

A. Proportion of value as one to three.

Q. 20. Is any tillage land laid down with grass seeds without sowing grain at the same time? If so, which method is found best?

A. None are so laid down.

Q. 21. What are the kinds of grass cut on the upland for hay? What proportion is from seed sown by hand, and what are the kinds thus sown, and in what quantities *respectively* per acre?

A. The kinds are clover, herds-grass, and red top, with some others which come in spontaneously; three fourths of which are sown by hand, viz. the clover, herds-grass and red top. Quantity sown on an acre various.

Q. 22. Are any grass lands *new* seeded after scarifying them with the harrow only, or in any other mode, without ploughing? And what is the success of such practice?

A. No grass lands are new seeded without ploughing.

Q. 23. What weeds, vermin or insects infest the mowing lands?

A. Weeds are not troublesome. The mole infests the low and meadow mowing. A worm, the species not known, sometimes destroys patches of the upland mowing, and also of the pastures, by eating the roots. In some particular places, the yellow weed or crow foot is considerably prevalent.

Q. 24. Are the spontaneous or cultivated grasses infested most?

A. The spontaneous; but we are but little injured by vermin or insects.

Q. 25. What methods are used to destroy weeds, vermin or insects without ploughing the land, and what is their success?

A. No methods are used.

Q. 26. What kinds of beasts, and in what numbers are they respectively kept, on medium farms? And how are they subsisted?

A. One horse, two oxen, four cows and several young cattle, and from eight to twelve sheep. All are universally subsisted by grazing in the summer. In winter, the horse feeds on upland hay, the others subsist mostly on fresh meadow hay; towards spring, they are allowed some English or upland hay, corn, stover, &c.

Q. 27. In what place and in what manner are the cattle fed with the coarse winter fodder? Is it given in the stable, in the yard, or in the field? Is it chopped or given whole?

A. The cattle, being generally housed, are fed in the stable over night; some of the coarsest fodder being flung into the yard in the day time. The fodder is almost always given whole.

Q. 28. How much butter is usually made in a year from a cow, all the cream being churned? And how much skim-milk cheese is made from the same cow?

A. None are so managed. A middling cow will make seventy-five pounds of butter in a season, all the cream being churned.

Q. 29. What food is given to sheep, besides grass and hay?

A. But little. In winter, especially towards spring, a little corn, beans, or potatoes, are given occasionally to them.

Q. 30. What is the value of the subsistence of a sheep through the year, besides the pasturage?

A. Value besides the pasturage from one dollar to one dollar and twenty-five cents.

Q. 31. What is the value of pasturage for a sheep compared with the pasturage of a cow?

A. Five or six sheep to one cow.

Q. 32. What is the ordinary weight and value of the flesh of a sheep when fit for the butcher? And what is the quantity of wool in a fleece?

A. Weight from 40 to 50 pounds. Value five cents per pound. Wool from two to three pounds.

Q. 33. What breed of swine are propagated? How are they fed? How fatted? At what age are they killed; and what do they then weigh?

A. Breed various—small boned best; fed the first year with potatoes, bran, whey, and the kitchen wash, with some Indian meal; fattened mostly with corn, or corn meal, sometimes with potatoes boiled and mixed with meal; age 20 months; weight 300 pounds.

Q. 34. What number of bee hives are kept? What is their product in honey and wax? What is the management, and what are the obstacles which discourage their extensive propagation?

A. But few are kept, they do not prosper well, and we believe the cultivation of them is not well understood.

Q. 35. What is the usual quantity of land sowed with flax seed? How is it manured and cultivated; and what is the medium produce of flax and seed in quantity and value?

A. Our soil is not congenial to flax, and but very little is raised; what is raised is commonly sowed on new or gross lands, after a crop of potatoes, as being the crop which best prepares the ground for flax.

Q. 36. How much labour is employed on a quarter of an acre of flax, before it comes to the spinner, and including the preparing the seed for market?

A. Not rightly known.

Q. 37. In what articles consists the surplus of the farmer, which is sold or exchanged for other articles?

A. In rye, corn, oats, some beans, pork, beef, some butter, some cheese, some cider.

Q. 38 How many loads of manure are collected (estimating thirty bushels to a load,) from the cattle in the barn yard, of a medium farm, in a year, specifying the number and kinds of cattle kept on the same farm, and the manner in which they are kept in relation to confinement or ranging abroad?

A. Twelve head of horned cattle, one horse and ten sheep kept up in the yard will make from 60 to 65 loads; and much more may be made of a very good quality by carting into the yard, meadow mud, bog, &c.

Q. 39. What quantity of manure is made in the hog-pen? specifying the number of swine fatted, the kind and quantity of food consumed, and the weight of flesh produced?

A. Two hogs made to weigh 300 each, fattened as before stated, and properly provided with bog, rubbish, &c. will make ten loads of good manure.

Q. 40. What methods are used to enlarge the quantity, improve the quality, or prevent waste of the manure, made in the barn-yard or hog-pen, and especially to save the stale of the cattle?

A. But very little attention has till lately been paid to enlarge the quantity or improve the quality of manure made in our yards; of late some attention is paid to carting into our yards meadow mud, straw, and rubbish. No means used to save the stale of cattle.

Q. 41. Is the manure and tillage labour exclusively applied to the best part of each farm?

A. Mostly so; land which is suitable for tillage and mowing, when reduced, is ploughed, planted and manured about two years, then laid down to grass; is sown with clover, red top and herds-grass, all or a part of them, according to the nature of the soil; our poorest lands lie unimproved.

Q. 42. In what manner and for what purposes is manure used, except those indicated in the foregoing inquiries?

A. Of late considerable compost manure is spread on our moist mowing ground and also used in our gardens.

Q. 43. What other manures are used besides those created by the stock, and what are their merits compared with these?

A. The only manures besides those created by the stock, are mud from pond holes and meadows, bleached ashes, sometimes ashes not bleached. The merits of these, especially when used for corn, are nearly equal to stock manure for one crop, but does not equally enrich the land.

Q. 44. Is lime-stone found in your vicinity? Is it used as a manure?

A. Not found in this town; but is in Chelmsford, 12 miles from this—not used as a manure.

Q. 45. Is Buck-wheat cultivated for the food it yields? or is it used to clense the soil from weeds, to fertilize and enrich it, or for any other purpose?

A. Buck-wheat is not raised in this town.

Q. 46. In what manner are new lands brought under cultivation? Is it customary to plant orchards in the new settlements?

A. The wood and timber are cut off, then ploughed with a team of 12 or 14 oxen, to tear out and kill the shrub oaks and other small brush which are with us very prevalent. We have no new settlements.

Q. 47. How is land cleared, which bushes and under-brush have overrun, since the trees were carried off?

A. Cut, and the brush burnt, then ploughed as before.

Q. 48. What is done with swamps or swampy lands?

A. Many of them remain in the state of nature. But when designed for improvement, we drain them, if practicable, take off the brush—sometimes seed is sown; but oftener the spontaneous grasses are mowed without further cultivation.

Q. 49. Is the growth of wood for timber and fuel equivalent to the consumption in your vicinity? If not, what measures are taken to provide against the inconvenience of future scarcity?

A. It is believed the growth of wood in this town, is equal to the consumption by its inhabitants, excepting what is carried to the market. Considerable quantities are carried to the Merrimack river, and transported through the Canal to the metropolis.

Q. 50. Are wood lots generally fenced, or left open for cattle to range in without restraint? In getting your wood for fuel, do you pick the oldest trees, or do you cut clear? Which method is best calculated to increase the value of your wood lands?

A. Our wood lots are a considerable part of them fenced, and the town by vote restraining cattle and horses from running at large, and thereby preventing the young shoots from being constantly cropped as formerly, our wood lots are doing very well, and we apprehend no scarcity. It is generally practised to cut the oldest and most decayed trees, leaving the rest.

Q. 51. What are the causes that the culture of wheat can no longer be pursued on the sea coast of New England? [*Not answered.*]

Q. 52. How far has Gypsum, (Plaister of Paris,) been fairly tried as a manure in the maritime parts of this state? What have been the effects of the experiment? [*Not answered.*]

Q. 53. Is the European practice of a succession of crops found to be expedient in this country, and in what order ought such a succession of crops to take place? [*Not answered.*]

Q. 54. Is it perfectly ascertained, that with proper attention to manuring the land, it is more advantageous to change the crops than to keep it in grass?

A. A considerable part of our English hay being cut on dryish soiled land, it is to us evident, that with the best attention to manuring, the grass would run out, unless tilled and manured; of course, we are obliged to change the crops.

Q. 55. Is there any crop so profitable as grass, taking into view the state of markets in our country, and the distance at which most of our farmers are from a market?

A. Our soil, not congenial to grass, is more profitably used in the raising of grain, particularly rye, which is raised on our pine lands, where grass would not thrive.

Q. 56. Can the farmers raise any crop which, on the whole, affords them so great a profit as grass, unless they are within twenty miles of the capital?

A. From our observations on the 54th and 55th queries it will be perceived that, in our opinion, grain is a more profitable crop.

Q. 57. What are the most profitable crops which the state of Massachusetts, taking one year with another, furnishes? [*Not answered.*]

Q. 58. What has been found to be the difference of profit between the Merino sheep, and the sheep which formed our former stock? [*Not answered.*]

Q. 59. Is there any cheap fodder which can be raised for sheep during the winter, which will supersede or diminish the consumption of hay? [*Not answered.*]

Q 60. What is the comparative profit of a farm adapted to the raising of sheep, between the cultivation of Merinoes, and the raising of any other cattle? [*Not answered.*]

Q. 61. Is there any profit derived from the raising of Indian corn, except for the subsistence of man, which can equal the employment of the same land in raising grass for the support of sheep and cattle during the winter? What are the calculations on which such profits are founded?

A. We believe there is; our calculations are as follows—it is obvious that the labour on an acre of Indian corn on our easy land is not great, and with a little manure will produce 15 or 20 bushels per acre, where if laid to grass the hay would little more than pay the getting.

Q. 62. What are the improvements in dairies, which have been made within the last twenty years? Is the quality of butter and cheese improved? And in what consists this improvement? And what are its causes? [*Not answered.*]

Q. 63. Are there any improvements in the tools of husbandry, which experience has confirmed, and what are these improvements? [*Not answered.*]

Q. 64. Are there any new and valuable fruits or productions, either contributing to the pleasure or profit of the citizens at large? What are they? What the mode of culture, and what their qualities? [*Not answered.*]

Q. 65. Are there any improvements in the breed of cattle? What are they, what their qualities, and where can they be obtained? [*Not answered.*]

Q. 66. Are there any other improvements, not comprised under the articles of manufactures, which have been made in any branch of agriculture? [*Not answered.*]

INTERESTING REPORT ON THE STATE OF THE WOOL TRADE OF ENGLAND,—July, 1815.

BY LORD SHEFFIELD.

[From the Repertory of Arts, &c.]

The Wool Fair which was held at Lewes on Wednesday the 26th July 1815, was attended by the respectable and principal wool growers of the county. Lord Sheffield, the President, made his Annual Report, of which the following are extracts.

He said he had foreseen and repeatedly represented the necessity of checking the immense importation of foreign wools: they had increased in a most extraordinary degree, and infinitely beyond even what had been apprehended. He had stated at former meetings that on an average of twenty years, in the beginning of the last century, when we plumed ourselves so much on our great staple manufacture of wool, the importation of foreign wool was only 869,727 pounds; and the average of eight years previous to the French revolution, viz. ending 1789 inclusive, was 2,660,828 pounds; but that in the last year, 1814, the importation of foreign wool was 15,712,517 pounds; and in the quarter ending 5th April 1815, 3,624,925 pounds.

This increased and increasing importation, he observed, was so alarming, that notwithstanding his age, and forty-six years attention to all country matters, entitled him to decline all meetings, he once more troubled the meeting with his opinions on a subject so interesting to them all,as well as to the public; and begged leave to repeat the necessity of an application to the Legislature, for protection for the fine wools of the United Kingdoms from which England in particular, for centuries, had derived extraordinary benefits, and its manufactures great credit.

The article wool, his Lordship continued, is the only produce of the island which is not protected; all other foreign articles which interfere with the growth or manufacture of the country, are restricted by protecting duties; and it is both just and politic thus to protect the produce and manufactures of the country. The legislature lately most wisely raised the duty on the importation of grain; and if that had not been done, the growth of grain in this country, would have been so discouraged and diminished, that we should have become dependant on foreign countries for our subsistence, and often liable to the extreme of famine. Wool is just as much entitled to a protecting duty as grain, or any other produce; but every discouragement is inflicted on the wool growers, and wool is the only article of produce of which the export is prohibited. If the landed interest will not make known its grievances, it cannot expect attention or redress, and it will be responsible for the ruin which will fall on the growth of fine wool. For if the wool of all countries is to be poured in upon us without restraint, and untaxed, every man the least acquainted with the subject will agree with me, that it never can be worth while to raise fine wool in this Kingdom; and the agriculturalist will aim only at quantity, neglecting the quality of the wool. In every point of view it will be highly mischievous. We should consider what immense sums will go out of the country for that article. 15,712,517 pounds imported last year cost this country, at the low rate of 2*s*6 per pound, nearly two millions sterling. A duty of 1*s* per pound on the imports would have added to the revenue £785,625. One shilling per pound added to the import, 2*s*6, would only raise that article to the price of the English fine wools prepared for the manufacturer, in which state foreign wool is generally imported. The present price of superfine woollen cloths *raised nearly one third within no long period*, would amply pay the amount of that duty. The foreigner is able to grow his commodity at half the expense of the British farmer, and there being at present little demand for wool, except in this island, it all comes here. *The manufacturers of fine cloths never had greater profits.* They enjoy an extraordinary monopoly. All the wools of Europe come here for a market. All the wools of Britain are *impounded* here for their use.

It must surely be expected, and it must happen, that British fine wool being so great a drug, and the price so low, the wool grower will find it his interest to promote the growth of the coarse and heavy wools,* which will pay him per fleece much more

* It ought to be recollected here, that the Leicester sheep yield a fleece of from 8 to 11 pounds weight, of the coarse kind of wool. The average weight of fleece of the common sheep of America is from 2 to 3 pounds.

than the fine wools. It is however particularly to be regretted, at a time when the greatest improvements in the fine wools were in progress, through the spirited exertions of many individuals in this country, that such a check should take place.

I learn with much concern that in consequence of the circumstances I have stated to you, much wool of the finest quality has been sold in this country at 1*s*10½ per pound; and this in many instances per fleece of so fine a quality as to weigh only 2 pound, and a considerable quantity has been sold under that price; and I have not heard of any that has been disposed of at a higher price than 2*s*2 per pound. Mr. Weston of Essex, well known to you as one of the most intelligent country gentlemen and farmers, has sold at 2*s*2; but at Colchester Wool Fair, the general price was 2*s* for fine wool of the Southdown and Norfolk flocks, and that was likely to be the general price of the year. I understand also that a large quantity was sold and the whole might have been disposed of if the holders of the ordinary sorts had not fancied they should have as much as for the best sorts.

At Hereford and Ross Fair, Ryeland wool sold at 2*s*4¾. And *Spanish mixtures* from 3*s* to 4*s* per pound, according to their fineness. Mr. Clive of Whitfield sold his Ryeland Merino at 3*s*7 per pound. At Ross Fair, very good wool of the Spanish mixtures only obtained 3*s*4½ per pound. At Hereford, short wool sold at 2*s*.

RECAPITULATION.

Ryland wool, - - - - - -	£0	2	4¾
At Hereford, Spanish mixtures, - -	0	3 *to* 4	0
Ryeland merino, - - - - -	0	3	7¼
At Ross, Spanish mixtures, - - -	0	3	4½
Short wool, - - - - - -	0	2	0

The debasement in the price of our fine wools, although principally produced by the immense importation of foreign wool, is increased by the great depression which the farmer suffers, in consequence of the ports having been left open so long that all the ware houses along the Thames and at Liverpool were crammed with foreign wheat; and this debased price happening after as bad a crop of wheat in this island as perhaps has occurred for many years, has impoverished the country in a degree scarcely known before; nor will the farmers have a reasonable price for their wheat, until these magazines are emptied.

The agriculturalist being thus depressed by an immense importation of foreign grain and foreign wool, has not the usual means of employing workmen; consequently also the shopkeeper, the tradesman and mechanic suffer, together with the whole community, from the cessation of that expenditure which employed them, and fed the poor. The farmer is obliged to sell at any rate, and thus the produce of his farm is greatly debased. But as the Legislature has seen the necessity of checking a ruinous importation of grain, we may flatter ourselves that it will attend to the case of the wool grower, and extend the same protection to him as has been so wisely afforded to the farmer. But unless the case of the wool grower and the difficulties under which he labours are properly represented, it cannot be expected that they will be removed.

But I shall add that there is sufficient ground to expect an extraordinary demand for wool, in consequence of the complete subjugation of those who have so long disturbed the world and deranged its commerce. France and the other countries which have been overrun by desolating armies are exhausted, and will not immediately re-establish their former occupations and settle to manufactures. It is therefore most probable there will be a very unusual demand for those of woollen, not only from the countries alluded to, but also for those countries which used to be supplied from those parts which have been ravaged by war.

The thanks of the meeting were voted to his Lordship, for the information he had so ably collected and for his instructive observations on the subject of wool.

HINTS TO WOOL GROWERS.

[The writer of the following article is a *Wool Sorter* from England, recently arrived in this country, and now in the employ of Mr. Z. Hayden, of Boston, Woollen Draper and Wool Stapler.

It was formerly very common in the counties of Kent and Lincoln, in England, to meet with large quantities of matted, cotted, tyed, or pelted-fleece wool, which was the natural growth of many sheep, and which was of course much increased, when the animal was from any cause deprived of its common supply of food for any length of time, which will frequently unavoidably happen during the winter, and also by sickness, and not unfrequently be occasioned by the disorder called the scab. But these incidents would not operate so powerfully as to produce a confirmed cott, were it not in the nature of them. It would only be slightly tyed, or impoverished on the ground, or cotton of the fleece, or in the middle of the staple, or any other part, according to the time these occurrences took place ; frequent demonstration of this occur to the wool sorters.

To prove the last case beyond a doubt, when sorting the long wools, and when they are intended for Combing Manufactories, you will find the staple to break exactly at the place where the impoverishment or sickness shall have taken place. It is therefore, incontrovertibly proved, that when a confirmed cott takes place, it proceeds from the constitution or state of health of the animal.

Scurfy or thick pelted sheep will generally be found to be very liable to the scab, a disorder which frequently causes the pelting and cotting of the fleece, or is otherwise very detrimental to the wool, and makes it sometimes very *hard ;* sheep having a thick pelt will be found, when minutely observed, not to thrive half so fast, as those which have thin pelts or skins. These latter will never be found to be scurfy, or pick themselves unless they really have the scab ; and to this they are not half so liable as the former. The latter kind have been known in England to improve one shilling per week more than the former.

The improvement in breeding sheep in England has been so great that it was common formerly to keep their wethers fatting till they were four years old, whereas at this time they will acquire more fat at two years. Therefore, attention should be paid to select your buck or ram free from all those defects, and your ewes having those defects should be marked off to be fatted or sold ; but as the latter do not infect the general flock so fast, it is not so much an object as paying strict attention to the former, which, if not sound, or of good breed, will soon spoil a whole flock, as a hundred and upwards may be annually infected with any defects the ram may possess.

There are other defects in the growth of wools of this country.

The first is, that a great quantity of wool is infested with a loose hair, generally called *kemp*, by the clothiers, sorters, and wool-staplers. Many of the fleeces are so completely beset with this loose hair as to render the wool not half so valuable, as these hairs will not take any dye. All wools therefore, of that description, are very injurious to the manufacturers, as they will spoil the colour of a whole piece.

There are also many flocks that have fleeces which have coarse points, or spiry tops, which are also detrimental to the manufacturer, as such wools will not spin so well, and when manufactured, the coarse tips will lay at the top of the cloth invariably, to the great detriment of it. This defect will operate, ultimately, to produce a depreciation in the price of the wool.

There are likewise some fleeces that have a large coarse breech, which may also be removed with the other defects.

In order to convince the gentlemen graziers, farmers, and growers of wool, how easy it is to remove all these defects treated of, it will only be necessary to inform them, that thirty years since you could not meet with a lot of wool of the Kentish or Lincolnshire growth, but what would average five per cent and upwards of confirmed cotts, which used to be sold with the lot, and two pounds given for one to to make up the value of the good wool free from defects. Even within these twenty years, I have seen lots of wool nearly, if not altogether, infected with cotts, or in some degree, more or less ; whereas, now it is not common to meet with any. even in those lots of wool where it was hereditary formerly, and some lots are entirely free from being cotted, even of Kentish wool. The sheep on Romney Marsh never receive any hay or other food but what they procure for themselves, in the most severe and long continuance of frost and snow.

It appears in this country, that the graziers and farmers conceive their sheep ought to be kept very high or fully fed, and that it improves the quality; but it is thought that wool of sheep kept so high is not so good as the wool of those sheep that are kept in low feed. For making cloth, the wool is better for being short, thick, chubby staple. As to sheep which give combing wool,they cannot be fed too high,as that prevents the staple breaking in the act of the process of combing, as it has to be drawn several times through the combs; but the latter wools are seldom or never wanted in this country.

WILLIAM BARKER.

EXTRACTS FROM THE BATH SOCIETY PAPERS, 1799; WITH REMARKS BY JOHN LOWELL, Esq.

A correspondent of that society warmly recommends a species of manure for potatoes which I think peculiarly applicable to our country because easily attainable. It is the employment of *mould*, and *fallen leaves* taken from the woods. This the writer observes he has found an excellent substitute for other manure. He found the potatoes raised in this way much more mealy and of a flavour much finer than when produced by the application of the ashes and dung; and he considers it of great importance to poor people who have not the means of procuring much dung. This he observes can always be procured in woody countries, and in those which are not so, it may be obtained under hedges, and in ditches and old ponds.

If this be a fact, and we have little doubt of it, since it is well known that few substances are more favourable to vegetation than rotten leaves, and the soil formed by their decomposition, there is scarcely a farmer in Massachusetts who may not by two or three days labour collect enough to plant all his potatoes, and thus save his manure for his corn and grass lands.

The same writer suggests a mode of fattening hogs on potatoes, which, as it is new, and has certainly the appearance of ingenuity, I will transcribe. "The next article which occurs to me," says the writer, "is the application of potatoes to the feeding of hogs. I have tried *every* mode of application, and find the following to be the best. I bred my hogs in a wood park appropriated almost solely to this purpose, during the spring and summer; and about the beginning of October, I let such of them *only* as I mean to fatten into the farm grounds, where they have the run of the stable, the clover fields and pastures, taking care to have them well wrung. I then have a pretty large fold prepared for them in my potatoe ground, into which they are driven every evening, and over every fold I strew a few horse beans (a small quantity of Indian corn would answer equally as well.) Here they will fill themselves well. They lie warm on the haulm of the potatoes, and by leaving behind them a great quantity of the finest and strongest dung, they amply repay what they take away. If the potatoe ground be dry and not sufficiently easy for their working out the potatoes, a light plough run over it will facilitate the business and they will do the rest. This seems to be the manner in which nature means the hog should find his food; and having wisely formed the vent for this purpose, I am convinced that he derives more relish and nutriment from potatoes thus found than if given to him in any other way. For if thrown to him in the stye he soon gets satiated with, and loathes them.

I have tried boiling, straining, and various other modes, and find this the best. The hogs being shut out from them during the greater part of the day, they come to the potatoes with redoubled relish at the close of it.

Two thirds of the preparation of them for market being thus done, the remainder is soon accomplished, by taking them into the styes and finishing with grain, or barley meal and peas, and which will be found much better applied in this way, than by mixing with the potatoes in the whole course of feeding.

This article is not recommended, except for experiment; where farmers happen to have small enclosures of potatoes, it may be well to try the effect of this mode of feeding hogs. It certainly will save much labour; and if they do thrive better, it may be a very useful practice.

The same writer mentions what would be very valuable, if successful, a mode of perpetuating clover crops.

"In the month of October I carry on to my clover grounds and spread a good top dressing of dung, ashes, &c.; this I suffer to lie in a loose easy state during the winter which shelters and invigorates the plant, and better enables it to withstand wet and frost. The beginning of April following, I sprinkle over the ground fresh and good clover seed, at the rate of six pounds to the acre, with about half a bushel of rye grass, (if wanted.) I then run over a fine dressing harrow each way, which serves as a hoeing and cleaning to the former plants. The new seed is then pressed down by a roller. Hence will arise an annual succession of new plants, and the objection to the instability of clover crops will thus be obviated.

Bayberry wax plant—Myrica Cerifera.

An English correspondent has expressed a great desire to know more of the history of this plant, and it seems he looks to us for this information. It is among the very common though mortifying cases in which, if we would learn the history of one of our own native productions, unknown in Europe till after the discovery of our country, we must go to European writers for this information.

Not a single attempt it is believed has ever been made in our country to propagate this valuable plant. Yet it would seem that it is pretty extensively cultivated in France. On a very short examination I find there have been not less than three considerable treatises on the culture of it, by French writers. One by M. Tessier, in the Annales de l'Agriculture, tome 14. One by M. Arsenne Thiebout de Berneaud, and the last by M. Rast Maupas. The latter has cultivated it with success in the neighbourhood of Lyons. It is stated that from twelve pounds of bayberries he produced one pound of wax. This latter work is not in this country. It is only from a notice of it in a French periodical work that we learn these facts ; we are not able therefore to state to *what extent* his cultivation proceeded.

It is desirable that some gentleman should furnish us an account of this plant, the probable amount of its products in our State, and that some enterprising man would undertake the culture of it on a small scale and communicate the result of his experiments, that the publick may be able to determine whether its merits would repay a more extended cultivation. It is certain that it has been cultivated in other countries, which cannot be more congenial to it than its native soil and climate.

In Tessier's Annales de l'Agriculture, tome 43, page 185, the following method is mentioned of preserving the health of fruit trees in grass lands.

The numerous sorts of grass are well known to be ruinous to fruit trees, especially while young. The fruit is smaller when they are thus surrounded with grass and of inferiour flavour.

They have very successfully remedied this difficulty in Germany, by surrounding the roots of trees with hemp breakings, not only surrounding the stock near the ground but also covering the earth with them for some distance from the tree. They acquire by this means a surprising vigour. They employ with equal benefit the dead leaves of trees, just covering them with stones or some other heavy substance to prevent their being blown away.

It is said, that such measures would also effectually prevent the descent or rise of the canker-worm.

We noticed in a former publication, that it was the custom in some parts of Rhode-Island to surround the apple trees with breakings of flax to, prevent the ascent of the canker-worm, and that it was found successful.

Tall Oat Grass.

It seems that the tall meadow oat grass, *avena elatior*, lately introduced on the recommendation of our correspondent, Justin Ely, Esq. has been long known in England, and is a natural grass there.

In the Bath papers for the year 1799, it is thus described:—*avena elatior*, or tall oat grass—this grass is very luxuriant, it is rather coarse, but makes tolerable good hay. It is common in all meadows.

In Willich's Domestic Encyclopœdia, it is thus described:—The *avena elatior*, (Holcus Avenaceus of Dr. Smith,)—tall oat grass or oat, thrives on wet damp soils, in meadows, pastures and hollow ways. It flowers in June and July. This grass vegetates with great luxuriancy, and though somewhat coarse, makes tolerable good hay. It is eaten by cows, goats and sheep, but is frequently troublesome in arable land, as its roots spread like couch grass, and are very difficult to be eradicated.

In a note to Davy's Agricultural Chemistry it is thus noticed:—*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 thrives best on stiff clayey soils.

On analysis it appeared to yield less nutritive matter from the same weight than most other grasses, but its whole weight per acre is much greater than almost any other.

We are induced to publish the foregoing, lest it should be supposed that we meant to recommend its adoption generally.

From what we have seen of it, we think it will never take the place of the meadow fox tail and some other grasses, though it may prevail against Timothy or herds-grass. It will have two advantages over the latter, it is a very early grass, and produces a great after-crop.

It is however a coarse grass, and it would seem is not very nutritive. The gentlemen farmers may rely that this new grass, called the tall oat grass, is the same as those above described by British authors. It has been accurately compared by botanists here, and it is certainly the same.

COMMUNICATION; IMPORTANT TO WOOL GROWERS.

BY MR. ZEBAH HAYDEN, *of Boston.*

My business for a few years past, has brought particularly within my observation, the great instability in the sales of sheep's wool of American growth. The demand for the article, and price which it has, from time to time, borne, have been equally irregular. I have frequently been led to inquire into the cause, and endeavour in my own mind to point out measures which might, at least in some degree, tend to remedy the evil.

Permit me, sir, to suggest to you some of my ideas upon this subject. Should they meet the approbation of the trustees of the Massachusetts Society for promoting Agriculture, I doubt not but they will exert their influence in rendering them useful to the public.

The state in which the article has generally been offered in market, I conceive to be one of the most prominent causes of the irregularity in its sales. The greater part of our fine wool has heretofore been offered in its natural unwashed state, and of the remainder, very little has been *well* washed. In its natural state it is well known that the quantity of yolk and dirt varies essentially, according to the *degree* and *kind* of merino blood, the method of keeping the sheep, &c. It has usually been wound up in fleeces, with the skin side *out*, which presents the best appearance, and *too* frequently with all the taglocks and manure carefully enclosed.

Among that whichhas been washed, too little attention has been paid to clearing it from tag locks and manure. In some instances it is believed deception has been practised by mixing that of different grades, and marking it according to the highest. In some instances it has been found to contain much sand, and very frequently barn litter, &c. Under these circumstances, it has been extremely difficult for the *best judges* to determine any way near the real value of the article in all its various states; it could not therefore be expected of our numerous manufacturers, in the infancy of their establishments. They have seldom had the opportunity (to say nothing of its inconvenience,) to open and examine all the fleeces of a lot before purchasing. The consequence has been, that they have bought of the same grade and at the same prices, at different times, that which has varied in its loss on cleansing, from thirty-five to sixty per cent. Many have bought *native* for *half*—*half* for *three quarters blood*, *merino*, &c. They have been so frequently deceived in the article as to produce among them a *general* and *strong* prejudice in favour of that of foreign growth. They know the value of Spanish and will purchase it, while they approach American as they would a lottery, under the just impression that the chances are against them. And this, sir, cannot be wondered at; they might as well purchase corn without measuring, or cotton without weighing, as to pretend to determine the quantity of yolk and dirt in a lot of unwashed wool.

As a remedy for this, I should propose that an uniform method of preparing sheep for shearing, and packing up the wool for market, should be recommended to the wool growers, under the sanction of the Massachusetts Agricultural Society, through the medium of the public newspapers. This method, in order that it may be generally adopted, should be too simple to be inconvenient; it might be as follows. Wash the sheep in as warm water as can conveniently be had, (always avoiding that which is salt or brackish) as clean as practicable; after which, let them run in a *clean* pasture from seven to ten days, as circumstances will admit, for the purpose of renewing, in a small degree, the *yolk* or grease which is alike necessary to the preservation of the wool, and the further cleansing it when necessary. During the time of shearing cautiously avoid barn litter and other dirt. After carefully separating from the fleece all tag locks and manure, wind it up as tight as possible with the skin side *inward*. After which it would be well to put it into a clean dry apartment for a week or more, for the purpose of drying before packing it for market. The most convenient bags may be made of tow cloth of from 7-8 to 4-4 wide, of three breadths each, from two to two and one quarter in length.

Should this method go into general practice, it would, I conceive, by rendering it much less difficult to determine the value of American wool, be a great step towards putting it upon a fair competition with that imported, and cause a more regular demand. It would also be in suitable order for the operation of stapling, a pre-requisite to a proper inspection.

A second cause is, the admission of foreign wool into the United States free of duty. This gives the manufacturer an advantage at the expense of the wool grower, which in addition to other discouragements presented by the close of the war, has a tendency to retard the progress of that interest, which, if properly fostered in its infancy, may probably in a few years not only furnish a sufficient supply of wool to our manufacturers, at as low and perhaps at lower prices than could be fairly imported, but a surplus for exportation.

As a remedy to this, it is expected by some, that Congress will lay a duty on the importation of the article. But as this is of very considerable consequence to the agricultural interest, would it not, sir, be well for some of our most influential agriculturalists to use their endeavours to procure from different states, petitions to Congress for this object, during their present session?

A third cause is the want of sufficient capital on the part of most of our manufacturers, to enable them to purchase wool on the short terms of credit usually offered by the growers.

Their goods are slow in *turning*. The liberal terms on which imported woollen goods are usually sold renders it necessary that *they* should be equally liberal in *their* terms, in order to obtain fair prices. If they hold their goods for cash, they must either sell very moderately or lower than they can be afforded; their goods are not of that uniform character which will command fair prices at forced sales. Those, therefore, who sell on liberal terms and make a reasonable profit in their business, soon find a respectable capital swallowed up, and themselves reduced to the necessity of taking advantage of liberal terms in their purchases, or selling their goods on such terms as will give them little or no profit; their capitals, therefore, are not sufficient, though in most cases respectable, to enable them to purchase wool with cash or on short credit, without forcing the sales of their goods at low prices; thus some have been under the necessity of discontinuing their business, while many others are doubtful whether to proceed further: this particularly affects the sales of wool at the present time.

The remedy to this lies but in a small degree within the power of the wool growers, and further I shall not attempt to consider it.

Many of them perhaps have not sufficiently considered how much the sale of the wool depends upon the circumstances of the manufacturers, upon their abilities and success, and the almost inseparable connexion between the two interests. Having been in the habit of making quick sales of the other productions of their farms, they have too confidently expected the same of their wool, have wondered why it would not command the cash at any time at something near its value, without duly considering that the demand for it is limited to a particular class of purchasers, whose abilities to purchase are subject to continual variations, according to their success in their business.

They have not perhaps considered that American wool has not yet become an article of merchandize, that its price has not settled down to an export value, that when our *manufacturers* can buy, *they* can sell, and not otherwise, unless at *very reduced* prices.

They have too generally offered their wool for cash or on short credit only; and manufacturers, under the necessity of purchasing, have too frequently bought without a fair prospect of being able to be punctual in their payments. They have, therefore, a just claim on the wool growers for liberal credit on their wool; and the growers of wool must, I conceive, consider it for their common interest to be as liberal as may be fairly within their power and convenience, in their terms of sale to the manufacturers.

A fourth cause, which constantly operates against the sale of wool, is the general prejudice which exists in the public mind against woollen goods of American manufacture. It cannot be denied, that during the infancy of our numerous manufacturing establishments, many bad goods have been made, and that many have been grossly deceived in the purchase of them. This has produced a prejudice too well founded to be easily removed; which at present very unjustly operates equally against the sale of those of the best quality. But so rapid has been the progress of improvement in the manufacture of many kinds of goods, that very considerable quantities are now made, which are but *little* if *any* inferiour in any respect to those of the same kinds usually imported. Should this course of improvement continue, that prejudice must in time thereby cease to exist; but as its operation is particularly felt at the present time, every exertion should be made to counteract its tendency. Measures more immediate in their operation are called for. The manufacturer who offers the best of goods as low, at least, as they can be elsewhere found, calls for support. The wool grower should be the first to step forward in his cause; it is for his interest and perhaps his duty.

Let him clothe himself and family in American cloth, (of good fabric) and thus recommend the production of his own sale; let all our wool growers thus dress themselves and families, and it is believed that the prejudice against American goods of most kinds, will soon be lost. To this end, would it not be well for some influential man of this interest to recommend it publicly, and at the same time point out the places where the best may be obtained of warranted quality.

January 5th, 1816.

ON BURNING STUBBLE.

BY MR. W. CURTIS.

[Communicated by J. Prince, Esq.]

Mr. W. Curtis of Lynn, Norfolk, found very beneficial effects from burning the stubble of oats, which was left eighteen inches high for that purpose, on a field broken up from old pasture the same year; he afterwards sowed wheat and oats in succession on the same ground, the stubble of both which were burned in the same manner. The ashes were in every case ploughed in to a small depth, and the verges of the field mowed previous to the burning to prevent accidents. After the third crop of corn, all of which were abundant and remarkably free from weeds, the field was laid down with clover and grass seeds, and the ensuing crops of both hay and grass proved infinitely finer than those before the ground was broken up.

Another piece of land was cropped for three successive years in the same manner as the first, to which it was similar in every respect of soil, aspect and previous management, but in which the stubble was ploughed in instead of being burned ; the produce of each crop on it was much inferiour to that of the first experiment, and the weeds increased so greatly, that on laying it down to grass, they overpowered the grass seed so much that it was necessary to re-sow it ; and ever after, while Mr. Curtis held it, the grass and hay produced were coarse and full of weeds, and consequently inferiour both in value and quantity to those of the other field, on which the stubble had been burned.

Note. This is a proof of the meliorating quality of carbonaceous matter to land and the great benefits of burning, both in producing this matter and in extirpating weeds in the most effectual manner—it is recommended previous to burning to carry one or two furrows round the field and to commence burning on the leeward side to prevent accident, if near any building.

[*Pub. Board of Agriculture*, 1805.]

TREATMENT FOR THE ROT IN SHEEP.

[In a letter to William H. Sumner, Esq.]

DEAR SIR,

THE regimen I pursue in cases of the rot in sheep, is pretty nearly as follows :—

I restrict them in the use of green food, and, if in summer, permit them to go to pasture only for an hour or two in cool of the morning and evening, but they are never turned out until the dew of the morning is dissipated. By frequent and sparing supplies, I endeavour to induce an appetite for dry food, such as ground Indian alone or mixed with oats, malted barley, corn or oats, and fine sweet hay. Care should be taken to furnish such food only as is very nutritive, and at the same time readily digested; as the digestive powers of the animal in this disease are evidently much impaired.

I endeavour to excite the stomach to its natural tone, and to restore the appetite by the frequent and moderate use of tonics; and in cases where lambs have been the subjects, I have given regularly every morning a half gill of rye whiskey in a half pint of fresh milk. The decoction of white oak bark is doubtless a very proper tonic, and so perhaps would be that of the inner bark of the wild-cherry tree. The leaves and boughs of pine and cedar may also be classed under this head; at any rate I always give them to my sheep when afflicted with this disease.

Sheep in this complaint are affected with an unnatural craving for drink, and in order that this also may contribute something towards the effect to be produced, viz. the bracing and invigorating of thin, pining and emaciated systems, I give them as their *only* drink, a decoction of fine hay, commonly clover.

Instead of salt, which (except in situations bordering on the ocean) is always necessary, I give *chalk* mixed up in the form of paste, with strong brine, and poured into the troughs where it adheres without interfering with their feeding, and is scraped off and eaten with avidity, for the relish which its saline taste gives it. I was led to this by observing that rotten sheep had a particular propensity for eating earth, which upon dissection after death I found in considerable quantities in the fourth stomach. This I construed into that instinctive disposition or tendency in almost all animals, when labouring under disease, to avail themselves of certain remedies which an all wise Providence has placed within their reach for their relief; and it seemed an indication of Nature to the use of some calcareous and absorbent earth, which might reduce the superabundant juices of the stomach or rectify their acidity. Of the correctness of this theory, I leave you to judge: you will at any rate agree with me in opinion, that such would be the chemical operations of chalk, but whether its nature is changed by a combination with salt, I am not chemist enough to determine. It is at any rate a simple remedy, and can do no harm.

Besides this, I have been in the practice of giving strong salt and water, in doses of about a gill, to a lamb of six or eight months, once a day, as a remedy for worms of the stomach.

These worms are about two inches in length, and exist in the fourth stomach: they resemble the red silk of corn, and are found knotted together in a mass, frequently as large as ones fist. They are soon destroyed when put into salt and water. I will not pretend to say that these worms are an invariable concomitant of the rot, though I have found them to exist in all the sheep I have ever lost with this disease.

By a patient adherence to this regimen I have cured seven or eight sheep out of ten, which laboured under all the symptoms of the most inveterate rot; even after the swelling of the throat had become permanent, and so large as evidently to be burthensome to the animal.

Rot is certainly *not contagious;* like scurvy, it proceeds (in *my opinion*) either from depraved or watery and insubstantial food; more especially when the transition from better to worse is sudden and great, as for instance the case of old sheep taken from high dry pasture, to which they have long been accustomed, and placed on marshy ground. A sudden change of the weather from a long drought to a great deal of rain, often produces the same effect. In the case of lambs, owing to the sudden loss of their natural aliment, at a time when, in consequence of great rains, the grass is watery and insubstantial. Hence it appears to me that the disease may generally be prevented, if proper attention be paid to prevent the occurrence of these predisposing circumstances.

That your little flock may be preserved from its ravages, is, my dear sir, the sincere wish of

Yours, &c. SAMUEL D. HOWELL,
of Pennsylvania.

ON THE UTILITY OF SALVING SHEEP.

[From the Virginia Argus.]

COMMUNICATED BY J. PRINCE, ESQ.

I HAVE long thought of communicating to the public, a remedy for the cure of the rot and scab in sheep, which I have made use of with very great success.

In the year 1806, my flock was so very indifferent, that from ninety sheep, I sheared only one hundred and thirty pounds of wool, so sorry as to be barely fit to make clothing for young negroes. Immediately after shearing, I made use of the following mixture: three gallons of tar and three gallons of train oil boiled together, to which were added three pounds of roll brimstone, finely pounded and stirred in. This quantity was sufficient for the above number, and was poured on with a ladle, from the top of the head along the back bone to the tail.

At the next shearing in 1807, from seventy-eight of the same sheep, I sheared three hundred and sixty pounds of very good wool; and instead of twenty or twenty-five sorry lambs, commonly raised from my flock, I raised fifty-five as fine as I ever saw. Since this application, I have frequently been asked by my neighbours, where I got such fine sheep. It may be necessary to add, that I have continued to make use of this application with the same success.

J. NELSON.

Mecklenburg, 13*th June*, 1808.

Note. It is presumed the above receipt must have been for the *scab only;* and it also serves to shew that that disorder was known in the United States long before the introduction of the valuable breed of merino sheep.

Recipe for the Rot in Sheep: Young's Annals, vol. 13, *p.* 209.

"Give to each sheep one spoonful of spirits of turpentine, mixed with two of water, after fasting twelve hours—let them have three doses, staying six days between each dose; this is said to have been used with success, even in cases where the fleece has been nearly gone, and the throat terribly swelled."

SINGLE HORSE CARTS MOST USEFUL.

[From Dickson on Agriculture, vol. I]

A VERY intelligent correspondent, who has paid much attention to the importance of carts in husbandry, found, in constructing single horse ones, that the capacity of waggons was by no means a just rule for them. From those with which he was acquainted, containing in the bed or *buck* ninety-six cubical feet, being twelve feet long, four feet wide, and two feet in depth; it was supposed, that to give one horse the fourth of the load of four, it would only be necessary to give them the space of twenty-four cubical feet, or to make them four feet by three, with a depth of two feet; but it was soon observed that the power of a horse was so much greater in working singly than in a team, that they might be enlarged so as to have the dimensions of five feet one inch in length of buck (or bed of the cart,) three feet seven inches in breadth, two feet in depth, and to contain thrirty-five cubical feet and a fraction, making the proportion of the one horse cart to the four horse waggon as thirty-five to ninety-six—more than one to three. This places in a striking point of view, the advantage such small carts have over large ones in the quantity of work performed. The great superiority of these carts is rendered still more obvious and striking by the observations, "that two horses with single horse carts will draw as much as three horses with one cart; that a common carrier at Carlisle who many years employed a waggon, has laid it aside, and now uses single horse carts only; as he finds he can, by these means, carry much greater weights."

It is likewise supposed, that the superior goodness of the roads in Cumberland, may be ascribed to the general use of single horse carts; and that wherever waggons are employed they are the destruction of roads, especially where the country is hilly, and where they are under the necessity of having the wheels locked, as in such cases the ground is in a manner ploughed up by them. The same objections are equally strong against large and heavy carts, as they produce the same bad effects, only in a somewhat less degree.

It is, in short, strongly contended that waggons cannot be advantageous to the farmer, since the same number of horses with single horse carts will draw much more than when yoked six or eight together. Besides, it is conceived that single horse carts are superior on other grounds; they are loaded and unloaded with greater ease and convenience, and are more handy for almost every purpose, and six or eight of them may be managed by a man and a boy at very little expense.

In these carts too, the size of the wheels can be adapted with the greatest exactness to the height of the horses, and be placed with more convenience in regard to the centre of gravity of the load, by which the draught is considerably lessened.

In fact, the Cumberland farmers, and those of some other counties, are fully convinced that very great advantages are derived from using carts of the single horse kind. This sort of cart has lately been compared in many different points of view by an accurate observer, and found in almost every instance to be greatly superior to waggons or tumbrils for almost all the various purposes of the farm.

CAUSES OF THE DRY ROT, AND THE VARIOUS METHODS OF SEASONING TIMBER, CONSIDERED.

[Our readers are referred to the third number of our last volume, for an account of some experiments. made under the direction of the Board of Agriculture, to test the efficacy of a new method of seasoning timber, proposed by Captain Layman, of the British navy. We have seen no further notice of it except what appeared in the Quarterly Review for October, 1814. From this article we learn that the invention of Captain Layman has received no countenance from the Admiralty and Navy Boards, and the author as little from the Reviewers. We have extracted from the Review of Captain Layman's *Exposé*, the following interesting article on the causes of the *dry rot*, and the means of preventing its ravages.]

It is an undoubted fact, that the duration of ships of war, and particularly those of the line, has of late years been very much shortened. They have died prematurely of a new disease—new, at least, with regard to them,—known by the name of the *dry-rot*, which we have supposed to originate in green timber, but which, having once planted itself, spreads its seeds and roots equally over green and dry, rotting and decomposing the fibre of the wood wherever it fixes itself.

The origin of this destructive disease is not, if our conjecture be right, difficult to be traced. We know not as yet precisely what is the supposed fluid matter called the *sap* of trees, nor by what laws it is propelled from the roots to the highest extremities: but that a circulation of something does take place has long been known and confirmed by direct experiment.

It is this circulation, moreover, as it would seem, that communicates new life to the vegetable principle; that creates in its ascent buds and leaves, flowers and fruit, all of which die away and disappear when it again descends. Whether it be the acids or the oils, the resins or the gums, or all or none of them, that are thus put in motion, or whether it be some gaseous or other subtle and volatile fluid, which at the proper season resuscitates the vegetable life, remains yet to be discovered. It is pretty clear however that whatever that power may be, which thus stirs up and calls into new life the active principle of vegetation, it does not cease altogether from the moment that the tree has been cut down and separated from the parent root. Every one knows that the trunks of elm trees, for instance, cut down in the spring of the year, if the bark be suffered to remain on them, will push out leaves and small shoots the following spring along the whole length of the trunk; the sap that was in the wood at the time of felling, impelled by the genial influence of the season, begins to circulate, puts the living principle in action, opens the pores of the wood, and makes a last and feeble effort at vegetation.

This simple fact, which could not escape common observation, must have led to the conclusion that winter felled timber, when the sap was supposed to have descended into the root or the ground, would not possess the same tendency to vegetate; and that if the bark was stripped off in the spring while the tree was standing, so that the sap could not rise, or rise but imperfectly, and left in that upright posture till the winter, the tendency to vegetation would be still further repressed; the fluid parts would subside; the fibres of the wood collapse; and the timber become more compact, solid, and strong; or, in other words, would at once be seasoned, and not liable to throw out those abortions of vegetation, those excrescences which form the lowest class of vegetables, and which, by some extraordinary process communicated to the wood, infect it with the disease above-mentioned; a disease which seems to act by depriving the wood of all moisture, and so completely decomposing the fibres, that, though in appearance sound, it crumbles between the fingers into a mass of impalpable powder.

We are fully aware that different opinions are entertained as to the origin of the dry rot, many contending that this disease will as readily attack timber, however long it may have been seasoned, when exposed to damp and confined air, as it will seize upon green timber. We are not of this opinion; and we are borne out, as we think, in our theory of the dry-rot being produced originally by the natural juices of the wood being brought into action, from the circumstance of the different genera of *fungi*, which are found to infest different kinds of timber. Mr. Sowerby, who was employed by the Navy Board to examine the Queen Charlotte, a new ship in a complete state of dry-rot, found the most prevalent of the parasitical vegetables which occasions the disease, to be the *xylostroma giganteum*, a gigantic leather-like fungus peculiar to oak, and known therefore, in common language, by the name of *oak-leather;* but he found also the *boletus hybridus*, being the young state of the *boletus medullapanis*, or white, ragged, soft fungus and *auricularia pulverulenta*, and some others, among which the *boletus lachrymans* was the most scarce, although this last fungus is that which mostly infests houses and other buildings. Now, as the Queen Charlotte was injudiciously built of a mixture of English oak, and American oak, of English fir and American pitch-pine, this assemblage of different sorts of timber will, we think, account for the different kinds of fungi found in that ship. In general, however, the *xylostroma giganteum* may be considered as the cause of dry-rot in ships, and the *boletus lachrymans* in houses, the former being the parasite that feeds on oak, the latter on fir.

It may fairly be inferred then that as different timber produces different kinds of fungus, there must reside on each kind of timber its peculiar moisture, and that mere wetness or damp could not produce a different vegetable on dry well-seasoned oak and other kinds of timber when exposed to such damps. It has been hinted to us, that fungi may be the *effect*, and not the *cause*, of rotten timber; as the fungi which form the mould of cheese are the *consequence* of previous rottenness, and not the *occasion* of it. We *doubt* the correctness of the fact with regard to cheese, and are rather inclined to believe that, if a cheese in a perfect state of soundness, be placed in a close damp cellar, it will very soon be covered with fungi, and long before the least tendency to internal rottenness has taken place; and with regard to timber, we *know*, for we have *seen* that in the *Mulgrave*, the *Barham*, the *Poictiers*, the *Dublin*, the *Sterling Castle*, *cum multis aliis*, whole planks, timbers and beams were covered with a sheet of fungus, while the wood was still perfectly sound; though it is still well known, that if not speedily removed, and a free circulation of air admitted, the *consequence* would be, a total decomposition of the fibres, either from some power possessed by the fungus of extracting the juices of the wood, or of occasioning some fermentative process within; and while the surface of the timber would still retain a smooth and sound appearance, the internal part would be reduced to a mass of dust and rottenness.

We have already had occasion to distinguish the *dry* from the *wet* rot; the latter has nothing to do with fungus, but is occasioned by alternate exposure to wet and dry; it is slow and gradual in its progress, and rather separates than decomposes the fibres of the wood.

Another circumstance may be mentioned in corroboration of our theory. The more *sappy* timber is, the more it is subject to be infected with fungi and the dry-rot; thus all the timber brought from the *forests* of Germany, of which the Antwerp fleet has been built, is remarkably subject to the dry-rot; so is all the timber that is brought from the *forests* of America; whereas the timber of trees that grow in exposed situations, as on the sides of hills and commons, and hedge-rows, being more compact, and less sappy, is less subject to this fatal disease. Soil and climate have also, no doubt, considerable influence on the nature of growing timber; the farther south oak grows, the better the timber would seem to be; the oak on the bold shores of the Adriatic is the best oak known in Europe; and the oak timber which is produced in the southern counties of England is preferred to the timber of the northern counties; that of Sussex being considered as the best. In a contract for tree-nails, drawn up more than a hundred years ago, it is stipulated that they should be made of 'good Sussex oak, free from knots and shakes.'

All these points are of great importance to be ascertained, and we know of no one so well qualified for the purpose as Mr. Sowerby, who has had more experience of the nature and habits of fungi, and of their ravages wherever they fix themselves on timber, than any other person we have heard of; and his ideas we understand, with regard to the seasoning of timber, accord very much with those of the officers of his Majesty's dock-yards, who have attended to this most important subject.

There can be little doubt that the custom of felling timber trees, except the oak, in winter, arose from a conviction that, when the sap has subsided, the timber is more compact. The exception of the oak from this general practice must have arisen entirely from the value of its bark and the facility of stripping it off for the purposes of tanning, while the sap is in the act of rising; and to this circumstance alone can be attributed the statute of the 2d James I. which prohibited the felling of oak trees when bark was at a given price, unless between the first day of April and the last day of June: with the exception however, of such oak timber as was meant to be employed in the building or repairing of houses, ships or mills—an exception which points out very clearly what the opinions were of our ancestors with regard to the superior quality of winter-felled timber. This opinion has, in fact, been confirmed by the ingenious experiments of Mr. Knight, who ascertained that the alburnum or sapwood of trees felled in the winter is more firm and tenacious in its texture, and consequently more durable, than that of the same kind of wood which had been felled in the spring.

Doctor Plott, who wrote about 130 years ago, mentions a practice in Staffordshire of stripping the bark of their oak trees about May, while standing, and when the sap was beginning to flow, and of felling them about Michaelmas. In Mr. Evelyn's book are some papers on this subject: and on the recommendation of Mr. Pepys, secretary of the Admiralty to James the Second, that monarch issued his royal warrant to the Commissioners of the Navy, directing them to cause to be stripped in the spring and felled in the ensuing winter, one hundred and fifty oak trees in Bushy park, fit for naval purposes. The result of the experiment is not known; though there is little doubt that, able and active, exact and laborious as Mr. Pepys was, the record would be found in his numerous manuscript volumes, now shut up in the Pepysian library at Cambridge, but which ought unquestionably to be lodged at the Admiralty, among the records of that department.

The papers of Pepys, of Plott, and Evelyn, induced the French naturalists, Buffon and Du Hamel, to undertake a set of experiments on the barking of trees in the spring, and leaving them to stand during the summer to season; by which process Buffon pronounces the timber to acquire additional compactness, weight and strength, and consequently greater durability. And it is laid down (in the *Histoire Générale de la Marine*, published in 1758,) as a criterion to determine the quality of oak timber—that, to be good, it should be felled when the moon is at the full, and the wind north; and that it is sure to be bad, if cut at new moon, and when the wind blows from the south.*

In England, the subject has not met with that attention which it so evidently deserves. Dr Plott says the Royal Sovereign was built of winter-felled timber, and speaks of its uncommon hardness; but there is no evidence of this fact. The first experiment we know of was that of building the Montagu of winter-felled timber, as we mentioned in a former Number, by order of Lord Sandwich; this ship was launched in 1779, and we do not find that she required any repair for ten years afterwards, and, indeed, she is yet a good ship.

It is the less surprising that the durable quality of this ship should not have attracted the attention which might be expected, when it is considered that the experiment was made when the ordinary duration of ships was calculated at eleven or twelve years, before they required much repair; but we own it does appear rather unaccountable that none of our builders, either public or private, should have felt the advantage of deviating from the ordinary routine, or that a mere spirit of curiosity should not have induced them to put to the test of experiment the comparative quality of oak timber felled in the winter when the sap was down, with that of the same age and from the same forest felled in the spring when the sap was rising. In France, where 'they order these things better,' they not only felled their oak trees when the 'wind was at north' and 'in the wane of the moon,' but by a royal ordinance of the year 1669, the time of felling was fixed from the first of October to the fifteenth of April. But Bonaparte, satisfied by the reports of the Sçavans, that 'ships built of timber felled at the moment of vegetation must be liable to rapid decay, and require immediate repairs from the effect of *the fermentation of the sap* in those pieces

* Hist. Gen. de la Mar. tom. iii. planche I. p. 282, de l'Archit. Nav.

which had not been felled at the proper season,' issued a circular order, 'à M M. les Agens Forestiers,' that the time for felling naval timber should be abridged, and that it should take place 'in the decrease of the moon, from the first of November to the fifteenth of March.'*

The late miserable failures in all the ships of the line launched from merchant's yards, to which recourse was had from the low state of the navy, and the inadequate means afforded by his Majesty's dock yards to raise it to its proper pitch, have revived the subject; and it is satisfactory to learn that the Commissioners of the Woods and Forests of the crown are instituting inquiries into this interesting question, and conducting experiments on an extended scale. It is high time, indeed, that a question so intimately connected with the vital interests of the country should be finally decided.

To destroy this vegetable principle in timber, which, as we have observed, is called into action long after the tree is cut down, a variety of experiments have been made on a small scale; but they have either not been applicable to large naval timber, or if applicable, have for the most part failed of success. They have consisted generally in the impregnation of the timber with oils, salts, acids, or in coating its surface with paint or lime, or bringing it to a state of seasoned timber by the application of heat, either by stoving it in close kilns, or by steaming or boiling it.

The application of oil was probably suggested from the known quality which this fluid possesses of killing living plants, as it does insects, by filling up the pores and excluding the circulation of air, or other fluids; or rather perhaps from an observation that ships employed on the whale fishery were never infected with the dry rot. The application of oil in a large way would, we conceive, be both expensive and inconvenient, and not improbably ineffectual; for as the question applies only to *green* timber, of which the vessels are already occupied by its natural juices, the absorption of oil could only take place in a partial degree.

The same objection would seem to apply to the steeping of timber in saline solutions, or the various kinds of acids, as we

* Instructions de l'Administration addresseés á M M. les Conservateurs, 6 Août, 1803. Circulaire du premier Février, 1811.

cannot see in what manner they could be made to impregnate the whole mass, unless the natural juices were previously driven off. Acids would, besides, very speedily corrode the whole of the metallic fastenings. But there is another and more weighty objection to such impregnation. The attraction for moisture which salts and acids possess, would keep the whole interior part of the ship dripping wet, like the bannister rail of a stair case on a moist day succeeding a frost, and not only destroy the ship with the *wet*-rot, but the ship's company also, whose health experience has proved to be best preserved by keeping the ship as dry as possible—the remedy in this case would be infinitely worse than the original disease.

As to coating over the surface of unseasoned timber with paint, washing it with a solution of lime, &c. little benefit, we apprehend, would be obtained from such a process. By excluding the free circulation of air, the vegetable process carrying on within the timber would be more likely to be encouraged than suppressed; and if it be true, as we have heard it asserted, that vessels carrying coals and lime are not subject to dry-rot, this exemption, we apprehend, ought to be ascribed rather to the frequent exposure to the air of the interior surface of the ship, and the absorption of moisture by the articles brought in contact with it, than from any particular virtue inherent in either coals or lime, by which the ship's timbers are supposed, erroneously we think, to be impregnated. It is the smallness of the timbers of which coasting vessels are constructed, and which renders a long seasoning unnecessary, aided by the thinness of the planking and the large open spaces between the timbers, through which the air can freely circulate, that preserves them from the dry-rot; from which they will be found equally free, whether they are employed to carry coals or lime, or cargoes composed of sundry articles.

Few persons, we believe, have given more attention to this important subject, or made more experiments on the rapid seasoning of green oak timber, than Mr. Lukin, though as far as we can learn, they have all ended in disappointment. He conceived that if the gallic acid and the watery particles were driven out of a piece of oak timber, by a process which should prevent the surface from splitting, the timber would contract its dimensions by the fibres being brought closer into contact, lose much of its original weight, and gain additional strength. With this view he buried a log of green oak in pulverized charcoal, placed in a stove or oven. When the process was completed the log had a very promising appearance; the surface was close and compact, the log had considerably contracted its dimensions, and lost a great part of its weight; but when the saw was applied to divide it, the fibres within were found to have started from each other; and a plank cut from it exhibited a fine piece of net work, ramified and reticulated precisely like the inner bark of a tree;—in fact it was completely shaken in pieces, and of course utterly worthless.

Mr. Lukin, however, learned something from the failure of this experiment. He now conceived that if he could by any means contrive, in dissipating the aqueous or other fluid matter of the wood by heat, to supply its place with an oleaginous fluid, he should not only destroy the vital principle of vegetation, but keep the fibres together and accomplish the desired purpose. With this view he got permission to erect a huge oven or stove in Woolwich yard, capable of containing two or three hundred loads of timber: on the outside, at the two ends of the building, were erected two large stills or retorts, in which the dust of the pitch pine was submitted to distillation. From the heads of these stills ran iron pipes, perforated with holes like a cullender, which passing through the walls into the building, were continued along the upper part for the whole length. The stove or kiln was kept up to a certain degree of heat sufficient to cause the fluids of the timber to pass off by evaporation, but not so high as to rend the logs. The oily matter distilled from the saw dust, and resembling weak oil, or rather spirit of turpentine, in passing along the iron pipes dropped through the holes upon the wood beneath, and was immediately absorbed by it; and thus, it was conceived, filled up the vacant pores from which the aqueous matter had been expelled;—when the transfusion was supposed to be complete, it was intended to stop the process.

The idea was ingenious enough, though we doubt the efficacy of the experiment; before however the process was completed, an unfortunate explosion took place which killed six men, and wounded fourteen others, two of whom died afterwards of their wounds; three of the former and most of the others were struck at the distance of sixty feet from the seasoning house.

The explosion was like the shock of an earthquake; it threw down seventy two feet in length of the dock-yard wall of three bricks thick, a part of which was driven to the distance of 250 feet in an adjoining field; in the same field it threw down a house. An iron door, weighing 280 pounds, was thrown to the distance of 230 feet; another of the same weight, in its passage through the air, knocked down a chimney and fell at 190 feet distance; the bricks and sticks of the building were hurled in every direction to the distance of 300 feet. This melancholly accident was supposed to be owing to the flame making its way at the part where the flue entered the building, and set fire to the mixture of hydrogen and oxygen gases contained in it. It is hardly necessary to add that this fatal experiment has not been repeated.

Of all the methods which have been tried for the artificial seasoning of timber, none, we believe, will be found so effectual and in every way so little objectionable, as that of boiling in water or steam—the latter, perhaps may be considered as too penetrating and injurious to the fibre; but the former has long been practised, though with other views than that of preventing dry-rot; namely, to bend the piece more easily to the required curve: all the thick planking, for instance, near the bows of a ship, are first boiled in a stove before they are applied to the timbers. It has recently, however, been discovered, as we understand, that fungus will not grow on a piece of timber that has been so boiled. The experiment is easily made; take a green piece of wood, saw it into two pieces, and after boiling one of them for twenty-four hours, place both in a close warm cellar. The unboiled piece will, in a very short space of time, be covered over with a coat of fungus, and if the other remain untouched, the effect of boiling is decisive; and the rationale of the experiment is too obvious for us to dwell upon.

We are, however, decidedly of opinion, that nothing but *time* and a judicious arrangement of the timber stacks, such as will keep them as much as possible from wet, and suffer the air freely to circulate through them, will give an effectual seasoning to oak timber on a grand scale, so as to answer all the demands for that article which the British navy requires. Had all our ships of war been built of timber with a seasoning of three or four years, we should not have heard so much of the ravages committed by the dry-rot, nor of so many ships being unfit to keep the sea after two or three years, and sometimes as many months, from the time of their launching. Ships of this kind are not likely, however, to be brought hereafter into the national navy. We have paid somewhat dear, it is true, for experience; but as 'bought wit' is said to be the 'best wit,' it is to be hoped that we shall profit from it; and, in that case, we may safely predict that a ship of the line never will henceforwards be launched in this kingdom from a merchant-builder's yard.

MANAGEMENT OF FRUIT TREES.

BY EBENEZER PREBLE, ESQ.

[To the Corresponding Secretary.]

Boston, *January* 22*d*, 1816.

SIR,

By a vote of the Trustees of the Massachusetts Society for promoting Agriculture, I observe, each member is requested to furnish some original article, or one selected, to be inserted in their next agricultural report. As no part of the horticulture of our country is more neglected, or less understood, than the management of fruit trees, I shall submit some remarks on that subject, for the consideration of the publishing committee; and describe the manner in which I have managed my own trees, with success. Although similar methods have for some years been practised in Europe, we have but few instances of this mode of culture in this section of the United States.

The apple and pear tree will, at this time, be the subject of my communication, as producing the most valuable fruit. They give food in various ways, and liquors superiour to any other we have. The general adoption of these would preclude the use of ardent spirits, which tend to impoverish the people, and injure their morals. Trees crowded with wood, and enveloped with suckers, are as unpleasant to the eye, as they are injurious to the quality and quantity of the fruit they produce. We frequently observe old trees, with holes in them, particularly the apple; they are caused by neglect, or injudicious pruning.

Limbs are frequently broken by the wind, and suffered to remain in that state until decayed—the farmer generally makes use of a hatchet or axe in pruning—limbs are cut at some distance from the body of the tree, and the stump not having aid from the sap, soon decays; which decay is facilitated by the rough surface caused by the instrument. It then serves to conduct water to the body, and there being no outlet for it, the tree decays, and is left with only a shell of wood and bark, and is then subject to be blown down by high winds.

The culture of trees has for some time engaged my attention, and has been my favourite pursuit. I have been averse from making a public communication on this, or any other subject; but the solicitations of my friends have induced me to make known the result of my experience, however inadequate I may feel to give general directions in this branch of culture.

I shall communicate the manner in which I have succeeded with more than one thousand of my own trees, and I presume their present condition will justify the mode I describe. I prefer the autumn to the spring for planting my trees. As soon as the foliage is off I remove them—the holes should be dug much larger than usual for their reception; the roots carefully pruned; the matted fibres cut off, as they would mould and decay, and prevent new ones from shooting—the long large roots should be shortened, to induce them to throw out new fibres; all broken and bruised parts should be removed. Care should be taken not to plant too deep—the roots should be extended, and spread in a horizontal direction—all top, or perpendicular ones, if not sufficiently elastic to conform to the others, should be cut off. It is preferable to raise the ground, and plant the tree high, rather than to suffer the root to shoot into the dead earth—deep planting retards the growth, and injures the fruit. Some well rotted manure mixed with top soil should be placed round the roots, the earth carefully pressed with the fingers, or a pointed stick, so that every vacancy may be filled, and that the earth may come in contact with all the fibres, without changing the position of the roots If the ground is not moist, they should be watered at the time of planting. If they are set out in grass land, the ground can be made loose with an iron bar round the holes, a few inches from where the ground is broken; this will assist the roots when they extend.

The advantage of fall planting is, that the ground will settle round the roots previous to the frost setting in, and be prepared to shoot in the spring, aided by the rains which prevail at that season. In this case, few will be lost. If planted in the spring, the drought and heat of summer will injure, if not destroy them, before the roots find their place; the farmer also has more leisure in the autumn, and the ground is in a better state to receive them.

Staking trees to secure them, I do not approve; they are frequently chaffed, unless well guarded with matts. As a substitute, I raise the ground a few inches above the level, round the trees, to keep them steady, and protect them from frost, leaving it hollow in the centre, to retain the rain and preserve moisture. When the tree has taken root the earth can be removed to its original situation.

The most approved distance to plant an orchard of apple trees, is forty feet in every direction. A less distance would answer for pears. The land can then be improved for other agricultural purposes. In grass land the soil can be cultivated round the trees with potatoes.

In pruning, all suckers should be grubbed up about the roots, and cut from the body of the tree, and the wood so thinned as to admit the air freely to pass. Every branch should have room without coming in contact witheach other; this will prevent their chaffing; sufficient bearing wood will then remain, to produce more, and better fruit.

Many of the branches of young trees may be separated with crotched sticks, with matts to protect the bark. The head can be formed with strings, fastened to peices of refuse leather, from three to six inches long, as the size of the branch may require, and about one inch wide, with holes in the ends; the strings secured to the leather, may be extended to stakes driven into the ground, and the limbs brought down to a horizontal direction. In this position, more fruit will be produced, and the trees opened without mutilating them.

The only tools necessary for pruning are, a saw with the teeth set wide, a chisel, and knife. All large limbs should be cut close to the body of the tree, or to a strong leading shoot that will draw up the sap. Smaller branches should also be pruned to a bud, and if the wood is made a little concave, it will assist the wound in closing. All large limbs should first be cut at a distance from where the limb is to be pruned, as the weight would be unmanageable, and apt, on its separation, to strip the bark. The under part of all branches should first be cut through the bark previous to its being pruned. After a limb has been cut by the saw, make the wood and edges of the bark smooth with some sharp instrument, and immediately cover the part with composition, to exclude the weather and keep insects from the wound.

I have found tar and ochre the best ingredients for a composition, they are not expensive, and are easily procured. Pounded brick sifted, and pulverized chalk, with tar, have been recommended; either of them would answer. Let the mixture be of the consistency of grafting clay, the wood and bark will remain bright under it, and will not obstruct the wound in closing.

The general impression is, that trees must be pruned at particular seasons of the year. I have pruned at all times of the year, without being partial to any, and with the aid of the composition, have been successful.

The injudicious method practised in gathering fruit, is more destructive in its consequences, than is generally understood; the blossom buds for the succeeding year are placed at the side of the foot stalk of the fruit, and if the spurs are broken, no fruit on that part will be produced the next season.

The general method of gathering apples for cider, is, shaking the tree, and thrashing the branches with poles, the former will answer when the fruit is at maturity; they will then drop without injury to the buds. Poles should never be used, but with a hook at the end covered with cloth, or matt, to prevent wounding the bark, they then serve to shake the small limbs. Particular attention is required in gathering winter fruit. They should be taken in the hand, the finger placed at the foot stalk and by bending it upwards the fruit is gathered with ease, and without injury; they should be removed from the gathering basket to the cask prepared for them with great care; if bruised they soon decay, the less they are moved the better. When in barrels they should be placed in a cool, dry, shaded situation above ground, and remain until they are in danger of being injured by frost, and then removed to the cellar.

REMARK ON THE SUPERIORITY OF COMPOSTS TO SIMPLE DUNGS.

[Transactions Caledonian Horticultural Society.]

A WRITER in a late Journal remarks, that all dung before being used as manure should be mixed with other substances, and a large heap formed, which should be turned over once or twice before being used. The common way of spreading dung over land, he observes, be it either arable or pasture, can by no means answer the end; for the fertilizing particles of dung being of a volatile nature, are readily exhausted by the action of the sun and air. The use of unmixed dung has been thought to be the best means of improving all lands. Most people think, if they have dung enough, all is well, and vegetation cannot fail of going on. This is especially the case in the repairing of worn out grounds. But with this we can by no means agree. Dung ought to be considered no more than a good ingredient to mix with earth and other sorts of compost.

ON THE IMPORTANCE OF ROTATION OF CROPS IN GARDEN GROUND.

[Transactions Caledonian Horticultural Society.]

GARDEN ground in general, being successively cropped with vegetables very near akin in nature to each other, and from the frequent application of manure, soon becomes a receptacle for worms, maggots, and other vermin, which prove destructive to the roots of carrots, onions, cauliflowers, and other tender vegetables, from which they are always free in new soils, or ground that has never been cropped before with such vegetables. The garden ground at *Errol* has been occupied as a garden for upwards of a century, and consequently is subject, in common with other old gardens, to the attacks of several species of vermin. This first induced me to try to remove this evil by a *rotation of crop-*

ping ; and the most rational method that presented itself was, to follow strawberries that had been four or five years planted, with onions; and artichokes that had stood the same time, with carrots; for the caterpillars do not choose to attack either the onion or carrot. This plan I found to succeed, and I have now practised it with uniform success for nine years.

Cauliflower and brocoli roots may be preserved from the effects of worms by watering the drills well with soap-suds before planting, and occasionally afterwards; this not only prevents the worm, but encourages the growth of the plants, and in some measure prepares the ground for other vegetables subject to the same sort of attack.

IMPORTANT COMMUNICATION RELATIVE TO THE CANKER WORM.

BY W. D. PECK, ESQ.

[To the Corresponding Secretary.]

DEAR SIR, *Cambridge*, 20*th January*, 1816.

In the Centinel of the 25th November last is a notice of the autumnal rising of the canker worms, or rather of the moths or millers which produce them.

It is there stated that this appearance of the insect late in the fall is not generally known. That it is not generally known is much to be regretted; for if the eggs are deposited in the fall, tarring the trees in the spring is in a great measure useless, and the farmer, finding his labour unavailing, will lose his good opinion of the most effectual remedy which has hitherto been put in practice.

It is certainly true that the canker moths rise in the autumn and deposit their eggs. They are such as were an inch or two below the surface; those which lie deeper are not affected by the transient changes of the atmosphere in November, and do not rise till the spring.

The history of this insect, published by the Trustees of the Massachusetts Agricultural Society in 1796, though not absolutely perfect, contains all the most important particulars which are necessary to be known by the agriculturalists. At page 41 of the pamphlet which contains it, is the following paragraph. "The chrysalis state comes on in twenty-four hours after the larva has penetrated the earth, and it appears that the insects are soon perfect, since a course of warm weather has been found to raise some of them from the earth in the month of November."

Those which rise in November are not very numerous, compared with those that rise in the spring; but being very prolific are exceedingly injurious if no means are taken to prevent their ascending the trees; as the winter's frost does not kill the eggs.

The warmth of the season at the time of their descent into the soil is favourable to the perfect development of the insects in the chrysalis, particularly those which are nearest the surface, while those at the depth of six or seven inches are longer in coming to maturity. The first are perfect in September, and require only to be excited, to burst from their confinement; but they cannot be excited till they have passed through a degree of cold sufficient to render them sensible of the mild temperature of the atmosphere which occurs in November. The excitability of such as lie deeper, and are not accessible by cold till a later period of the season, is not so soon accumulated, nor are they sensible of slight changes of temperature which affect only the surface; they therefore do not leave the earth till the spring, when the warmth of the air is longer continued and penetrates to the depth at which they lie.

On the 22d November, I was examining a twig upon which a female moth had just completed her deposit, immediately above a leaf-bud; there were ninety-nine eggs. It was a twig of the sycamore maple, (*hur psuedo-platanus*) and will accompany this letter, with one of the English ash, (*traxinus excelsior*) on which I have since found the eggs of the canker moth.

I do not know whether elms or other forest trees are infested with these insects *remote from orchards.* They abound in the vicinity of neglected apple trees, and the fact of their being found on the maple and ash, which indeed surprised me, as well as the elm, shews them to be multivourous, or at least adapted to feed on a variety of trees, and this perhaps they do to a greater extent than has been suspected. A check to their ravages, or their extirpation, is therefore more earnestly to be desired.

The remedy of tarring was probably first suggested by the structure of the female insect, which, happily for man, has no wings. If this remedy were diligently and universally used, it would very likely rid us of this pest, it must indeed be granted, at a considerable expense. But the negligence of many will countervail the vigilance of a few, whatever remedy may be proposed or discovered.

The tar-bucket and brush are rather out of place in a farmer's establishment, and this may have had some influence in preventing the general adoption of the practice of tarring; but there are particulars in the œconomy of the Canker-worms, which indicate a process, that may very considerably check their increase.

There are many insects of the tribe to which this belongs, which go through their metamorphosis in a slight coccoon attached above ground to the plant they feed on; but many others, like the canker-worm, require to be kept moist, in the chrysalis state: these go into the earth, in which they are kept in a state of pretty equal moisture, by the humidity of the soil. If exposed to the action of the air, which would dry them, they would perish.

While they are caterpillars, they are in their strongest state. Their muscles are much more powerful, the head covered with a hard shell, and the six feet nearest the head, short and robust. They are thus enabled to dig their way into the soil, and the path, if I may so call it, which they make in their descent, remains open, or nearly so, and affords a passage for the ascent of the perfect insect, which, as respects muscular power, is in the weakest state of its existence.

These particulars suggest two operations, either of which alone would be beneficial; but united, almost effectual.

1*st*. Turning up the ground carefully in October, as far as the branches of a tree extend, to half a spades depth or five inches, so as completely to invert the surface. A great number of chrysalids would thus be exposed to the air and sun, and of course destroyed.

2*d*. Breaking the clods and smoothing the surface with a rake and passing a heavy roller over it, so as to make it very hard and without cracks.

By these two operations every vestige of their downward path would be completely obliterated, and if any remained undisturbed below the stratum of earth which has been turned up, they must remain there, as it is utterly impossible for them to orce their way in the moth or miller state, though such an obstruction as this layer of earth would oppose to them.

In grass grounds the sods should be turned with the grass side down, and placed side by side, so as to be rolled; the earth from which they were taken should be loosened and rolled also.

It is probable that with this treatment no moths would rise in the fall. The winter's frosts would heave and crack the smooth surface, but it might be smoothed and hardened by the roller or other means, in March, with much less trouble, time and expense, than the long course of tarring requires.

As lime when slacked is reduced to an impalpable powder, and is thus well adapted to close the least openings in the surface to which it may be washed by rains, I am inclined to think its good effects are produced in this way, as well as by its caustic quality.

I present you these hints, sir, but have no experiments in point to relate.

I intend to try this practice the next year, though I am not favourably situated for the purpose; as there are in this vicinity numerous apple trees which are totally neglected.

APPLE TREES.

[European Magazine,—1815.]

It is a general complaint, that the finest apple trees of this country have degenerated, and that many of the best sorts have entirely disappeared from our gardens and orchards. It would not be difficult to show that every successive grafting deteriorates the fruit engrafted; or to point out an effectual method of retaining good apples in this country without the trouble of grafting, as in every perfectly ripe apple there will be found one and sometimes two round seeds; the others will have one or more flatted sides. The round ones will produce the improved fruit from which they are taken, and those with flatted sides will produce the fruit of the crab upon which the graft was inserted. It requires not a long time to ascertain the difference; for if a circle is drawn in rich ground, and the flat-sided seeds planted therein, and the round seeds in the centre, the variation of quality will be discovered in two or three years. The first will throw out the leaves of a crab, and the latter the leaves of an improved tree, distinguished in shape and fibre, and with a woolly appearance; and in due time the fruit of each will put every thing beyond doubt. It is to be observed that the seeds of crabs (being originals) are mostly if not altogether *round.*

HOTCHKISS' STRAW CUTTER.

THE machine for cutting straw and corn-stalks, invented by Mr. Elihu Hotchkiss, of Brattleborough, Vermont, is recommended to the public by the Trustees as the *best* and *cheapest* machine for the purpose, known in this country. The Society's premium of *seventy-five dollars* has been paid to the inventor, and to aid in introducing it into general use, the Society has purchased the patent right for the state of Massachusetts. The only further concern which the Trustees think incumbent on them is, to ascertain what should be a fair price for the machine; to prevent, as far as may be in their power, the cost of the machine being an obstacle to its use. The machine forwarded to the Board by Mr. Hotchkiss, was valued by him at twenty-five dollars, the patent right included. A machine of the same dimensions made in Boston, would cost not less than thirty dollars, nor exceeding thirty-five dollars.

It is desirable that the expense should not be so great as that any present inconvenience shall be felt in meeting it; as from this cause we become insensible and indifferent, often, to the benefits of valuable improvements, and their general adoption is thereby retarded or altogether prevented. We could name a number of instances in which labour saving machines, for farming purposes, have been confined to a few large farms, although as well adapted for use on farms generally, and attended with much real saving. In such cases the only apparent cause has been the expense of the first cost of the machine; and yet the diminution of labour in the employment of such a machine, would have amounted in many instances to as much, in one year, as the machine cost. The Trustees can do no more than *recommend* improvements. The rewards they bestow on useful inventions are designed, not so much to reward the successful ingenuity of the inventor, as to simplify the operations of husbandry and enable the farmer to accomplish his work with less labour, and thus increase the sum of his profits.

Reference to the Engraving of Mr. E. Hotchkiss' Straw Cutter.

[See plate.]

THE length of the frame as seen at *Fig.* 1, is *four* feet. The frame is denoted by the letters A, A, A, A. The front posts as seen as *Fig.* 2, and which support the iron crank, E, are *four* feet high. Short posts at the opposite corners as seen in *Fig.* 1, *two* feet *eight* inches.

Distance between the side rails in the frame *eleven and an half* inches.

The trough B, *Fig.* 1, which contains the straw to be cut, is *five* feet in length, and breadth *one* foot *three* inches.

C, C, *Fig.* 4, Cog wheels attached to the cylinders L, L, as seen *Fig.* 1. Cog wheels *eight* inches diameter including teeth—teeth *two* inches in length.

D, *Fig* 1, Wheel by which the motion is communicated to the cylinders—*two* feet diameter.

E, Iron crank as seen *Fig.* 2 and 5.

F, *Fig.* 2, Large wheel *three* feet diameter, with a handle fixed into one of the spokes for the purpose of turning by hand.

G, *Fig.* 2 and 6, The arm by which the slide containing the moveable knife is set in motion.

H, *Fig.* 2 and 3, Slide, with the principal knife attached diagonally. Length of this frame *two* feet; width, *one* foot *five* inches.

I, Principal knife with two edges, upper and lower, *seventeen* inches long and *two* inches wide.

J, *Fig.* 2, Ends of the straw in the trough, appearing from between the cylinders.

K, K, *Fig.* 2, The two set knives *one and an half* inch in breadth. Distance between the knives *two* inches.

L, L, *Fig.* 2 and 3, Cylinders, *five and an half* inches diameter. These by their motion draw on the straw from the trough, presenting it to the knives.

M, at *Fig.* 1, Is a wooden spring, the use of which is to compress the cylinders, resting against the axle of the inner one.

N, at *Fig.* 2, Cleats with rabbets corresponding to rabbets in the frame posts, within which the knife-slide plays.

Fig. 3.

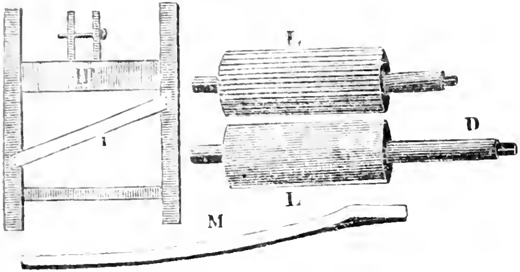


Fig. 4.

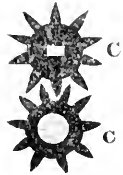


Fig. 6.

Fig. 5.

Fig. 2.

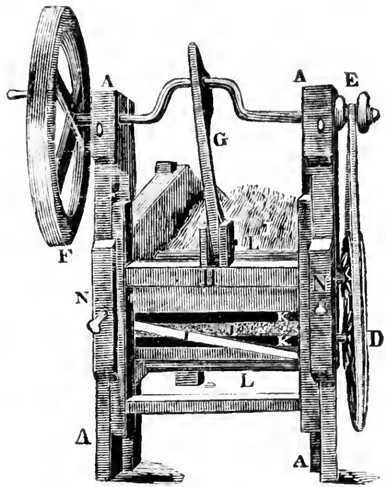
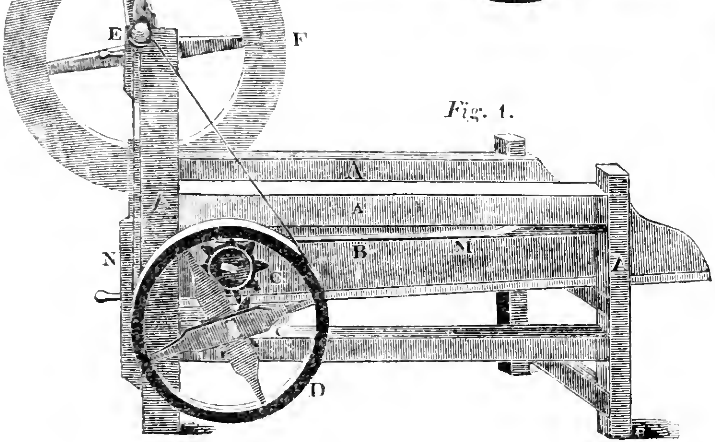


Fig. 1.



REMARKS FROM "MALTHUS ON POPULATION."

It is for those who are at the head of society to dertermine by their influence and example, whether a country shall go on in its natural course of progression in plenty and prosperity,(for its numbers will increase in proportion to the means of subsistence,) or whether by neglecting its natural resources, that course shall be checked.

If the population of a country outrun its means of raising or acquiring subsistence, it must unavoidably be checked by scarcity or emigration: for such is the inevitable law of nature to level the population with the food of the world.

Other circumstances being the same, it may be affirmed that countries are populous according to the quantity of human food which they produce or can acquire; and happy according to the liberality with which this food is divided; which is measured by the quantity which a days labour will produce.

As the strength of countries depend in a great degree upon their numbers and population, and consequently upon the degree of improvement and most perfect cultivation of the soil, it is therefore both the interest and duty of those who have the power, to use every means of promoting such improvement, thereby increasing the strength and security of their country.

But those who by their situation are exempt from bodily labour, have duties equally pressing and serious to perform; some must think and others act; the class immediately above the labourer must find capital or form plans, and inspect and assist in their execution; and they have it in their power by example, authority and influence to introduce and give effect to plans for increasing the subsistence and consequent numbers in a community, to better the condition of the lower classes of society, increase the general and individual happiness, and to add to the resources importance, strength and security of a State.

MISCELLANY.

Composition of an Unchangeable Cement.

BY M. THENARD.

[Repertory of Arts, &c. London, 1815.]

THE following cement has been used with great success in covering terraces, flat roofs, lining basins, soldering stones, &c. and it every where resists the filtration of water; it is so hard that it scratches.

It is formed of *ninety-three* parts of well burnt brick or clay, and *seven* parts of litharge and of linseed oil. Nothing can be more simple than its composition, or the manner of using it. The brick and litharge are pulverized, the latter must always be reduced to a very fine powder; they are mixed together, and enough linseed oil added to the mixture, to give it the consistence of thin plaster. It is then applied in the manner of plaster, the body that is to be covered being always previously wetted with a sponge. This precaution is indispensable, otherwise the oil would filter through the body, and prevent the mastic from acquiring the desirable degree of hardness. When it is extended over a large surface it sometimes happens to have flaws in it, which must be filled up with a fresh quantity of the cement. In three or four days it becomes firm.

Method of Preserving Fruit.

AN English Journal recommends the use of dry pit sand, for preserving pears and apples. Glazed earthen jars are to be provided, and the sand is to be thoroughly dried. A layer of sand an inch thick is then placed in the bottom of the jar; above this a layer of fruit, to be covered with a layer of sand an inch thick; then lay a second stratum of fruit, covering again with an inch of sand. An inch and an half of sand may be placed over the uppermost row of fruit. The jar is now to be closed and placed in a dry airy situation, as cool as possible, but entirely free from frost.

Clay Paint to destroy Insects, &c.

A CORRESPONDENT of the Caledonian Horticultural Society recommends *clay paint* for the destruction of insects and the mildew on fruit trees. The instructions are, that you take a quantity of the most tenacious brown clay that can be obtained; diffuse it among as much soft water, as will bring it to the consistence of thick cream or paint; pass it through a fine sieve or hair-search, so that it may be made perfectly smooth and unctuous, and free from any gritty particles. With a painter's brush dipped in the clay paint go carefully over the whole tree, the young shoots not excepted. This layer when it becomes dry, forms a hard crust, which, enveloping the insects closely, completely destroys them, without doing the smallest injury either to the bark or buds.

I have for several years past applied the clay paint to the buds of my grape vines. The advantage to them seems to arise from the clay retaining the moisture upon the shoots and buds for a greater length of time, when watered with the syringe, by which the buds are always kept in a kindly state of moisture.

From the simplicity of the above method, I doubt not there are many who may not think very highly of it; but all I request is, that a fair trial may be given to it. I have had the pleasure of seeing it very generally adopted in my neighbourhood by gardeners, who ridiculed it at first.

The syringe I use has brass noses fitted to the end, with holes of different degrees of fineness, so that water may be thrown in large streams or as fine as dew.

ANNUAL CATTLE SHOW,

AT BRIGHTON, IN THE COUNTY OF MIDDLESEX.

The Trustees of the Massachusetts Society for promoting Agriculture, taking into consideration the importance of improving the breed of domestic animals, and influenced by the example of enlightened societies in all parts of Europe, who have established annual exhibitions of such animals, and encouraged the cultivators to produce them by suitable rewards, and wishing as far as possible to fulfil the expectations of the Legislature of this Commonwealth who have liberally patronized this institution, have determined to establish an *Annual Show of Cattle* in a situation, and at a season of the year, the most convenient for the citizens at large.

They have therefore adopted the following regulations, of which the Farmers throughout this State will please to take notice ; and in order to save trouble to the Trustees and themselves, they will conform thereto, whenever they may see fit to become competitors for the prizes.

I. The annual show of cattle patronized by this society shall take place at Brighton on the second Tuesday in October in every year, the first to be exhibited on the second Tuesday of October 1816.

II. In order to assure to the competitors the most perfect fairness in the distribution of the Premiums, the Trustees will nominate three judges from among their own members, and two other gentlemen well skilled in such subjects to be joined with them ; the decision of a major part of whom shall be final and the premiums shall be paid accordingly.

III. The Premium shall be divided into two classes, with respect to each description of animals, in order to encourage those who, having failed to attain the first premium, may yet be entitled to some reward for their exertions.

IV. The object or animals for which premiums shall be awarded, and the rates of such premiums, shall be as follows, viz.

1. To the person who shall produce the finest Ox fitted for slaughter, of not less than thirteen hundred pounds weight, *forty dollars*, or a *silver cup* of equal value, at his option, which cup shall be ornamented with a suitable inscription.

2. To the person who shall produce the next best Ox fitted for slaughter, *twenty dollars*, or a *silver cup* of like value.

3. To the person who shall produce the best pair of working Oxen, *forty dollars*, or a *silver cup* of equal value.

4. To the person who shall produce the next best pair of working Oxen, *twenty dollars*, or a *cup* of equal value.

5. To the person who shall produce the best Bull, having regard to his size, form and other qualities, *thirty dollars*, or a *silver cup* of equal value.

6. To the person who shall produce the next best Bull, having regard as aforesaid, *twenty dollars*, or a *silver cup* of equal value.

7. To the person who shall produce the best Milch Cow, with the requisite proofs of her goodness as to quantity and quality of milk, *twenty dollars*, or a *silver cup* of equal value.

8. To the person who shall produce the next best Milch Cow, *fifteen dollars*, or a *silver cup* of equal value.

9. To the person who shall produce the best Merino Sheep, not less than five in number, whether rams or ewes, having regard to their forms and fleeces, *forty dollars*, or a *silver cup* of equal value.

10. To the person who shall produce the next best Merino Sheep, being at least five, *twenty dollars*, or a *silver cup* of equal value.

11. To the person who shall produce the best native Sheep, whether rams or ewes, being at least five, having regard to their size, form, quantity and quality of fleece, *ten dollars*, or a *silver cup* of equal value.

12. To the person who shall produce the best Swine, not less than *two*, and not less than one year old, *ten dollars* or a *silver cup* of equal value.

13. To the person who shall produce the next best Swine, not less than *two*, and not less than one year old, *five dollars*, or a *silver cup* of equal value.

V. The said premiums shall be adjudged on the day of meeting and shall be paid within ten days after the meeting, or sooner if convenient, and if the party shall elect to receive money.

In case any of the Trustees shall be competitors, one of the Trustees being a member of the Board shall be replaced by a person not a member of the Board, so that in such case the judges not being members of the Board shall constitute a majority.

The Farmers, it is hoped, will view this attempt to improve the breed of our domestic animals with favour, and as an additional and much stronger inducement to enter into the competition; they will of course reflect, that this *Cattle Show* will draw together a great collection of persons and thus will much facilitate the sale of their cattle, and also that the animals, which shall command the prizes, will sell at very much enhanced prices, either for Boston market, or to Connoisseurs who may be desirous of improving their own breed.

AARON DEXTER, *President.*

PREMIUMS

Offered by the Trustees of the Massachusetts Society for Promoting Agriculture.

1. To the person who shall have raised within two years from the first day of June, 1814, the greatest quantity of woad within this Commonwealth, not less however than three hundred pounds, and shall produce to this Board specimens of the same, provided the quality thereof be good, a premium of *one hundred dollars.*

2. To the person who shall within three years from the first day of June, 1814, produce a specimen of madder of good quality of his own growth, and who shall have actually raised the greatest quantity thereof, in this Commonwealth, being not less than 1000 pounds, a premium of *one hundred dollars.*

3. To the person who shall invent the most approved machine for thrashing or separating grain, (regard being had to its fitness for a medium farm,) a premium of *one hundred dollars;* to be claimed on or before the first day of June, 1816.

It is requested that the communications, for which the foregoing premiums are offered, be accompanied with proper certificates from the selectmen, magistrates, or clergymen of the vicinity, or other vouchers, to the satisfaction of the Trustees; that they be delivered without names, or any intimation to whom they belong; and that they be severally marked in such manner as each claimant shall think fit; the claimant sending also a paper, sealed up, having on the outside a corresponding mark, and on the inside his name and address.

RICHARD SULLIVAN, *Recording Secretary.*

Eben Parsons Esqr.
from his affectionate son & humble servt
Gorham Parsons

MASSACHUSETTS

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EXTRACTS FROM SIR H. DAVY'S "ELEMENTS OF AGRICULTURAL CHEMISTRY."

[Continued.]

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, oxygene, and azote, have been mentioned as the principal substances composing it, but more minute enquiries respecting their nature and agencies are necessary to afford correct views of the uses of the atmosphere in vegetation.

On these enquiries 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.

The quantity of water which exists in air as vapour varies with the temperature. In proportion as the weather is hotter, the quantity is greater.

The power of different substances to absorb aqueous vapour from the atmosphere, by cohesive attraction was discussed in the last Lecture. The leaves of living plants appear to act upon the vapour 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 circumstance in the œconomy of nature, that aqueous vapour 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, oxygene and hydrogene.

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 œconomy 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 $\frac{1}{12}$, 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.

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 $\frac{1}{500}$, nor less than $\frac{1}{800}$ of the volume of air. Carbonic acid gas is nearly $\frac{1}{3}$ 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 aerostatic adventurers.

The principle 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.

Oxygene is necessary to some functions of vegetables; but its great importance in nature is in its relation to the œconomy 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 oxygene; and for the oxygene 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 oxygene 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 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 endeavour to connect it with a general view of the progress of vegetation.

If a healthy seed be moistened and exposed to air at the 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 oxygene, 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 oxygene 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 gasses 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 a slight difference in the proportions of their carbon.

The absorption of oxygene 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

* The impregnated eggs of insects, and even 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 oxygene partly disappeared, and carbonic acid was formed. The fish in the egg or the spawn, gains its oxygene 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 vegeta-

supply of oxygene. From the moment the heart begins to pulsate till it ceases to beat, the aeration 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 oxygene, 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, oxygene 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

bles, the leaves of which, in performing their healthy functions, supply oxygene 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 endeavour to overleap weirs, mill-dams, and cataracts.

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 farther 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 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: this principle is at once a nourishment of plants and animals, and the greatest ravages are committed upon crops in the first stage of their growth.

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 oxygene 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 oxygene 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 of which I have repeated with similar results. The absorption of carbonic acid gas, and the production of oxygene 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 oxygene, even when immersed in water holding carbonic acid in solution.

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.

In the dark no oxygene 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, oxygene 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 oxygene.

Some persons have supposed that plants exposed in the free atmosphere to the vicissitudes of sunshine and shade, light and darkness, consume more oxygene 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 the experiments brought forward in favour of this idea, and particularly his experiments, have been made under circumstances unfavourable 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 oxygene 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.

The result of some experiments I have made 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, oxygene 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 oxygene 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 oxygene 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 oxygene 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 oxygene 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 south-west gales convey air, which has been purified by the vast forests and savannas 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.

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.

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.

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 oxygene, 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 hydrogene, starch, sugar, the different vegetable acids and substances soluble in water, may be formed from 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.

The increase of trees and plants must depend upon the quantity of sap which passes into the 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.

It will be proper to mention the facts which shew, that in many cases fluids descend through the bark; they are not of the same unequivocal nature as those which demonstrate the ascent of the sap through the alburnum; yet many of them are satisfactory.

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 coloured, and till the leaves were affected; and that the colouring 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.

I have mentioned in the Third Lecture, that when new bark is formed to supply the place of a ring that has been stripped off, it first makes its appearance upon the upper edge of the wound, and spreads slowly downwards; and no new matter appears from below rising upwards, if the experiment has been carefully performed. I say carefully performed; because, if any of the interior cortical layer be suffered to remain communicating with the upper edge, new bark covered with an epidermis will form below this, and appear as if protruded upon the naked alburnum, and formed within the wound; and such a circumstance would give rise to erroneous conclusions.

In the summer of 1804, I examined some elms at Kensington. The bark of many of them had been very much injured, and in some cases more than a square foot had been stripped off. In most of the wounds the formation of the new cortical layers was from above, and gradually extending downwards round the aperture; but in two instances there had been very distinctly a formation of bark towards the lower edge. I was at first very much surprised at this appearance, so contradictory to the general opinion; but on passing the point of a pen-knife along the surface of the alburnum, from below upwards, I found that a part of the cortical layer, which was of the colour of the alburnum, had remained communicating with the upper edge of the wound, and that the new bark had formed from this layer. I have had no opportunity of looking at the trees lately; but I doubt not that the phenomenon may still be observed; for some years must elapse before the new formations will be complete.

In accounting for the experiment of M. Palisot de Beauvois, mentioned in the Third Lecture, it may be supposed that the cortical fluid flowed down the alburnum upon the insulated bark, and thus occasioned its increase; or it may be conceived that the bark itself contained sufficient cortical fluid at the time of its separation to form new parts by its action upon the alburnous fluid.

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.

The arguments in favour of a contraction similar to muscular action have not much weight; and besides, there are direct facts which render the opinion highly improbable.

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 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 shew, 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 analogous to the irritable action of animal systems.

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; 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, common 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 be inclined to assert the existence of any thing above common matter, any thing immaterial in the vegetable œconomy. Such a doctrine is worthy only of a poetic form.

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 upon the sides of the tubes now considerably diminished in their diameter; 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.

Mr. Knight 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; and no system exists by which it can be preserved.

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 is gradually converted into heart-wood, and being constantly pressed upon by the expansive force of the new fibres, becomes harder, denser, and at length loses altogether its vascular structure; and in a certain time obeys the common laws of dead matter, decays, decomposes, and is converted into aeriform 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 dispositions to old age and decay, of the tree whence it sprung.

This seems to be distinctly shewn 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 cyder are gradually deteriorating, and many will soon disappear. The golden pippin, 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 trees 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 chesnut and the oak, are pre-eminent as to durability; and the chesnut 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 chesnut require glasses to be seen distinctly.

In consequence of the slow decay of the heart-wood of the oak and the chesnut, these trees under favourable circumstances attain an age which cannot be much short of a thousand 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 two hundred 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 chesnut 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 antiputrescent 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 large 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 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 productions 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 colour, 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 flavour and even the colour of the fruit seems to be a matter of accident. Thus a hundred seeds of the golden pippin will all produce fine large-leaved apple trees, bearing fruit of a considerable size ; but the tastes and colours 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 hundred of thousands ; the results of great labour 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 cyder 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 as 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.

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 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 peculiar unfavourable circumstances, and liable to premature 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 its 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 equable 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 greenhouse during the cold seasons 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 favourable to the general growth of the species. And, as was stated page 169, 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 generally very 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 lying 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 experiments.

Besides the diseases having their source in the constitution of the plant, or in the unfavourable 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 labours 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, abounds 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 havock 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 shewn by various botanists; and the subject has received a full illustration from the enlightened and elaborate researches of the President of the Royal Society.

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.

No remedy has as yet been discovered for this disease; but 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 neighbourhood of a field of wheat often produces the mildew, deserves examination. This tree is frequently covered with a fungus, which if it should be shewn to be capable of degenerating into the wheat fungus would offer an easy explanation of the effect.

There is every reason to believe, from the researches of Sir Joseph Banks, that the smut in wheat 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 mistletoe 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 is * at this time issuing decrees with a view to occasion the destruction of the larvæ of the grass-hopper.

In general, wet weather is most favourable to the propagation of mildew, fungusses, 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

* January 1813.

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 inalterable inheritance, spontaneously providing for his wants; but as a doubtful and insecure possession, to be preserved only by labour, and extended and perfected by ingenuity.

Instructions for the improvement of sterile Soils.

In ascertaining the composition of sterile 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 neighbourhood, 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 sterile soil it is found to contain the salts 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 marle, 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 last year 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 bringin 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 labour 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.

Permanent Pasture—Top Dressing.

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 labour; and in climates where great quantities of rain fall, the natural irrigation produces the same effect as artificial. When hay is in great demand, as sometimes happens in the neighbourhood of the metropolis, where manure can be easily procured, the application of it to pasture is repaid for 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, offer 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.

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 foxtail grass; but their produce at the time of flowering and ripening the seed, are 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 shew, that such a plan of cultivation is very practicable.

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 interest, but is likewise an enemy to the public: a few thistles will stock a whole 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 favourable 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 fleabane 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.

Soils absorb moisture from the atmosphere.

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 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.

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 vapour 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.

Advantages in soiling cattle.

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 with the teeth of the cattle, and no food is wasted by being trodden down. They are likewise obliged to feed without making selection ; and in consequence the whole food is consumed : 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.*

Important Remark respecting Food for Cattle artificially prepared.

WHEN food artificially composed is to be given to cattle, it should be brought as nearly as possible 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.

* 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 of 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 and 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, and 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;

Calcareous Water not to be used in washing Sheep.

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 analysed 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.

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 24 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 grass. 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 walks.

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 ani-

How the comparative value of fruits for fermented liquors may be ascertained.

The value of fruits for the manufacture of fermented liquors may be judged of from the specific gravity of their expressed juices. The best cyder 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.

mals 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 Welch 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 Welch 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 Welch 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 largest 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; horses 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 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.

Table of the quantities of soluble or nutritive Matters afforded by 1000 parts of different vegetable Substances.

The following table contains a statement of the quantity of soluble or nutritive matters contained 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, the full details of which I shall hereafter have the pleasure of stating.

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 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.

Vegetables or vegetable Substances.	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, hydrogene, and oxygene. Certain combinations likewise of these substances may be more nutritive than others.

DIFFERENCE OF SEASONS IN SWEDEN, ENGLAND, AND MASSACHUSETTS.

BY THE CORRESPONDING SECRETARY.

THE Trustees of the Massachusetts Agricultural Society having formerly published some journals of the flowering and leafing of plants, and having recommended the keeping, and communication of such journals, I send you some remarks I have made of that nature. Such records have been deemed important in other countries, and certainly may be applied to as much use as meterological tables. If it be true, which it most certainly is, that the state of forwardness of particular plants is a much safer guide to the husbandman than his Almanac, it surely may be of great service to him, to see the proofs of this accordance furnished. My principal object, in the present very short journal, is to shew the difference between the climates of Sweden, England, and Massachusetts The comparison does not extend to many plants, because there were not many which in our respective journals were the same, but there are sufficient to enable us to form a correct idea of the difference of seasons in the three countries.

Gooseberry in blossom,	England, Norfolk,	April 13th,
do.	America, Boston,	May 5th,
do.	Sweden at Upsal,	June 7th,
Gooseberry in leaf,	England,	March 11th,
do.	America,	April 20th,

Apple tree in blossom,	Sweden,	June 2d,
do.	England,	April 25th,
do.	America, Boston,	May 20th,
Lily of the Valley,	Sweden,	May 30th,
do.	America, Boston,	May 16th,
Red Currants,	England,	April 3d,
do.	America, Boston,	May 9th,
Apricot,	England,	April 1st,
do.	Boston,	May 1st,
Plum,	England,	April 16,
do.	Berlin,	May 12th,
Peach,	England,	April 6th,
do.	Boston,	May 8th,
Cherry,	England,	April 18th,
do.	Boston,	May 6th.

This comparison could be extended to a great number of other plants, but sufficient has been shewn to prove that the climate, or season of Great Britain is from 38 to 18 days earlier than our own; the greatest difference being found in the earliest part of the season, and this constantly diminishes until we get to the flowering of clover, which blossoms on or about the same time, in both countries. After this period, we rather advance upon them, and our hay-making and harvesting are rather earlier than theirs.

The season of Sweden, on the other hand, is from a month to 15 days later than ours, diminishing like the other as the season advances. Great Britain, or rather England, has the advantage of at least three months longer farming and productive seasons than we have in this state This alone is a great profit, especially in raising cattle.

We are very apt to make mistakes about the seasons, and if they are not so propitious as our hasty and impatient wishes, to find fault with the present one as being worse than usual, often "worse than ever known"

A comparison of the seasons, fairly formed on the same farm, and upon documents made at the time, about which there can be no mistake, may serve to correct some errors on this subject, and to lead us to be a little cautious in forming our opinions.

It has been a prevailing opinion, that the season of 1816 is a very cold and backward one. I should perhaps be ridiculed for denying it, if I had not the records and nature to support me.

The following is a comparison of the years 1813, 1815, *and* 1816.

In 1813.

May	10th,	Cherries begin to open their blossoms.
	11th,	Mespilus Canadensis, or snowy medlar in blow.
	14th,	Asparagus cut.
	16th,	Narcissus in blow.
	20th,	Pears begin to blow.
	23d,	Apples begin to blow.
	24th,	Tulips in full blow.
	27th,	Apples in general blow.
		Lilacs in full blow.
June	19th,	First mess of Peas.
	20th,	First Strawberries gathered.
	26th,	First Cherries gathered.
		Roses in general blow.
July	12th,	Raspberries ripe.

In 1815.

May	1st,	Apricots in blossom.
	10th,	Cherries begin to blow.
	11th,	Peaches begin to open.
	6th,	Gathered 1st Asparagus.
	14th,	Plums in blossom; also Gooseberries and Currants.
	14th,	Early Potatoes and Corn, just out of ground.
	16th,	Mespilus Canadensis in blow.
	22d,	Pear trees in full blossom.
	27th,	Apples in full blow.
	28th,	Lilacs in full blow.
June	3d,	Cinnamon Rose in blow.
	13th,	Syringa in blow.
	21st,	Gathered 1st Peas and Strawberries.
	29th,	Cherries begin to ripen.
July	3d,	Cherries generally ripe.
	15th,	Raspberries ripe.

In 1816.

April 20th, Gooseberries put forth their first leaves.
28th, Red Currant do.
Peaches against a wall in blow.
29th, Apricot begins to blow.
May 5th. Gathered Asparagus. Gooseberries in full blow.
6th, Narcissus in blow. Also Cherry trees.
9th, Red Currant in blow; and the Mespilus Canadensis.
12th, Peas begin to blow; and Plums and Peaches in full blossom.

Thus it will be seen that the years 1813 and 1815 were very nearly alike, and that the year 1816 is from 5 to 10 days earlier than either. If this will, in your opinion, afford amusement to the readers of the Massachusetts Agricultural Repository, you are at liberty to publish it.

Yours, &c.

To the Recording Secretary. J. LOWELL.

ON THE USE OF CHAFF, COMPARED WITH HAY FOR HORSES.

[From the Bath Society's Papers.]

[We know that some very excellent managers of horses in this country have been in this practice for forty years, and no horses have equalled theirs in appearance.—*Editors.*]

Permit me to solicit, that you lay before the Society the following comparative statement respecting the use of Chaff, and the common practice of serving horses, &c. with hay.

I have throughout the summer kept my horses in the stable, feeding them with good hay and beans. My oxen have, on the contrary, always been turned out to grass when liberated from their work: they have had the range of good pastures, and the benefit of some less valuable hay, previous to going to their labour. My horses, five in number, have been regularly worked at the plough in pairs; latterly, after much opposition on the part of my servants, with reins. The oxen, four in number, have worked in collars, drawing generally a stout Beverstone plough, or a large drag and scuffler: their labour has been constant and rather severe. As our meadows began to fail us towards the end of September, owing to the quantity of stock upon them, it became necessary to allow the oxen more and better hay.

The increased expenditure alarmed me; as the four oxen, and the five horses, consumed no less than four tons within one month. This caused me to prohibit the use of hay in the racks, and to feed all the cattle with chaff; of which a boy can cut sufficient for daily use in two hours.

My servants not only ridiculed the change, but, so far as they dared, opposed it in an underhand manner, by various evasions and pretexts. Aided by the care and vigilance of the young gentlemen with me, the system of chaff-feeding was fully established; and the quantity needful for the horses, and for the oxen, separately ascertained.

One hundred weight of hay was found to yield 20 bushels of chaff pressed into the measure, and piled as high as it could safely be carried; consequently each bushel weighed about $5\frac{1}{2}$ lbs. It was found that the five horses would eat twelve bushels of chaff during the 24 hours; and that the four oxen would consume an equal quantity in the same time. Ever since, the oxen have been feed with chaff only, they have very evidently improved in condition, as have also the horses, although their work has latterly been on heavier soil, and of course, more severe than formerly.

Twenty-four bushels of chaff, at 20 to the cwt. amount to about $21\frac{1}{2}$ tons yearly; which, deducted from 48 tons, (the quantity we were consuming within the year,) gives a saving of about $26\frac{1}{2}$ tons, or more than half.

I have, however, carried the retrenchment further, by cutting in bean-stalks, to the extent of about a quarter of the chaff. These, being laid uppermost in the cutting trough, keep the hay well pressed, and cause it to be cut more regularly. Thus we now use about 25 cwt. of hay monthly, instead of four tons!

It is customary in our quarter to throw bean-stalks under cattle, a practice which cannot be too speedily abolished. Mine had suffered much from standing out full a month in the late rainy weather, yet all my cattle ate the chaff cut from them alone, without hesitation; indeed, rather in preference.

I am, Sir, your obedient servant,

THOMAS WILLIAMSON.

Writhlington, Nov. 9th, 1812.

ON THE TREATMENT OF A MERINO AND MERINO CROSS FLOCK OF SHEEP.

[From the same.]

["It has often been observed, and justly, of the people of the United States, that there is no people and probably there never existed a people so enterprizing, bold and adventurous as they are. The truth of it as well as the causes might easily be established without derogating from the rights or merits of any other people. From this part of their character it must often happen that they frequently undertake projects either impracticable or unprofitable, or pursue them with an ardour which their merit will not justify. If disappointed in the first expectations they are apt to abandon them in despair, and fly to some new and more easy and rapid way of making money. Our whole history is filled with examples of this sort. But the cultivation or production of merino sheep is one of the most striking examples.

"Almost every nation in Europe has taken up this branch of agriculture, but with more moderation, and we may add, more rational views and more practical advantages. Every thing in our country must be the subject of speculation. Hence a merino ram has been sold for $ 3000. When the moment of disappointment and fickleness arrived, and it must ever arrive when men so act, the losses were immense and people passed to the other extreme, and it is an undoubted fact that some half-blood merinos were sold to the butcher at the price of one dollar twenty-five cents. In Europe both these extremes are avoided, and to shew that the merino sheep still stand their ground in England we insert the following letter from a cultivator to the Bath and West of England Society for the promotion of Agriculture, &c."]

As it is my intention to be a competitor for some of the premiums of the Bath and West of England Society relating to sheep and wool, particularly premium 7, class x. I send you, agreeably to the requirements of the Society in that case, an account of my flock, and mode of treatment. If it should be deemed worthy of their attention, I shall be happy in having made the communication.

The farm which I occupy is principally hill land, on Salisbury Plain. The customary mode on this situation is to divide the farm into six parts, as follows: first, *sainfoin*, which remains good about six years; then it is broken up, cleansed, and turnips sown on it. The second year *tares*; third, *wheat*; fourth, *turnips*; fifth, *barley*, sown with grass seeds, and broad and Dutch clover, trefoil, and ray, which lie two years for feeding, and then the ley is broken up for wheat. But previous to the breaking up the sainfoin, it is always necessary to lay down the same quantity of land to insure a constant supply of hay. Besides the piece laid down to sainfoin, the other five pieces in succession are turnips, barley, and grass, two years wheat. This is my regular mode. In addition to the arable land, I have about 150 acres of down land for feeding my sheep. My flock consists of 950; namely, about 450 of cross-breed from Merino and South-downs, and 500 pure Merino purchased and bred from his Majesty's flock. Many of my friends have made several objections to Spanish sheep; 1st, say they, "*it is impossible for them to live on our cold high hills in the winter, and endure folding.*" As I have been a great advocate for Merino sheep for some years, I promised them to give the sheep a fair trial, as I knew by experience (on a small scale) they were capable of enduring hardships with any sheep in this country. In the month of October, 1812 I began folding about 200 Merino ewes, and about 100 Merino cross ewes, on as cold a hill as any in this part of the country; they were regularly folded every night on that situation till the end of February, 1813; then the flock was brought to the low land for the ewes to drop their lambs. These sheep had but very few turnips, (which they partook of in the day in a distant field,) with which they had threshed hay and barley straw till Christmas. Notwithstanding they were kept so badly on this exposed situation, not one of them died. This I did, though it was cruel treatment to my flock, in order to convince my friends and the world that they would endure such hardships; whereas in a similar situation, and under similar treatment, some other breed of sheep would have died. As the objection by this experiment is set aside, and they are proved to endure the coldest situation, and bear regular folding, their credit and value in these respects are established. The Spanish sheep are clothed from head to foot, which points out, in nature, they are more able to bear the cold than sheep that have no wool on their legs, and very little about the belly, neck, and head.

The second objection made to Spanish sheep is, that "*they carry but little manure to the fold, and even that is not so valuable as from the larger sort of sheep.*" It is certain they do not eat so much as larger sheep, consequently there is not so much manure to be expected, in proportion to an equal number of each sort: but in proportion to the weight of the sheep, so will be the quantity of food consumed, if they are of the same age and condition. Therefore it appears to me that two South down sheep eat as much food as three Merinos. In consequence, I fold 300 of the latter on the same piece of land as I used to pen 200 South-downs on. According to the quantity of food consumed will be the return of each flock to the land. I judge of the *quality* of the manure from my crops of corn, which are equally as good as when I kept a South-down flock; this objection, therefore, does not weigh with me.

Third objection. "*The mutton, it is said, is so bad, the* Dogs *will not eat it, if put to the trial; and the sheep cannot be made fat.*" In the autumn, 1812, an old experienced farmer on grazing land called on me to see my Spanish flock. I shewed him one of my best ewes in particular: he laughed and ridiculed them as long as he thought proper, observing, "the best sheep there would not be more than enough for his family's dinner, though they were but few in number. He should be ashamed to see them in his field. What signifies, said he, having a fine coat, and nothing for the belly? They may do for gentlemen's parks, but they are not fit for you." I invited my visitor to take a luncheon, which he cheerfully did. I put a piece of mutton before him, and he ate very heartily of it, exclaiming against the Merino mutton from what he had heard, and observing "my meat was very fat, tender, fine in the grain, and rich as venison." I had a friend sitting by who heard the conversation; to whom I observed, after the other was gone, that the mutton he had been feasting on was a part of an *old Merino ram*. Instead of prejudicing me against them, this and other subjects of conversation, with experience, establish my confidence in them. I hope to see the day when Spanish mutton will sell for more money than any other sort.

The fourth objection urged against Merino sheep is, "*that the wool becomes coarse from the climate and soil.*" It is certain the climate does not injure the wool. That is not the cause of deterioration. The wool exported from Saxony is equally good as that which grows in Spain. I have sheep, the breed of which have been in England twenty years, and the wool equally good as any imported from Spain. I think this a sufficient proof that the climate is *not* the cause of its becoming coarse. The soil, such as is generally used for breeding flocks, is poor land, and on such the wool does not deteriorate.

On rich, deep, grazing land, I have observed Merino wool considerably injured. I sold a ram to S. Watts, Esq. near Yeovil. In the next year I visited that gentleman, and inspected the sheep; I found the staple longer, and the hair rather larger. The second year the hair larger than the first, and the staple longer. His land is very rich, deep, and good. Such land is generally used for grazing, and not for breeding; therefore in fatting them the injury will be but little, as it is likely the loss in its coarseness will be made up by a greater quantity. It is of the greatest importance to procure a regular annual supply of food for a flock of sheep. My mode is as follows: To endeavour to have a constant supply of green crops, I sow tares at five different times on my low land: 1st, Tares in September; 2d, Winter tares in February, about the latter end; 3d, Spring tares in March; 4th, some time in April; 5th, latter end of May, when there is a regular succession of seed. Turnips sown in May and June to finish.

In the next winter, every sheep will be on the hill as usual; but I intend in future to give them good hay, and constantly to keep them well, in a fair working way. After my experiment had taken place, had I found the Merino sheep did not answer, it was my intention to get rid of them immediately, and purchase a flock of some other breed. Whenever I am convinced of an error, with haste I will retract it. Many persons have insisted on it, that the Merino ewes are bad nurses, and give but very little milk. I have found them very good nurses, and never had so little trouble with any ewes in taking to their lambs. It cannot be expected for a small ewe to have as much milk as a large one, but I believe their milk is richer than that of any large sheep; and on an experiment of taking an equal quantity of both sorts, it will be found to be the case; similar to the Alderney, or any small breed of cows with a fine coat, compared with one of a large coarse coat of hair. It will be found, the finer the hair in the different sheep, the finer the grain of the meat, and consequently more tender and rich. Some gentlemen have been discouraged from keeping Merinos, because they have had the foot-rot; but this is easily accounted for, by their lying constantly in wet grass. If they were put into a fold by night, or not let out in the spring or summer till the dew is off the grass, I should not be afraid of the rot in the feet. This is generally a preventative. In the disease, my mode of cure is to cut away the dead ragged part of the hoof, but to be careful not to cut too near the toe vein, or to make the foot bleed; and apply to the part affected, every day, a mixture, as follows:

2 ounces of the best gunpowder,
1 ounce of blue vitriol,
1 spoonful of spirit of turpentine,

mixed with about a quarter of a pint of crab verjuice or vinegar; which with me has never failed of a cure.

The deterioration of wool arises from two causes. The first and greatest (from my observation) is from an improper selection of rams; many breeders having selected the *finest framed* sheep, without regard to the wool; and the wool has degenerated every year, and the soil and climate (of Wiltshire) supposed to be the cause, when both are blameless. I refer to Southdown sheep, which were brought from Sussex. Of these things I have been eye-witness, having been in the practice, for some years, of attending the sheep-shearings in these parts, and particularly examining the wool. But where the agriculturist has been careful in selecting a ram with a superior fleece, there it is evident the wool becomes fine. In proof of this observation, I can refer with great satisfaction to the practice of two highly respectable gentlemen in this neighbourhood. Joshua Smith, Esq. M P and John Gale, Esq of Stitt, whose flocks have been every year improving in the quality of their wool, owing to a judicious and spirited selection of rams.

I kept six rams (three of them fine Merino, and three of the Merino cross) for one year, on clover, tares, turnips, hay, and *pasture*. The soils on which they were kept, sand, chalk, and clay. The weight and quality of the wool were nearly the same, as the year before, when they lived on clover, tares, a few turnips, hay, and on poor down lands. For one of the above sheep, I obtained a premium from the Wiltshire Agricultural Society, at their late meeting holden at Devizes.

The *second* cause of the deterioration of wool I have pointed out, in answering the objection to the wool becoming coarser, where the sheep are kept on rich, deep, grazing land, where it is practicable to breed; but for those who occupy such land, to purchase sheep at a proper age to graze on that soil I occupy both high and low lands, have kept sheep on both situations, and do not find land of a middling quality deteriorate the wool. My improvement in fine wool has been by selecting the finest coated ram, the success of which was evident every year, by the variation of the stock got by different rams.

I am, &c.

Lavington, Oct. 1, 1813. C. GARRETT.

[Upon the same subject with the preceding, and as being also useful to woollen manufacturers, we insert the following from the Bath Society's papers.]

ON BRITISH WOOL, AND ON THE ANGLO-MERINO BREED OF SHEEP.

After writing what I considered interesting on the culture and preparation of Woad, though confined to my room, I am inclined to say something on our native wool and woollen manufactures, which for many centuries (until the wonderful invention of machinery, introduced at first in the cotton trade) was considered as our principal staple, or first branch of commerce. This pre-eminence it still continues over every other branch. But the superfine broadcloth trade has greatly suffered of late, from the scarcity of Spanish wool occasioned by the internal commotions of Spain, which have deprived great numbers of our artificers and labouring poor of employ. His Majesty's patriotic conduct and attention to the commercial interests of the country are now experienced in a high degree, and particularly evident from the benefits derived from the introduction of the Spanish Merino sheep. And a very laudable emulation has stimulated our noblemen and gentlemen to experiments in crossing these sheep with our native finer flocks. And to their perseverance and expensive efforts we are highly indebted for a positive demonstration, that these crosses are now producing great public benefit; and, when fully extended, will become an object of the first importance to the British empire.

The great advance on fine wools has brought many sheep farmers to introduce these crosses into their flocks, who before had ridiculed the idea. But now the increase in quantity as well as quality begins to operate as a powerful and general stimulus. For a few crosses will render every fleece at least equal in value to three fleeces of the original English stock: I do not mean at this time only, but at all times. And from the observations I have been enabled to make, and the reports received from gentlemen whose experience has confirmed them, I make no doubt but perseverance will in a very few years render us independent of every other country for fine wool. And this will also render Spain (whoever may rule there) dependant on this country for a market. It would also relieve our manufactories, and render gentlemen (whose fortunes are employed therein) more independent of speculation; and all such as are interested in feeding the market as they please, under whom (with no possibility of relief) the superfine clothing trade has severely suffered for many years. Not that every importer of Spanish wool has been willingly accessary to the evils herein observed; but chiefly such as by agents in Spain have offered any terms to obtain connections, for which this country has severely paid; when most probably as much wool would have been imported through the regular established methods For it is evident that France had before this more than she could use; and where else, then, in the present state of Europe, could it have been manufactured? Nor does it appear now, that under the present tyrannic system commerce will be restored so as to increase the manufacturing interest on the Continent. The Bakewell system, (although its laudable and enterprising spirit has, I believe, brought forward the principle on which our agricultural societies were established,) yet I am fully persuaded it has debased and injured the quality of our wool; and with respect to the carcase, a very different one has certainly been acquired. The long coarse-woolled sheep, by his crosses, have debased the fleece abundantly, giving the wool stitchel hairs; and even the fine part of it is but hungry stuff, no better than flocks, seldom seen in the distinct kinds, unless the sheep were unhealthy, or fed on unhealthy land or scanty pasturage. In combing for worsteds, it is found to have increased the pinnions or nile, as also to have much debased their quality; so that in low articles of serge or cloth manufactured from it, the dyer has often experienced much difficulty in giving many colours: for this unnatural combination has rendered the dye itself deficient, weak, and imperfect, much more than on the pinnions, before these crosses were introduced. But in cloth made from such wool it produced a more serious effect, in reducing its value, and in deceiving the clothier and wool-stapler, though perhaps few persons knew from whence it originated. Formerly the finest Hereford and South-Down wools were much more in request than of late years; for they afforded abundantly more of the finest quality. And I believe there is rarely seen now any so fine as the trinded wool used to be, when the trade for second superfines was carried on to so great an extent as to form a very considerable branch of trade to North-America, &c. particularly at Warminster, Westbury, Tamworth, Stourbridge, Stroud, and many other places. This trade is now extinct. Besides this, there were large quantities used in the fine districts, for the warps or chains to Spanish cloths, which, from the increased weight, are *now* inadmissible as to any advantage from it; for since fine cloths are made so thin, it would be discoverable to almost any one. I can also assert, from my own experience, that formerly our fine cloths were much superior to those made at present; but these, however, greatly surpass those made a few years past. Spanish wool was formerly imported in much better condition than it now is, and finer; there were then also a due proportion of F.'s and T.'s taken out, to render the R.'s of a proper staple; and the buyers expected to share such proportion; but now and of late, through chicanery somewhere, nearly all have remained, and been sold as R.'s. I have often had an opportunity of convincing those who contended the point with me, by shewing them cloths made many years past. (even from thirty to forty years,) which were the refuse of shops, being such colours as were long out of fashion, and sent to be dyed. The texture and face of cloth made now do by no means come up to them. This may appear inconsistent with the adopted opinions; but in two instances within a few years, certainly the marks and numbers have verified it beyond a doubt.

The quality of our fine wool generally thus declining rendered it impossible to support a second superfine trade, and therefore it soon annihilated almost every quality between a Spanish and a livery; for at present our mechanics must have Spanish cloth, though formerly the difference being so little in comparison with the price, that our first people did not scruple to wear second superfines. Spanish wool always will produce the best ground and face; but our wool, and the spinning and dressing, excelled then to such a degree, as puts it out of our power to make such cloth from English wool now. This has decreased the use of English, and increased that of Spanish wool abundantly, inasmuch as Mr. Temple, (a celebrated writer on this subject,) in his calculation of our average importation for forty years, says, that nine thousand bags was then the average yearly, and that of France forty nine thousand. But of late our importations appear to have been near four times the amount stated by Mr. Temple. I do not pretend to say that our wool became larger and inferior solely from those bad crosses; for many flocks I presume, continue entire yet. But though it may not have been generally observed, I believe our improved state of agriculture has enlarged the fleeces of wool pretty generally. More than thirty years ago I was a purchaser of fleece wool, and that for some years, in the county of Bucks; and I much interested myself in observing which part of the county produced the best and finest fleeces. Many farmers in the upper parts, from Beaconsfield to Wycomb Heath, &c were in the habit of going to Weyhill and Andover fairs to replenish their stock; and some bought their stock together, and divided at home yearly; and I have particularly observed, when these divisions have partly been sent into the rich vale of Aylesbury, and and the others kept in the hill country, there would be two or three fleeces difference in the tod in number; and these expected something more for their fine wool; and whenever they obtained it, the others were offended. The deep land and strong grasses produced this difference, making allowance for the effects of soils, in rendering it more or less foul.

I do not exactly recollect when, but I have seen accounts that Spanish wool was prohibited here; and I believe Mr. Temple's book notices it.* Surely we must have then had more fine wool than of late years has been produced in this kingdom, or the quality of cloth was not so generally well known: but herein to enlarge I decline, as my purpose is to demonstrate the decrease, and promote an increase in the quantity and quality of our fine wools.

I have been more than fifty years in a business that has afforded me great experience, and every opportunity of investigating the quality and condition of wools; and pleasure as well as interest prompted me to it. My connections and intercourse with the first houses in the West was to such extent for many years, as did not a little contribute to improve it; and with them many times the subject of wool, and its decreasing state, both foreign and domestic, has been often brought forward, and with repeated expressions of regret upon the observation, as the remark was a very general one with respect to the Anglo-Merino breed on their first introduction. His Majesty's wool, as well as noblemen and gentlemen's who had it manufactured for several years, was often sent to me to scour and dye blue; and then I particularly examined it, and I never saw one parcel with the stichel hair, or the hungry flocky stuff I have mentioned to have generally attended our so widely differing English crosses. From these observations I soon became an advocate in its favour; but I must confess that I did not then conceive the progress of improvement would ever have arrived at its present state, or have promised so much in future to perseverance. And I am persuaded, that keeping our own long wool distinct for the comber, and the middle kinds sorted for those purposes of combing, or coarse cloth, &c. as they may be suited to, and only crossing our fine-woolled sheep with the Merino, will (as I before observed) furnish sufficient for the whole of our super-

* There are even to this day in Spain two distinct breeds of sheep; one of which is very coarse-woolled, and only used to make the very coarse serges, and is the ancient native sheep of Spain. Stow the historian is of this opinion, and says, that in the reign of Henry II. viz. 1170, a petition was presented by the weavers of London, that if any cloth was found mixed with Spanish wool, it should be seized and publicly burnt. The present Merino breed was not known in Spain for centuries after this.—ED.

fine trade, without diminishing the quantity of inferior wools, or at all injuring our worsted or coarse cloth trade; but as the different crosses will furnish different degrees of fineness, it may again promote a second cloth trade, a little inferior to that of the first quality. For of course there will be a sufficient difference in the price to warrant such an idea, else the crosses of different years (that is, the two or three first) must go into the inferior sorts, until enough have been crossed for our finest trade. For I am informed by gentlemen amongst the first and most zealous adventurers herein, that after these crosses are brought to a certain point, it will no longer be necessary to introduce the real Merino rams. This is a consideration of the first importance; for then we can determine how far to proceed, without reducing the carcase. Our English wool (particularly for the fur trade) had been declining in quality for many years, and with no benefit to the inferior sorts, or at least no increase, but the present system promises to improve it more rapidly, and to become an object of the greatest advantage to the British empire.

I have been stimulated to write this humble essay by the interesting importance of the subject, and a confidence that gentlemen who are united for purposes so laudable, and are induced to make so many experiments for the public good, will not too nicely criticise the performance of an old man who writes in bed.——With deference and respect, I am, most respectfully,

J. PARRISH.

P. S. I have not herein noticed the beautiful Saxony wool, which, from the great advance on Spanish of late years, has been introduced; but now, on account of the state of things on the continent, I presume we cannot obtain it in any large quantity, and in future it may not be wanted.

Neither are our Ryeland, Shropshire, Scotch Isles, and other fine wools herein noticed, only the Hereford and South-Down; but those wools, nevertheless, are equally desirable in the market, in proportion to their quantity and quality.

I cannot leave this subject without declaring, that I have seen wool from these crosses as fine, if not finer, and better in all respects, than any of our first piles of Spanish; but there is not that attention as formerly to marks and distinctions in their wool; and for it I believe we may only thank our wool merchants, and such are said to have rendered marks and distinctions useless. Formerly the manufacturer could, without any close examination, depend on the condition and character (by the mark of the pile of wool to which he was accustomed) of the cloth he was to make from it.

ON SOAP-SUDS AS A MANURE.

[From the same.]

A FEW years ago my attention was attracted by the soil of a garden, reduced to a state of poverty very unfriendly to vegetation. Interest in its future produce influenced my wishes for its restoration. An invigorating manure was necessary; but such a stimulus could not be easily procured. While considering which of the succedanea within my reach had the greatest probable appearance of succeeding, it occurred, that possibly some trivial advantage might be derived from the oil and alkali suspended in the waters of a washing. Pits were immediately ordered to be made, and in them the contents of a tub, which my servant usually committed to the common sewer, were carefully deposited: as washing succeeded washing, other pits were dug and filled; so that the whole garden, a small portion only excepted, has in this manner been watered and enriched: that small portion remains a visible demonstration of the utility of this manure. There vegetation is still languid; while the residue of the garden, invigorated by the suds only, annually exhibits a luxuriance almost equal to any thing this fertile neighbourhood can produce.

I am, Sir, your humble servant,

GEORGE IRWIN.

Remarks, by the Rev. T. FALCONER.

1. The above important experiment may perhaps remind the reader of the principal ingredients of the oil compost, suggested by Dr. Hunter of York. In the simple fluid manure we have an animal oil, potass, and water; in the compost are the same oil and the same alkali, but neither of them perhaps in so pure a

state as in the manure, with the addition of "fresh horse-dung." The fresh horse-dung is added, in order to produce "heat and fermentation;" and a delay of "six months" is supposed to be necessary, to make the compost "fit for use." All, however, that seems to be gained by the horse-dung is the animal oil, which may be united to the alkali during the process of fermentation, the straw, which in the fermentation of the compost will bind the mass together, and when decomposed on the ground, will afford a small supply of vegetable matter. If we make the comparison strictly accurate on the other side, we may observe, that in the fluid manure there must be an increased quantity of animal matter in the water, after it has been used for the purpose of washing linen.

The experiment then shews what is the advantage of the application of the oil and alkali only, as a manure, and perhaps the delay of "six months" in preparing the compost would not be compensated by any superiour efficacy that may be expected to arise from the combination of the horse-dung.

It also appears from the experiment, that the compost is a more useful discovery than Dr. Hunter himself could justly infer from his own limited experience of its effects.

2. This mixture of an oil and an alkali has been more generally known than adopted, as a remedy against the insects which infest wall-fruit trees. It will dislodge and destroy the insects, which have already formed their nests and bred among the leaves. When used in the early part of the year, it seems to prevent the insects from settling upon them; but whether by rendering the surface of the leaf disagreeable to the bodies of the animals, and thus repelling them, or by neutralizing the acid they deposit, and thus preventing the leaf from contracting into a necessary form for their reception, I cannot presume to determine. One of the modes by which this mixture indirectly contributes to the fertility of the ground, may be by its destruction of the insects which prey upon the plants.

It is also, I think, to be preferred to the lime-water, or the wood-ashes and lime, which Mr. Forsyth recommends to be used for the removal of insects. It is preferable to the lime-water and the lime, because lime loses its causticity, and with that its efficacy, by exposure to air, and must consequently be frequently applied; and to the dredging the leaves with the fine dust of wood-ashes and lime, because the same effect is produced by the mixture without the same labour, and is obtained without expense.

Mr. Speechely, in his treatise on the Vine, published in 1796, has used this mixture with great success; but he has applied it awkwardly and wastefully. He directs it to be poured from a ladder out of " a watering pot over both trees and wall, beginning at the top of the wall, and bringing it on in courses from top to bottom." Page 161. Mr. Speechley is not the first person, who has thought of this application of the mixture. It is a fact which has been long known and neglected.

A considerable extent of wall may be washed by means of a common garden-pump in a short time ; and this operation should be repeated as often as a supply of the mixture can be produced ; or if the water of a washing cannot be had, a quantity of potash of commerce dissolved in water may be substituted.* The washing of the trees and wall twice a week for three or four weeks in the spring will be sufficient to secure them from the injuries of these insects.

On the whole, then, this must be considered as a valuable manure, as it can be obtained easily, at small expense, and in large quantities ; and when its nature is well understood, will probably be no less esteemed by the farmer than horse-dung. To the gardener, as well as to the former, it is useful, mixed with mould, as a fertilizing compost ; or, when fluid may be applied to his fruit-walls, as a wash fatal to the noxious brood of predatory insects.

THOMAS FALCONER.

ON THE CROSSING THE BREED OF ANIMALS.

[By Dr Parry.]

There being in the whole circle of farming no subject more important than that of breeding, I trust I shall stand excused if in this place I add to my former paper some observations, which while they tend more accurately to state the illustrations there adduced, will serve to confirm the general conclusion which I have formed.

* Mr. Speechely uses his mixture warm to soak the shreds, and wash the wall more effectually.

It is generally presumed, that when a breed of animals of given form and qualities is crossed with one of a different kind, the distinctive marks of the former will from time to time infallibly break out in different individuals of the progeny, so as clearly to exhibit the original female race.

On the other hand, that which I wish to prove is, that, by crossing to a certain extent, we may either fully arrive at the standard and fixed qualities of the original male, or may establish a new variety of animals, as permanent as any which now exist.

With this view I have, among other instances, adduced that of the English race-horse, which I have supposed not to be of the pure Arabian blood, but to have some mixture of a female race long existing in this country. This fact, though I cannot positively demonstrate it, I have thought probable for the following reason. In the female line of the pedigree of some of our most noted stallions, as for example, Eclipse, I find a great many deficiencies or omissions. Now the purity of these pedigrees is a most important point. It is considered by sportsmen as giving a high saleable value even to untried horses, and is preserved with an attention as minute as that of the proudest German nobleman. When therefore in this respect there is any deficiency, we may reasonably conclude that it arises from the intervention of some ignoble female, whose rank it was prudent to bury in oblivion.

As however this particular part of the argument is not essential to my conclusion, I will readily relinquish it, and ascend still higher, to the known origin of the supposed blood-horses.

The Arabs have various breeds of horses, of which that which they chiefly value is the Kochlani, or noble, whose genealogy, according to some, they trace two thousand years, or, according to others, only to the time of Sheik Ismael. These horses are so prized in their own country, that it would be very difficult to prove that all those which have been imported from thence into ours were of this race, and not of some baser mixture.

Next in the pedigree of Eclipse comes the Barb, usually brought from Morocco; from two to three thousand miles distant from the native soil of the Kochlani. That these are of the pure race, we are obliged to take upon trust; and nothing is more improbable.

Last among the known sires is the Turkish horse, some of which were war-horses, or chargers. Of these there are one or two crosses in the pedigree of Flying Childers, and, in that of Eclipse, from fifteen to twenty, with at least nine different and well-known Turkish stallions. Now it is agreed by all who have seen this breed, that there is a most striking and essential difference between the frames of the Turkish and Arabian horses; the former being proportionably much larger in the trunk, and longer and smaller in the legs than the latter; and as the same difference and a great increase of fleetness obtains in our race horses relatively to those of Arabia, there can be little doubt that those qualities are derived from the Turkish admixture.

In the pedigree of Diamond, an ancestor of Eclipse, there is a foreign horse of unknown extraction; and with regard to the Royal mares procured by Charles the Second, it is not even presumed that it has been ascertained what they were; and it has been suspected that some of them were of the breed of Andalusia in Spain, a breed at that time greatly esteemed throughout Europe.

Such is the origin of our boasted blood-horses, and such their real identity with the pure Kochlani. On much better grounds the French descendants of a ram exported from Lincolnshire, and mixing with the breed of Friesland, might be esteemed a genuine Lincoln.

The opinion of those who contend for pure and original breeds, involves in it an absurdity, of which it is probable they are not aware. Let them trace the Arabian upwards for two thousand years, or even to the age of Solomon himself, still that will not, consistently with their theory, suffice. A single cross up to the very creation will vitiate their conclusion, and if the reader will admit the moral certainty of this fact, then is my position established.

On this subject of crossing horses, I am, in reality, not without some little knowledge derived from experience. Several years ago, from two crosses of a grey forest poney, twelve hands high, with a brown stallion of doubtful pedigree, I obtained a horse exactly similar in colour to his sire, and with a form and qualities so much approaching to what is usually called blood, that I was convinced of the practicability of reaching the ultimate standard, and that much sooner than from theory I should have been disposed to conclude. If any man shall assign as the reason of this, that the forest horses have already some blood by the introduction of an Arabian or Barbary stallion, that is an admission of the principle for which I contend.

How then, may it be asked, does it happen that when, by crossing, we attempt to introduce new forms, the posterity, after a lapse of one or two generations, shall occasionally shew those distinctive marks, which we have tried to destroy? The answer is obvious. Because persons have concluded too soon, and not crossed deeply enough to confirm the variety which they wish to establish. Thus if in mixing the Spanish with the Ryeland race, we stop at three crosses of the former, we shall have rams, of which some individuals may have wool as fine as the Merino; but as this may arise from the accidental or acquired constitution of the individual, it is no evidence of the constitutional predisposition or nature of the cross, and therefore may fail of perpetuating itself with females of precisely the same mixture. Experience, however, shews, that a fourth cross gives the specific predisposition which is capable of being communicated to posterity, as well as from the pure Merino breed. At the same time, as the individual constitution is also not without some capacity of being transmitted, a Merino-Rye-land ram of the fourth cross, with finer wool, under similar states of health and flesh, than the original breed, will, by the union of these qualities, give his posterity finer fleeces than that breed itself: and this effect may with certainty be relied on, if, as I have observed in my former paper, it shall have been found that three or four generations from such a ram shall have maintained this superiority of fleece.

This appears to be the fact with regard to the wool of the Merino-Ryeland race; but there is considerably greater adherence to the female ancestry on the side of the carcase; and, therefore, he who would wish to have the full form of the Merino, must have at least five crosses of such a male. For this reason, perhaps, among others, the Ryeland and South-Down may be much better to mix with the Merino than the Wilts and some other coarse breeds; because by reaching the ultimate standard of fineness of fleece with at least one cross less, the posterity are less subject to deterioration of form.

How far this convenience may be counteracted by the superior proportions of the Leicester race, I cannot as yet determine, though I have been some years engaged in making the experiment.

Of the truth of the principles which I am endeavouring to establish, there cannot be better or more irrefragable evidence than in the known effect of mixing different varieties of the human race. Thus, "a white man with a negro woman produces a Mulatto, of a yellow blackish colour, with black short frizzled hair. A white man with a mulatto woman produces a Quadroon, of a lighter yellow than the former. A white man with a Quadroon woman produces a Mestizo. A white man with a Mestizo woman produces almost a perfect white, called a Quinteroon. This is the last gradation, their being no visible difference between the fair Quinteroons and the whites ; and the children of a white and Quinteroon consider themselves as free from all taint of the negro race."*

Precisely the converse of this fact takes place in the mixture of white females with Negro males.

C. H. PARRY.

[The following letter from Sir Benjamin Hobhouse, Bart. M. P. President of the Bath and West of England Society for the Encouragement of Agriculture, Arts, Manufactures, and Commerce, to the Corresponding Secretary of the Massachusetts Society for Promoting Agriculture, we have thought it a duty to make public, as evincing a disposition highly honourable to that distinguished gentleman, and to the ancient and respectable society over which he presides It is by a rivalship of this sort, a rivalship in the arts of peace, and in generous efforts to maintain and extend a friendly intercourse between our two countries that the interests of both can be best promoted. With the letter came eight volumes of the "Transactions of the Bath and West of England Society," thus completing a set which the Massachusetts Society had formerly procured but which the national difficulties had prevented them from continuing.]

Hetling House, *Bath*, *Dec.* 19, 1815.

Sir,

For your favour of the 4th of last September, which was received on the 5th instant, and for the valuable Volumes which

* Encyclopedia Britannica. article, Negro.

accompanied it, I am, as President of the "Bath and West of England Society for the Encouragement of Agriculture. Arts, Manufactures, and Commerce," desired by the Anniversary Meeting, held this day, and most numerously and respectably attended, to offer their warmest thanks to the "Trustees of the Massachusetts Society for Promoting Agriculture." I have the greatest pleasure in conveying this expression of the Society's unanimous sentiment, in which no person concurred more heartily than myself.

The members of the Bath and West of England Society rejoice in the return of peace between this kingdom and America; which terminates the effusion of blood, and by restoring the advantages, and blessings, which had been interrupted by a state of warfare, happily opens a free intercourse between the two countries. They are greatly indebted to the Trustees of the Massachusetts Society for having availed themselves of so early a moment, after the re-establishment of the facilities of communication, to send to them a complete set of their publications, and are eager to close with their proposal. Our remaining volumes are now forwarded to you; and they are in *boards*, because it is impossible for us to know, in what manner those which you possess are bound. We hope to be favoured with the transmission of your future publications, as they appear; and, on our part, we promise to convey ours to you, being thoroughly persuaded that this practice is for the advantage of both societies. The skill of man is as boundless as the varieties of soil and climate. If from our volumes may be collected many improvements in rural economy with which you were previously unacquainted, so may we derive from your pages, not only information of your having accomplished the same end by different means, but, in some cases, of the results of an entirely new set of experiments. Besides, it is the tendency even of an established course of amelioration to content itself, like an old system of error, with its present condition, regardless of the improvement, which may be made upon improvement: but what can be better calculated to prevent knowledge from becoming stationary, than the communication of its progress to other countries. Whether you or we shall be the gainers by this proposed interchange of publications is a question, into which we are not inclined to enter. If you should have the advantage, which we are not disposed to allow, we shall not repent of, but, on the contrary, delight in the compact. If, on the other hand, the scale should turn in our favour, the like, we are sure, will be your feeling: so that, what rarely happens, will occur, namely, that whatever may be the result of the bargain, both parties will be equally satisfied and pleased.

I cannot refrain from expressing a strong hope, that you will favour us, in the interval between the appearances of your volumes, with such communications, as are connected with purposes of immediate utility. We anxiously desire that this may become the usage of both societies, from a deep conviction that the most enlarged, and most free intercourse between them, will best promote the important objects, for which both were established.

I cannot conclude this letter without breathing an ardent wish on the part of myself and the other members of our Society that henceforth there may be but one species of rivalry between our nations, a rivalry to excel each other in the arts of peace, and in readiness to confer benefits on each other. Let neither entertain the notion that a hostile interest can ever arise between them, and then the race which they have to run, will be a race, not of enemies, but of brethren. May this be the feeling of one country towards the other, and may no event ever disturb it.

Wishing your Society every possible success, and hoping that we shall have the pleasure of contributing to it, I have the honour to be. Sir,

With great respect,

Your obedient humble servant,

BENJAMIN HOBHOUSE, *President.*

JOHN LOWELL, Esq.

Corresponding Secretary to the Massachusetts Society for promoting Agriculture.

PRODUCT IN MEAT, TALLOW, AND WOOL, OF A MERINO WETHER.

[From Gorham Parsons, Esq. to the Corresponding Secretary.]

Brighton, April 26th, 1816.

DEAR SIR,

I have killed my full blood Merino wether, and the following are all the particulars respecting him.

He was yeaned May 26, 1812.—His sire, my imported buck, Don Roderick—his dam, my imported ewe, Saragossa—emasculated June 8, 1812—ran with my flock without any extra feeding till December 19th last—was then put by himself for fatting, and fed on second crop hay, corn, oats, barley, and meal, varied from time to time as best suited him. On the 23d inst. he was killed—weighed alive 140 pounds—when dressed by the butcher, as follows, viz.

Rump hind quarter,	23 pounds.		
Other hind quarter,	20 $\frac{3}{4}$		
One fore quarter,	17 $\frac{1}{4}$		
Other fore quarter,	16 $\frac{1}{4}$		
	77 $\frac{1}{4}$		
Rough tallow,	13		
		90 $\frac{1}{4}$ pounds.	
Pelt with fleece,		16	
		106 $\frac{1}{4}$	
Head, liver, heart, &c.		12	
		118 $\frac{1}{4}$	
Feet, intestines—the offal,		21 $\frac{3}{4}$	
			140

1813, June 3d, he was shorn, fleece weighed 6 $\frac{1}{2}$, was sold to Doct. Tufts of Dudley, at 8s. 6d.	\$9 21
1814, May 13th, he was shorn, fleece weighed 8 $\frac{3}{4}$, was sold E. Mathews of New Braintree, at 12s.	17 50
1815, May 24th, he was shorn, fleece weighed 9 $\frac{1}{4}$, was sold Thomas Bond & Co. of N. Brookfield, at 6s. 6d. - - - - - - -	10 02
Cash received,	\$36 73

1816, April 25th pulled the wool, which weighed 9lb. 13oz. and is very fine and clean, as per sample inclosed, and may be fairly estimated at 6s.	9 81	
	46 54	
Meat and tallow at the present price, readily obtained for our native sheep, 90¼lb. at 9d.	11 28	
		\$57 82

Although I gave him as much as he would eat since December 19th last, yet he was a very small eater, and had a disposition to fat that I have never found in our native sheep. I feel very confident he was fatted on two thirds the quantity that would have been required for a native sheep of the same frame. He was examined before he was killed, and afterwards by many of our most reputable and discerning butchers, and by all pronounced the fattest sheep they had ever seen. The quality of the meat I feel satisfied will prove very superior.

Respectfully your very humble servant,

GORHAM PARSONS.

P. S.—The sample I inclose was taken from the shoulder, but except on the quarter there is very little difference; when alive his shape and general appearance were highly approved.

[Since the above was received, the mutton of Mr. Parsons' wether has been pronounced by gentlemen who partook of it, to be of a much finer grain and better flavour than that of the common sheep of our country—thus putting it in our power to combat, we hope with success, a prejudice generally prevalent, it is feared, among the farmers in this state. For a further confirmation of the value of this breed (whether of the pure blood or mixed,) for the butcher, we refer to the article in this publication at page 140.]

WET UNPRODUCTIVE MEADOW RECLAIMED.

[From S. W. Pomeroy, Esq. to the Corresponding Secretary.]

Brighton, 25*th April*, 1816

DEAR SIR,

In compliance with the request of the Board of Trustees I will endeavour to detail the management, in reclaiming a tract of 20 acres of Woodcock-meadow, or swail, upon my farm;—the contrast between its present and former appearance having attracted some attention. The soil is a light, black, vegetable mould, mixed with fine white sand, upon thin, alternate strata of blue, yellow-veined clay, and the same kind of fine sand. This sub-soil retained all the surface water, and so level and wet was the whole tract, that the hay seldom paid the labour of harvesting; and except in dry summers its value for pasture was trifling—besides, one quarter was occupied by flag ponds and mounds, that produced nothing like herbage suitable for stock. No part except four acres of the upper end had been subdued, in any other way, than by cutting the bushes and floating; the vestiges of a dam for that purpose now remain—a ditch through the centre five feet wide, carried off, slowly, the water from the spring and winter floods of the neighbouring high-grounds. I began at first, with ten acres, and the next year the whole was under the plough—it was struck out into lands of from one to two rods wide, as was found convenient, on account of roots, mounds, &c. and in a direction to the ditch; the lands were back-furrowed, as it is called, and the water furrows were cleared out by one or two extra bouts—as the tract was narrow and the ditch being incumbered with roots, and its sides unequal, it was found necessary to plough directly across, by which it was nearly filled up. The first heavy rain its contents were of the consistence of mortar, and a stop was put to all operations. To have cleared it out with shovels would have been a heavy and expensive job; a plough was tried with very little advantage. A maple sapling, that had been taken up with all its close and horizontal roots, extending four feet, was cut 6 feet long, hitched to a strong team, and with a man mounted on it, was drawn several times through the middle of the ditch, completely scooping out a passage for the water, throwing the mud on each side, and filling up the inequalities; the only manual labour necessary, was to clear out the mouths of the water-furrows with a shovel, which was soon performed—in the subsequent operations, the maple was frequently resorted to, with similar success. When sufficiently dry the lands were harrowed, in the same direction they were ploughed, and then ridged with a large Dutch plough and two yoke of oxen, these ridges were made by turning one furrow nearly upon another, the space being perhaps six inches, into which the manure was put, and were about five feet apart. In the centre of the ridges potatoes were planted in hills, from three to four feet apart—in cultivating, they were ploughed between the ridges *only*, with a yoke of oxen, or two mules *tandem*, and the earth to form the hills, taken out of the furrows, so that the ridges remained entire, and the crop secure from too much wet, which otherwise would have destroyed it. As it is not the intention of this communication to state the particulars of this crop, I shall only observe, that it was an average one, with the uplands in the neighbourhood—had the manure been more suitable for potatoes it probably would have exceeded; but in applying the manure, which was a compost of bones and hoofs from the soap and glue boilers, fermented with leeched ashes and sandy loam. I was governed partly by necessity, and having in view, the preparation of the two first substances for the permanent crop of grass that was to follow, they being of too fiery a nature to be laid down *fresh* with grass-seeds. The next season, the lands as first laid out, were again back-furrowed, ridged, and the same process pursued as before, with less labour, the same kind of manure, and the crop rather better; and as soon as it was off the lands were ploughed in the same manner as before, for the purpose of laying it down; but they were not sufficiently convex to take off the water entirely, and very unequal. Repeated ploughing and harrowing might have produced the desired effect, but time would have been wasting, and it became necessary to try the operation called turnpiking. A scraper, made of thin pine plank four feet long and two feet wide, shod with iron, with a couple of old plough handles fixed by staples conveniently for a man to hold, a small chain connected with them from the centre, to which the chains from a yoke of oxen were hitched. The scraper was then placed in the water-furrow of the first land in such a position as would take up as much earth as the oxen could draw and walk briskly. When he came to the centre of the land, which may now be called a *broad ridge*, the man raised the scraper and followed on to the next, treating each ridge in the same manner till he had gone over fifteen or twenty, he then came about and returned by the side of his former track, till he had performed the same operation over the whole—in some parts a second scraping was necessary. As the scraper was light the man held it up till he came to the water-furrows, or such places as he wanted to take the earth from, and the work was not harder than to hold a plough in new rough ground. As there is no stopping, the oxen may perform as much in a day as they can harrow with a harrow of the same width of the scraper. After the ridges had been harrowed level, and the water-furrows cleared out, the whole resembled a field of turnpike roads. To each acre were spread 200 bushels of dry leeched ashes, and 3 pecks of herds-grass seed, sown, harrowed and rolled—the sowing was from the 20th September to the 1st November, and on most parts the seed vegetated before winter. It was my intention to have kept a particular account of this enterprize, but the work, owing to wet weather, and other causes, became so blended with other operations of the farm, that it was found impracticable. I believe, however, that the potatoe crops nearly paid the expence the two first years; and I am convinced that the whole expence, besides the value of the crops, including the extra expence, compared with laying down common upland, did not exceed ten dollars per acre. The crop of grass the following season owing to the plants being so very young, was light—heads were formed but no seed produced. The hay resembled rowen, and was of more value than any crop the land would have borne had it been sown with the grass seed in the spring, as is usual. The land for four successive years since, has averaged two tons per acre—not estimated tons, as taken out of the field, but weighed out in the winter and spring in the Boston market, being put in a barn by itself, and an exact account kept of the sales. The last season the crop was lighter, but no water remaining even in the water-furrows, it has become a fine perennial meadow, and with slight top dressing once in two or three years will forever be productive of the sweetest herbage. The value of the land in the estimation of many, who were acquainted with its former state, is thought to be more than quadruple.

I am, &c.

SAMUEL W. POMEROY.

N. B.—It may be proper to state, that I have not suffered the land to be fed with any kind of stock, but have some seasons taken a second crop from some parts of it.

ANOTHER INSTANCE OF SUCCESSFUL TREATMENT OF WET MEADOW.

[To the Trustees of the Brookfield Agricultural Society.]

GENTLEMEN,

PURSUANT to a request of the society, that any of its members, or others, would communicate such information as they may possess, conducive, in their opinion, to improvement in the art of husbandry, I am induced to submit to your consideration, the following account of a successful experiment, which, seven or eight years since, I made in draining a tract of marshy ground.

The piece contains about four acres, gradually descending to the North-west. I dug drains in such directions as to intercept all the springs, which arose within the inclosure, or came from above it. The trenches were dug about twenty inches wide, and two feet deep. They were then filled with stones of various sizes, to within eight or ten inches of the surface. Particular care was taken in throwing the stones into the ditch not to beat the dirt from the sides, and to place them in such a manner, that no one might extend across the drain, or lie so as to obstruct the water. To prevent the dirt from sifting through the stones, when thrown over them, they were first covered with straw, or old hay. The drains were then completely filled with the earth which had been thrown from them, and care taken, through the whole, that no aperture should be left, through which straws or dirt might be carried, to prevent a passage of the water. It is best that the ground over the drains should be a little crowning.

After I had in this manner finished my drains, I covered the whole plot of ground, from two to four inches deep, with loam and earth, thrown from trenches nearly two feet in depth, which were dug for the purpose of setting stone walls. Having sown the usual quantities of clover and herds-grass seeds, I gave the whole a small dressing of yard manure. The grass seed took very well, and the first year I had an abundant crop of feed; since then the experiment has answered my most san guine expectations. The ground, from being almost barren and useless, has become exceedingly productive, yielding annually, in favourable seasons, two large crops of hay, with a like propo tion of *fall* feed.

Previous to my adopting this method, all my efforts to drain the land by open ditches had been ineffectual. The ground was so wet and miry, that the drains were almost entirely filled the second, if not the first year after they were made. I am thus convinced, that in grounds capable of being drained, covered drains are far preferable to open. The extra cost, in the first instance, is small, and when once properly and faithfully made, I am confident they will answer their purpose for years, or perpetually, without any further expense; so that eventually they will be much the cheapest. Add to this, they dry the ground more effectually; they may be dug in any direction, as is most convenient, (contrary to open ditches) without disfiguring the land or obstructing a free passage over it; they afford a repository for those small stones that are a nuisance to many farms; and besides give to the proprietor the improvement of the whole of his ground, the earth covering the drains being quite as productive as the adjacent.

I am, &c.

GAD WILLISTON.

Brookfield, Oct. 15, 1806.

ON THE USE OF PLASTER OF PARIS.

Duxbury, January 10, 1816.

[To Thomas L. Winthrop, Esq.]

SIR,

AGREEABLY to your request, I make the following communication. About the 10th of April, 1814, I sowed a piece of land, (about a quarter of an acre) with summer wheat. Measuring out ten quarts, I put it into clear water, twenty-four hours before sowing. Then mixing fine Plaster with it I planted it while it was wet, the plaster adhering to the kernel. It was sown in a calm morning, came up well, and when about thre inches high the ground was strewed with about half a bushel of fine plaster, and again when the wheat was up, say 10 inches high, (taking each time a calm misty morning.) One load of barn manure was put on and harrowed in before sowing; no other manure was used. It was ripe about the 20th of July, cut and got in good order and thrashed soon after, and from the ten quarts, I measured ten bushels and one peck of good wheat, and a peck and a half of rye. The rye was grown with the wheat but was picked out before thrashing, and thrashed by itself. This rye was full grown and large, but on almost every head were one or more kernels blasted, of a dark blue colour, about three fourths of an inch long, and known in our neighbourhood by the name of spurred rye. About three fourths of this piece of ground was planted the year before with corn, the other one fourth, used as a garden, was ploughed in the fall and twice ploughed and harrowed in the spring before sowing. This piece of ground is near the salt water, and part of the same made over salt meadow. The wheat which I sowed was procured from a Mr. Alden, from the south part of Brigewater.

I have used plaster in various ways for seven years, and for several years past have practised sprinkling a handful on each hill of corn, after the first and second time hoeing; preferring a calm misty morning to do it; and am fully convinced it does no hurt, as I have had good crops of corn of about 30 to 35 bushels to the acre, where fifteen or twenty years since 15 bushels was called a good crop. But I have used other manure made of almost every perishable substance. The plaster is first ground in a common grist mill fine as flour. In 1814, I had one field of summer rye and one of winter rye. The summer rye was full and very good, the winter much pinched and good for little. In 1815, I had summer and winter rye, and this year it was quite the reverse. Perhaps the same season does not suit both kinds of grain; should this be the case, it may be well for farmers to have some of each kind growing at the same time.

Your humble servant,

SAMUEL A. FRAZAR.

A NEW AND CHEAP METHOD PROPOSED TO EXTERMINATE THE CANKER-WORM.

BY JOHN KENRICK, ESQ.

[To the Corresponding Secretary.]

Newton, March 25, 1816.

SIR,

Having attentively examined the various communications which have been made to the Massachusetts Society for promoting Agriculture, on the subject of the *Canker-Worm*, and its very extensive and destructive depredations, I am induced to propose a new and cheap method of seizing and destroying the insect in its chrysalis state.

It appears to have been ascertained by Professor Peck, on the most careful and critical observation, that a part of the worms when they have done feeding, descend by the trunks of the trees, and immure themselves in the earth near the trunks; and rarely, if ever, more than from three to four feet distant; in grass land from one to four inches deep; and in ploughed land, not more than to the depth of seven or eight inches. Also, that the few canker-moths which rise in autumn, never ascend the trees before the beginning of November.

I think it more than probable, that the canker-moths which ascend the trees in the autumn and spring, proceed, exclusively, from the worms which had previously descended by the trunks.

Presuming on the undoubted accuracy of Professor Peck's discoveries, I take the liberty to propose as follows:

From any time in June, after the worms have entirely disappeared, until the twentieth of October, let the whole of the soil surrounding the trees, to the extent of at least four feet from the trunks, and to a suitable depth, be dug up and carted away; and placed at a distance from any trees the canker-worms are in the habit of feeding upon; and let there be returned in the same cart, an equal quantity of compost, or rich earth intermixed with manure. Or the soil returned may be taken from ponds, roads, or the ridges which often accumulate on the margins of fields; or, if there happen a ploughed field near the orchard, in which there are no apple-trees, the soil may be exchanged, load for load, without injury to the field: but, in either case, let a good quantity of manure be spread at the bottom of the soil returned to the trees.

The earth taken from the trees, if not otherwise disposed of, will make a substantial ingredient in compost.

If a few straggling canker-worms appear on any of the trees the spring following, I recommend that those trees be marked, and that the operation proposed be repeated the succeeding summer. The exact extent to which the surrounding soil ought to be taken from the trees, will be ascertained by experience; the distance suggested appears sufficient, and none too great for the benefit of the trees.

The process proposed, will not only accelerate the growth, and increase the fruitfulness of the trees, but will prove a considerable guard to them against the depredation of moles in the winter following: advantages which will abundantly outweigh the whole expence. But the pre-eminent advantage attained will be to have captured those destructive invaders, broken up, and completely destroyed their encampments.

Annual tarring, the only remedy in general use, instead of being beneficial to the trees, is allowed on all hands to be injurious. The seasons being variable, it requires considerable care and skill to know when to begin; if one day too late, some of the canker-moths will have ascended the trees; if four days too early, so much labour and tar is lost. The same difficulty occurs in knowing when to cease tarring. The business must be attended to exactly in the right time, whether it rains or shines; and the operation repeated, (as farmers who are in the use of this remedy generally agree,) considerably more than twenty times in every season; and the average of various estimates, of the annual expence of tarring each tree, amounts to full ten cents.

The method I have proposed, appears to be perfectly adapted to the convenience of the practical farmer; he will avoid the trouble and expence of purchasing and applying tar, lime, or any other article; he can perform the operation when most at leisure; and with a certain prospect of ample reward for his labour, even if no damage were apprehended from the canker-worms; and if the operation is performed in June, he can raise a crop of potatoes around the trees the first season. Hence it is obvious that several very important advantages will be obtained, in addition to the prime object; and the prudent farmer, who adopts this method, will have in view the most, if not the whole of the following *distinct objects:*

1. Extermination of the canker-worms.
2. Growth of the trees.
3. Fruitfulness of the trees.
4. Defence against the moles.
5. Several crops of potatoes.
6. Manufacture of compost manure.

As I have never had any canker-worms on my farm, I cannot with convenience, personally, prove the efficacy of the method proposed by actual experiment; but have engaged Gorham Parsons, Esq. and another gentleman to do it, and expect they will be able to communicate the result by the beginning of June next.

Some remarks on the necessity and importance of improving the Manufacture of Cyder, introductory to some extracts from approved English and French works on that subject.

BY THE CORRESPONDING SECRETARY.

THERE are people, it is well known, who are prejudiced against cyder as being an unwholesome liquor, and who would prefer to see beer introduced in its stead. There is no danger, that such an opinion will ever prevail generally. The people of this part of the country are too much attached to the beverage of their forefathers readily to relinquish it. Whoever wishes to be convinced of this, need only visit the new plantations in the winter season, in which he will often find the poor cultivator returning from a journey of 50 or 60 miles with a load of cyder. There is nothing of which a good farmer is so proud as of his orchard, and the state of the orchard is generally a pretty good test of the character of the man as to industry and capacity at least.

Cyder has been a favourite liquor in all countries in which it can be produced. The Normans and Bretons of France value themselves as much on the excellency of this article as the Gascons do upon their wines. The same thing may be affirmed of the cyder counties in England. It is certainly desirable that it should continue to be the general drink of the New-England people. Our climate and soil is well adapted to the apple-tree. If we drink cyder, we can spare so much the more grain for other purposes. As to the superiority of malt liquors, in point of salubrity, that is a point not yet settled. If the English farmer is more fleshy it is much to be doubted whether he is more hardy than ours. It is not certain, that the spare habit of our farmers is to be attributed to their food or drink. It may be owing to the extreme heat of our summers, a cause quite sufficient to account for it. As to the comparative health of Great Britain and America, neither our bills of mortality or tables of longevity calculated upon them, nor the census so often corrected would warrant the opinion that our country is less healthy than that.

Some persons suppose that cyder has a tendency to make men intemperate. If men are disposed to be so, there are no liquors which may not be made subservient to the purpose. The malt liquors are as intoxicating as most cyder. Cyder certainly supplies the place and very usefully of ardent spirits. It is therefore greatly to be desired not only that its use should not be diminished but that it should be improved in its quality as much as possible.

Notwithstanding our state is so remarkably well adapted to the production of cyder, and although our people are so generally and strongly attached to it, yet it is not to be disguised, that the quality of our cyder, as it is commonly drank, particularly in the country, is inferior to that of any cyder country in the world, and much inferior to that of New Jersey.

Many very excellent remarks have been heretofore made by writers in this work on this subject, but the agricultural papers had not then so extensive a circulation as at present.

It is therefore best, even at the hazard of repetition, to inquire into the causes of this acknowledged inferiority in our cyder, and to point out the most probable successful remedies.

The remote causes of the badness of our cyder generally, are the want of sufficient encouragement hitherto to produce better, and the general neglect and indifference of our farmers to the preparation and cooking of their food. It is a truth not to be questioned that with as good, if not the best provisions, of every sort in the world, few people enjoy the innocent luxuries of the table less than we do.—Our bacon and hams are often ruined in the curing, our butter in the making and preservation.—Our cheese used to be subject to the same difficulty, but within the last twenty-five years this article has wonderfully improved, and this encourages us to hope, that we shall not throw away or injure the other bounties of Providence.

When our citizens in great towns would make no distinction between good and bad cyder, when a man who took the pains to sort his apples, house them till they were ripe, and then make his cyder in the best manner, could only command the same price which would be obtained by his neighbour, who neglected all these precautions, it could not be expected, that our cyder would be good for much. But the towns having become more opulent and luxurious, distinctions begin to be made and the cyder from some farms will bring from 30 to 100 per cent more than that from others. It is indeed cheaper in the end to pay five dollars a barrel for good cyder than one for such stuff as is sometimes sold for that liquor.

It is to be hoped too that the increased opulence of the farmers will not be devoted to building showy houses, but will be manifested in a disposition to ameliorate their mode of living, their diet, and improve the neatness and comfort of their furniture and moveables of all sorts. In that case we may hope that strangers may be able to take a glass of cyder with our farmers with pleasure, a thing which can now very seldom be done. How rare is it, (there are some honourable exceptions) to find cyder in the country clear, refined and free from acidity. It would not be extravagant to say, that three quarters of our cyder, is more or less acid, turbid and disgusting to those who have seen better. It is not necessary cyder should be bottled and treated with all the nicety and care which it receives in great towns. The farmers in England, those of Herefordshire and Worcestershire especially, have excellent cyder preserved in casks. It is equal to the choicest of our bottled cyder. But the English farmers do not as will be seen in the sequel, regret the labour bestowed on the cyder after it is expressed. They do not neglect it as soon as it is in the barrels. How absurd and preposterous this neglect ! After all the expense of planting an orchard, rearing and pruning the trees, after the labour of picking and grinding and pressing the apples, to suffer the cyder to be ruined for want of one weeks attention only after it is put into casks ! Yet a large part of all the cyder produced in Massachusetts is irreparably injured, within the first ten days after it is put into barrels. In some seasons, and on some farms the liquor is so rich and genuine that it will survive even this neglect, but much the greater part of it is far advanced towards the last stage of fermentation. It wants only body, and little heat to become good vinegar.

Such are in my opinion the remote causes of the general ill quality of our cyder, compared to that of New-Jersey, or of Europe. The proximate or immediate causes may be resolved into the following :

1. Inattention to the selection of proper fruits in making our orchards.

2. Neglect to separate the different sorts of apples so as that those only which are of an equal degree of ripeness should be ground together. What sort of wine do you suppose would be made, if the ripe and unripe grapes were all put into the same press ? Is cyder an exception to the common laws on this subject ? How can it be expected that cyder should pass regularly through the process of fermentation when it is composed of liquor in various stages of ripeness ? Some farmers we know are attentive to this point, and others must have felt the good effects of it.

3. The third cause of the indifferent quality of our cyder is the process of making it.

And lastly, gross inattention to it after it is made.

I shall consider each of these points separately, and instead of shewing the existing defects, I shall take from the most approved English and French works, directions on all these heads. Let our farmers read them, if they are conscious that their own practice is defective on any of the points mentioned, they will have instructions how to remedy them. If they think their own practice better, let them for the publick good, communicate that practice to the Society for promotion of Agriculture, and the society will make it known.

The 1st point of attention in which I think we are defective, is the selection of proper fruit for making cyder. I believe there is not an orchard in Massachusetts, planted on the principles laid down by writers on this subject. I believe there is no one apple selected in preference as a *cyder apple*. There are trees grafted for winter fruit, but our cyder generally takes the refuse of all our apple trees.

The first work I shall cite on this subject is a treatise on cyder making, by H. Stafford, Esq. of Devonshire, Great Britain.

" Some are of opinion, that with good management any kinds of apples may be made to produce good cyder, but experienced farmers do not concur with them. I have indeed tasted of cyder made of common fruits extremely sweet, but for want of sprightliness mixed with it, it soon palled or became sour.

" In Devonshire it is a maxim worth observance, that in planting an orchard, the several excellencies of the kinds intended for that purpose, should be previously well considered, whether they are likely to make lasting, large and fruitful trees, as well as hardy, not subject to blights ; that they produce fruit which will make the best cyder, and that all the kinds may ripen about the same time, or at least, enough at the same time to make a good cheese for one pressing, which last property is of no small consequence for the making of cyder " Who among us has followed such rules, and yet who will deny they are wise ?

The following directions for planting an orchard, are from the celebrated Philip Miller, one of the greatest gardeners England ever produced.

" In planting an orchard, great regard should be had to the nature of the soil, that *such sorts of apples* as are well calculated for the land should be chosen. It is for want of attention to this, that in many countries we see orchards planted and never arriving at perfection, the trees starving, their bodies covered with moss, and the bark cracks and divides, whereas, if instead of apples, pears or any other sort of fruit to which the soil was adapted, had been planted they might have grown well. If you are at liberty to choose, a rising ground open to the south east is the best situation ; but I would not recommend the side of a hill when the ground is very steep, for the rains are apt to wash away the soil from the trees ; but a gentle rising is beneficial by admitting sun and air. If defended from the west, north, and east winds, so much the better. If your land has been in grass some years, you should plough in your green sward the spring before planting the trees, and if you will permit it to lie fallow it will improve it, stirring it two or three times to hill the grass. In September, plough it deep, and plant your trees in October if the soil is dry, if not the next March (or in our country, April). You should stake them to prevent their being loosened by the wind.* If the summer following proves dry, you should cut some sods, or turf, which should be laid round the roots of the tree, with the grass down, which will prevent the effects of drought. Whenever you plough among them, be careful not to go too deep among your roots lest you wound them ; but if you are careful, it will be very beneficial to stir the land often. Never suffer weeds or grass to grow too near the trees.

"There are some persons who plant many sets together in the same orchard, but this should be avoided, for there will be a difference of growth in different kinds, which is unsightly, but the fruit will be injured by some overtopping others.

"Your orchard should be manured every two or three years. This can be done by taking a crop from it.†

"In making choice of your trees for an orchard, always choose them from a soil nearly akin to that in which you mean to plant them, or at least from a *poorer* soil, for if you take them from a rich soil, and transplant them into an indifferent one, they will not thrive well, especially for 4 or 5 years. The trees should be young and thriving, for whatever

* Mr. Preble recommends treading the ground hard round them and omitting the stakes, which he thinks does as much harm by galling the trees, as good by keeping them steady.

† He does not mention the sort of crop, but potatoes would without doubt be the best crop for a young orchard.

you may be advised, though large trees bear fruit sooner, they never thrive so well nor are so long lived. They must not be much pruned. It is necessary to take out dead wood, and such limbs as cross each other, but pruning too much is hurtful "

The Complete Farmer's Dictionary gives the following additional hints on this part of our subject. They are the advice of a Herefordshire planter. That county is famous for its excellent cyder.

" The worse the apple is for the table, the better it is in general esteemed for cyder, such as are harsh and crabbed to the taste. They are called red streak, white and green musts, &c. &c. of all which I prefer the red streak. Generally the redder the apple the better it is for cyder. The paler the rind the worse the juice. A sweet apple with a tough skin will always yield a good vinous liquor. The more yellow the flesh of the apple, the better and finer coloured will be the cyder. The above maxims, though few, have been of great service to me in life, but they must not be scrupulously adhered to because there are exceptions. I seldom suffer my apples to be gathered till they begin of themselves to drop. Great care is taken in gathering, for fear they should be bruised. I have found this a very needful precaution.*

" As they are gathered (says the Herefordshire planter,) I have them sorted according to their several degrees of ripeness."

The French writers are equally urgent on the importance of selecting the fruits best adapted for cyder, and in planting those of an analogous, or similar nature, in one orchard.

It may be said, there are great difficulties in procuring trees of approved sorts. Where can we get the Hughes's crab, and the Hagloe crab, and the other celebrated cyder apples it may be asked ?

We answer. There never will be a supply till there is a demand. It is believed, that as many thousand trees of the

* This is a point, never, or very seldom attended to in our country. Cyder apples are usually knocked down with poles, to the damage of the fruit and tree.

best cyder fruit can be procured annually, as will be wanted. Trees can be imported from England, or France, or from New York, and sold here for 30 cents apiece. In a few years we should have nurseries here, whenever our farmers shall think it best to have the most productive apples, and those which experience has shewn to be calculated to make the best cyder. But while they are contented with an orchard, one half of which consists of bad fruit, some trees ripening in August, some in September, and some not ripe in October; while they are indifferent as to the quality of their cyder, and esteem an acid, musty liquor as much as a vinous well flavoured one, no doubt good apple trees will be dear or not to be had. It is true, that we probably have many natural apples equal to the most famous of Herefordshire.

Our climate is much better suited to the apple. Our trees are fairer and finer than those of the best cyder counties in Great-Britain. We must have probably some excellent native apples. But then who knows where to get them? The reputation of an apple hardly goes beyond its village, and many farmers know nothing of the quality of their own apples except their productiveness, because they mix the good and bad together.

On this first point it is apparent, that we cannot rival other countries in cyder until we adopt some system in planting, by selecting apples well known to be calculated to make good cyder, and well assorted as to ripeness.

We now proceed to the second point.

The culling and sorting the apples previous to grinding them.

That this is considered an important part of the process of making good cyder, will appear from the following extracts.

The Abbe Rosier, author of the most approved work on agriculture in France, has the following remarks.

"The fruit ought always to be left upon the trees till it is quite ripe. You may then disengage it from the tree easily without hurting the fruit buds of the next year. They should be gathered on a dry day when they are not covered with dew, or any extraordinary moisture. Moisture causes them soon to rot and turn black. They ought to be collected in as large heaps as possible to ripen them better. The early apples ought to be separated from the later ones. Some will be too ripe or even rotten while others are yet green.

"They take care therefore to heap together those only of the same kind. As to windfalls they are collected separately, in order to make cyder for present use. The apples ought to be gathered by hand. It should be done by light ladders so as not to injure a single bud of the next year. The question is this, whether the slight additional expence of gathering the fruit by hand, will not be abundantly compensated by the preservation of the fruit buds of the next year?

"Rotten apples ought to be entirely excluded. They give a musty taste to the fruit.

"You ought to collect all the apples of a similar sort together, having a regard both to the quality and degree of ripeness. Without this attention you will carry to the press apples which are yet green, others rotten, and there will result from it a very bad liquor. On the other hand you will have by separation cyder of different qualities, but all good. Some is good for immediate use, that is, in three months, some will keep for one or two years.

"The Normans separate the sweet apples from the sour. This was the advice of the celebrated Olivier de Serres, the father of French agriculture. He says, Let us remark that we ought not to mix the different kinds of fruit. The sweet should not be mixed with the sour: each should be separately pressed. This will affect the goodness as well as duration of the cyder. Thus sweet apples will give the best quality, and the sour the second. The last will keep the longest." *Abbe de Rosier.*

Such are the opinions of French cultivators as to the sorting and selection of apples.

The Complete Farmer's Dictionary gives us the English practice. The Herefordshire planter thus describes his operations.

"As the apples are gathered, I have them sorted according to the several degrees of ripeness, making in general three sorts which a little experience teaches to separate properly, the difference being apparent at first sight. As fast as they are gathered they are carried under a shed to ripen. I suffer my apples to lie a longer or shorter time in heaps according to their nature, such as are hard and solid lying longer than those that are soft and pulpy. I divide my apples into three sorts, but I have six qualities of cyder, each differing in taste, flavour, and quality.

"As fast as the fruit is ground, (I need not say I use the ripest first) the pulp is put into vats near the press before it is put into the cheese ; at the bottom of the vat is a tap through which a considerable quantity of vinous juice will run without pressing.

"This is the best cyder, and I barrel it by itself. I then press the rest and barrel it separately. Thus I have six qualities from my three assortments of apples."*

Another English writer says, "When your apples are fit for gathering, it is essential to choose dry weather, for water is a bad ingredient in all vinous liquors, and gather it *by hand*. This is difficult in extensive orchards and on high trees, but it is of great advantage and quits cost. You can choose your apples and leave those that are not ripe : you save your fruit from bruises and your trees from damage. The gathering by hand is so essential, especially for winter fruit, that it cannot be dispensed with. Those who plead the want of time, may be answered, that it would be more beneficial to them to have only half the quantity of good cyder, than the whole of indifferent.

"But for those who are too lazy to adopt this practice, the best method is to cover the ground with a sufficient thickness of straw, to save the apples in their fall, and to put blankets upon the straw ; then to shake the boughs gently, removing the apples under the tree at every shaking, that they may not be bruised by those which afterwards fall."

Now we ask, whether this sort of care is with us ever taken? and whether it is not as well worth the pains in this country as in England? Would not half the quantity of excellent cyder go as far in a family, and sell for as much as double of an inferior and miserable quality?

"Windfalls, bruised apples and unripe ones, should not by any means be mixed with those which are choice ; for if they are, it will be vain to expect good cyder. This bad fruit need not be thrown away. It will make a cyder of inferior quality. There is a difference of opinion as to sweating the apples in heaps, but they all agree in one maxim, that the fruit should be ground when it is in the greatest perfection for eating. Almost all apples require some time for ripening. And they should be so separated as to have each sort ground when it is perfectly ripe."—*Complete Farmer's Dictionary.*

* Would it not be worth the pains of our farmers to keep the first runnings of the press separate, and use or sell it as cyder of superior quality? There can be no doubt of the correctness of this Herefordshire farmer's remarks. He must have had the advantage of experience.

These are the hints given by French and British writers. Are they not judicious? Are these practices adopted with us? If not, why should they not be? Cyder in the cyder counties of England is not much dearer than with us. But the price is regulated by the quality. Cyder of good repute will sell for three or four times as much as that which is indifferent. It would soon be the case in our country, if any of our spirited and intelligent farmers would adopt these rules, or any others calculated to make their cyder equal to that of Normandy or Great-Britain, or of Newark in New-Jersey. Let us not longer have the reproach so often bestowed upon us, that while our soil and climate are peculiarly adapted to the apple-tree, our cyder is such that foreigners and even our own citizens who have been accustomed to better liquors cannot endure it. Hence the great consumption of brandy and ardent spirits in our country towns. Furnish them a pleasant and wholesome beverage, and you will do more to abolish this practice than you can do by any other means. We have thus seen that a second method adopted to procure good cyder in other countries is to sort and select the fruit destined to produce it.

The third question relates to the mode of making the cyder and the last to the treatment of it, after it is made, till it is fit for the table These two points being intimately connected and very much blended by the writers on this subject, we shall consider together.

The Complete Farmer's Dictionary contains the following directions on this part of the process.

" The first runnings from the vat may be immediately put into barrels, taking care to strain them first. As to the juice after it is pressed it ought to remain thirty hours in the tub or vat into which it runs till the fœces or dregs have fallen to the bottom, after which it may be drawn off by a cock and put into the barrels. After the cyder has done fomenting some persons throw two or three handfuls of wheat bran into each barrel which serves to make the head or cream thicker, and makes the cyder keep better. New casks are, if possible to be avoided, as they give the cyder a disagreeable taste, if it cannot be avoided, they should be scalded with water in which a considerable quantity of apple pulp has been boiled. If a vessel is not sweet, it may be made so by putting some unslacked lime into it, and letting it stand till the fermentation is over. A dozen sweet apples sliced into a cask of cyder have been found to be advantageous."

One writer says, the best cyder he ever had was when he put into each hogshead three quarts of good wheat first boiled and hulled. The same writer says, he must give one piece of advice to cyder makers, that they diligently watch the alterations in it during changes of weather. There is scarcely any disease in this liquor but what may be cured by a timely application. If it is only a little inclined to tartness, wheat managed as above (that is boiled and hulled) will cure it. The quantity when the cyder is quite tart is half a peck to a hogshead. (or about a quart to one of our barrels) Such are the directions of one cyder maker whose opinions are quoted in the above mentioned dictionary.

Another writer says "when the apples are ground they are not put immediately into the press but into wide tubs or vats, where the pomace should be turned five or six times a day to prevent fermentation. This is done in order to give the cyder a fine colour. This is done in two days. It is usual (says this cyder maker) to dispose of all the liquor in the same way and without distinction. This is wrong if there is any analogy as there must be between cyder and wine. Experience has shewn that in making wines there is a great difference between the *first* runnings from the press and those which are obtained by hard pressing; and this difference is always in favour of the former. If the same be true of cyder we lose by our common method the richest and choicest kinds.

When the pressing of the apples is finished, the most careful makers of cyder strain it through a hair sieve, (or through sand) to separate it from the coarsest dregs. It must be then left to itself till it has gone through the necessary fermentation; for this purpose some put it into hogsheads and others into great tubs or vats wide at top and narrower at bottom, containing from 5 to 20 hogsheads (or from 20 to 80 barrels.) In these vessels the heaviest lees subside and the lighter lees form a crust, which when it begins to crack and sink gives notice of the time to draw off and barrel the cyder.

The usual time for this first fermentation is from 36 to 48 hours. Some affirm they can put the liquor immediately into the barrels without any other caution than leaving space to work off the lees, but this is hazardous and successful only in favourable seasons. A moderate degree of warmth is absolutely necessary to produce the proper fermentation of cyder. If therefore your cellar or apartment be too cold it must be moderately warmed. As soon as the fermentation is over, (and great care must be taken to prevent its being too great for in this last case it will become acid) it must be drawn off and then it may be put where it is to be preserved. New casks are bad. Frequent scaldings with hot water in which a little salt has been dissolved or with hot water in which pomace has been boiled, and afterwards washing the casks with cyder will check this evil.

There are some who advise the fumigating casks with brimstone, and affirm that the acidity of the cask is corrected, the musty taste destroyed and that the cyder will keep the better for it. It must in that case be put in as soon as the fumigation is finished. The best shaped vessels for keeping cyder are those in which the cask or vessel is wider at top than at bottom.

A question of great importance is now to be considered. Some maintain that frequent racking spoils the cyder, and others assert that it can never be good without it. Some rack once and twice, and others whenever the liquor frets or ferments. We shall therefore state the various methods and give a general opinion on the case.

One mode is to leave the cyder in the open vats at the press some days longer than above advised (which was two) and till it is in some degree finer, then to put it into casks where it is to remain without any further racking. Those who defend this practice say their cyder is stronger and better for it.

A second and more common mode is after barreling it and letting it stand about a fortnight to draw it off into fresh casks. To this second racking others add a third in March. Others especially the Devonshire people (whose habits and usages much resemble ours) look upon a thorough fermentation as the great secret to have their cyder light, fine, and free from dregs and accordingly they do more. At first barreling they leave a space to receive a fresh paillull from the press. This produces a new fermentation, and often is kept up by fresh cyder for a fortnight. A month after this they rack their cyder into new casks and in two months more they rack it again, and if it still frets they often repeat it a third and fourth time.

Such are the various practices in England, and the authors of this dictionary on the whole advise to the racking of cyder. Weak cyder cannot bear more than one or two rackings. Strong cyder will stand several and grow mellower for them. Above all, great pains must be taken to prevent fermentation after the liquor has become fine : this can only be done by racking. Generally the cyder which is longest in refining is the strongest and most lasting.

Another more sensible writer in the same work, observes, "that the ground apples, or pomace ought to remain at least 12 hours before it is pressed at all. With respect to the temperature of the air in which cyder should be kept while fermenting, or to make it ferment, he remarks that farmers have no thermometers. Some more obvious rules must be applied. They should not be exposed to frost. In the beginning, however, they cannot be kept too cool short of frost. Hence the time when fermentation will commence is uncertain. Sometimes not till after a week, or even a month in cold weather. Agitation in a carriage will, however, speedily bring on fermentation.

"The continuance of the vinous fermentation is as uncertain as its beginning. Liquor which has been *agitated by transportation*, will pass through it perhaps *the same day*. But other liquors less agitated, seldom go through it under two or three days, and sometimes will continue in fermentation five or six days. With regard to ascertaining the degree of fermentation which cyder has undergone, whether not great enough, or exactly right, or too great, I have not been able, says this writer, to collect any fixed notions on the subject. It is a subject to which most cyder makers pay little or no attention. It is true the manufacturers of sweet cyder pay some attention to fermentation. Their whole art consists not in regulating, but in checking the fermentation as far as possible.

"Fermentation operates differently on different cyders. Thus that which is made of ripe fruit, throws up a gross spume or froth like malt liquors, forming a brown crust. The riper the fruit the more of this brown froth, or scum, is thrown up.

"Having remained some days on the lees, it is drawn off into fresh casks. Some men wait before they rack their cyder till the brown crust begins to crack. Others prefer to rack before the fermentation is entirely over. The makers of perry rack it off when it has done hissing. The manufacturers of sweet liquors will not permit them even to hiss.

They keep up the process of racking which certainly checks the fermentation.

"The fresh casks into which cyder has been racked are never quite filled. This is general practice. They are left short about a pailfull, so that you can just touch the liquor with the end of your finger.

"The number of rackings depends on the state of the liquor. If the fresh fermentation, which mostly commences after the racking, be violent, it is understood generally that the liquor should be racked again. Hence in the practice of some men it is racked five or six times.

"On the other hand, if the fermentation is moderate, it is commonly suffered to remain after the first racking. In the common practice of farmers, (English farmers) it is racked but once. (In our practice, speaking of farmers generally, it is not racked at all, but suffered to remain in its first lees.) Those who prepare cyder for sale, always think it prudent to repeat the rackings till the liquor is quiet. If this cannot readily be brought about, they have recourse to stumming. Stumming is burning matches covered with sulphur within the cask. The match is let down into the cask lighted, and the cask is thus filled with the fumes of sulphur. The cask is suffered to remain three hours before the liquor is put into it. *Ninety-nine* casks in an *hundred* in the country, (Great Britain,) go through this process.

"But there are some persons who prefer fermenting their cyder, in open vats, or tubs. Some do it in deep tubs, but the most approved mode is in shallow vats, five feet in diameter, and not more than two deep, each containing about eight barrels. In these the liquor remains till it has done rising; when it is racked off without skimming (being drawn off from the bottom). In this case, it seldom is racked a second time.

"There are three species of fermentation

"The vinous, which gives the liquor the body and qualities of wine.

"The acetous, which produces vinegar.

"The putrid, which utterly destroys its use.

"(The cyder in our country rarely stops at the first stage. It is nine times in ten far advanced to the vinegar state.) The juices of fruits, with moderate heat and fermentation, will readily pass into the vinous state. They will, if left open and not attended to, soon after pass into the acetous, or acid state: and if neglected, the putr'd state will ensue.

"The object then is, to bring on the vinous state, and to preserve the liquor in that condition.

"The first effect of vinous fermentation is to increase the strength of the liquor, furnishing it with an intoxicating quality which it did not before possess, and changing its medical properties Another effect is, to lessen or destroy the sweetness of the liquor; some prefer rough, and some sweet liquors.

"To produce rough liquors, choose austere and sour fruits. To produce sweet ones, choose sweet and luscious fruits, and check the fermentation by racking. The effect of racking, is to prevent the progress of fermentation. Filtering a liquor, drop by drop, is found to destroy fermentation.

"Much is added by this author, on the subject of amending cyder which is bad or weak, but as this, more properly, belongs to the retailer of cyder than to the farmer, we shall at present omit it." *Marshall's Rural Economy Abridged.*

Such are the general practices prevalent in the cyder counties of Great Britain. The effect, every man who has been in that country knows, is the production of a much finer, more vinous, and fine flavoured liquor than we usually have, not better than we can, and than many persons do, produce. That this practice, to us apparently elaborate and expensive, is adopted in other countries where the farmer has less inducement from prices than in Great Britain or America, will appear from the following extracts from the "Abbe Rosier's Complete Course of Agriculture in France."

"Every one has his own mode of making cyder, says this author, and every one boasts of it as the best But they are all reduced to the following conditions: that is, they all agree in these opinions:

"1 To grind the apples most thoroughly.

"2. To leave the pomace at least six hours before it is pressed, in order to colour the juice.

[3. Is a description of their mode of making the cheese, which is the same nearly with that of New England and Great Britain.]

"4 The barrels, *nearly full*, are placed in a situation where the fermentation will be moderate (that is in a cool place). The barrels should be filled from time to time as the froth is thrown out. But when the fermentation is done, you must bung up the barrels, and if they are to be moved *they must be racked off into other casks*, in order that the lees may not mix with the other cyder.

"But, says this same French author, if you have any vats near the press, into which you can pour the liquor, vats which will contain from 12 to 20 barrels, you will place all the cyder in them. It remains in these open vats 3 or 4 days without fermenting, after which it ferments strongly. All the lees mount as they do in wine, to the top: and when they have all ascended and the crust is formed, you draw off the liquor by a tap below."

This author then proceeds to detail a method of racking, very much like that of Great Britain, of which we have given so detailed an account.

We could fill one of our numbers with extracts from foreign writers on this subject. It should not be thought derogatory to us to borrow from them in the useful arts. They have preceded us many centuries, and it will not do to reject the lessons of experience. No people avail themselves more readily, or carry the improvements of other nations further than we do The manufacture of cyder (for it is a manufacture,) is still with us in its infancy. We have not only much but ever thing to learn on the subject. I speak of the people at large, of our farming practice generally.

Our cyder is the worst article we produce Our hay, potatoes, grain and fruit do not depend on ourselves. They are the gifts of God, the productions of his goodness, which we call nature. Our butter, cheese and cyder, are partially the result of our own industry. The two former are often indifferent enough, yet with some important exceptions they are in a state of improvement Our cyder is not improving; we have of late learned to treat it better in great towns; but the farmers, whose interests we espouse, drink a miserable liquor instead of an excellent one, which they might have; they obtain a reduced price for the article, in consequence of the bad state in which it is brought to market.

It would appear from the above extracts from the works of the most celebrated writers in the best farming countries of Europe, that more ought to be done at the press, and less at the cyder cellars of the cities We get to be sure a clear, but a medicated and factitious liquor, easily discernible by men acquainted with the subject. The improvement, if we have any, must originate at the cyder press, and the *farmer* must reap the profit, not the *retailer*, who sells it at thirty dollars per barrel.

The difficulty now is, that families are compelled to go through this process of racking their cyder frequently, and refining it, after *all which* they are not sure of having it good, and of course prefer to pay the retailers three dollars a dozen for bottled cyder

The price of the cyder paid to the farmer, will always be regulated by the risk of its being good and the trouble required to make it so. If the farmers could reduce the liquor into a vinous state, and it is much more easily done before the agitation of a removal, before it is transported to market, they would obtain five and even ten dollars a barrel instead of three. I have no hesitation to say that cyder not only reduced to the vinous state, but refined, would more readily bring from five to ten dollars a barrel than it now does three.

Something too must be allowed for the addition to their own comfort and enjoyment. With three days labour of one man, forty barrels of cyder may be sufficiently attended to, racked one or more times, the casks rinsed, and stummed with sulphur; then the farmer would never have occasion to resort to foreign liquor to regale his friends. A good bottle of cyder is often equal to the best Champagne, the most popular wine of France.

It may be thought that the rules above extracted are too numerous, and too complicated. We shall shew that they are essentially reducible to a few, and yet they are mostly such as we are not in the practice of adopting. If this publication shall have the effect of inducing one public spirited man in each town to adopt all or any of these recommendations our object will have been answered.

The rules may be reduced to the following, of the respective importance of which we shall notice as we proceed.

First. "Apple orchards ought to be planted with the same kinds of fruit, or with fruits which ripen as nearly as possible together."

This, though valuable, is not among the most important rules. It is however very important, that there should be no early summer or autumn apples in the cyder orchard.

Two or three trees near the house for early fruit may not be amiss, but for cyder they are generally lost and wasted.

Second rule. The apples whenever gathered should be put for some time in piles, and before they are pressed should be sorted, and not only the rotten ones separated, but those only ground together which are of an uniform and equal degree of ripeness. The first part of this rule is followed with us, the second is but too much neglected.

Third rule. The pomace should be suffered to stand from 6 to 24 hours, according as you may wish to give a higher or paler colour to your cyder But in our climate, if the weather is hot, it should be turned frequently to prevent fermentation.

Fourth rule. The first runnings of the press should be kept separate, being a superior quality of cyder.

This it is believed is seldom attended to. Barrels warranted of this sort ought to fetch, and after a short time would fetch, a greater price.

Fifth rule. Where the farmer is rich and forehanded, it is advisable to have a vat made near the press, which will contain from 8 to 20 barrels. This may be made either square or round. Into this vat, the cyder as it is made should be turned, and suffered to work off in the open air. This will save much future trouble. There should be a cock or tap and fasset near the bottom, to draw off the cyder when the scum or crust is perfectly formed.

But lastly. If farmers will not go to this expense, they should leave their barrels not full by a gallon or two, and as they work off they should fill them up, and after they have done working rack them off into other casks. This should always be done before they are sent to market, or put into the place where they are to remain. Removing them before they are worked, produces an agitation often fatal to the cyder.

Such is the invariable practice as to wine. There is no difference between the two liquors, except the fruit from which they are made. They undergo the same process of fermentation. Wine if neglected as we do our cyder, would be an acid and vile liquor.

If these ideas shall contribute to give information, to those who have not books at command, I shall be happy.

ECONOMY OF KEEPING A COW ON THE PRODUCE OF ARABLE LAND ONLY.

[From Hunter's Georgical Essays.]

BY SIR H. VAVASOUR.

For some years past I have encouraged my cottagers in Yorkshire to manage their small possessions, which are in general from one to three acres, in the Flemish manner, called *field gardening husbandry*. I here state the husbandry of a poor industrious cottager's *garth*. As the man can neither write nor read, I had these particulars from his own mouth; and as I saw his land almost every day during the last harvest, I can vouch that this account is not far from the truth.

Produce.		£. s.
240 bushels of Potatoes,		24 00
60 do. Carrots,		6 00
5 quarters of Oats. at 44 *s.* per quarter,		11 00
4 loads of Clover, part in hay part cut green,		12 00
Turnips,		1 00
In garden stuff, for the family, peas, beans, cabbages, onions, &c.		
		£.54 00
Deduct rent, including the house,	£9 00	
Seeds, &c.	3 00	
Value of Labour,	10 00	
		22 00
Profit if sold at market, exclusive of butter,		£.32 00

His stock was two cows and one pig, one of his cows had pasture from the landlord for twenty weeks. The land was partly ploughed and partly dug with the spade ; it was cultivated, the ploughing excepted, by the man, his wife, and a girl about twelve years of age, in their spare hours from their daily *hired* work, seldom a whole day off, except in harvest ; made the rent in butter, besides a little used in the family.

The man tells me, that he thinks he clears, one year with another, from the three acres about £. 30 ; the daily wages earned by his family about support them.

It is very evident, that this man clears from his three acres, more than a farmer can possibly lay by from more than eighty acres of land in the common husbandry of the country, paying for horses, servants, &c. and it must be obvious to every one, how much the advantages must be to society in cultivating land in this manner. It would have taken more than half the value of his three acres in pasture for one cow at grass during half the year ; whereas (excepting the summer's pasture for one of his cows as before mentioned,) his stock of two cows and one pig is kept and carried on the whole year. The family live well, and a handsome sum has been every year saved to place out two sons, and supply them with clothes, washing, &c.

FURTHER INFORMATION OF THE PREVALENCE OF THE WORM IN THE HEAD OF SHEEP.

[In a Letter to John Prince, Jun. Esq.]

Woodstock, 1st April, 1816.

DEAR SIR,

I WROTE you about six weeks ago by Mr. Foster, and mentioned a distemper which had attacked some of the flock and occasioned several deaths. I then flattered myself that it had abated, but soon found it return with increased violence, shewing symptoms of dysentery, rot, consumption, and many others which I could not comprehend. I consulted with every one whom I thought capable of giving me advice, but could not obtain any satisfactory information, and was almost led into the prevailing prejudice of large flocks being unhealthy. I was sensible they had not suffered on the score of food, air and shelter. I had devoted my personal attention to them, had hardly left the farm during the winter, and then for no longer period than six hours at a time. Finding them so differently attacked I spared no expense in food or medicine, nor any trouble on my own part; but failing in all my exertions, and perceiving that death invariably followed every attack, even where the sheep had previously been under high keeping, I began to despair of any remedy, and my health being also much impaired with continual fatigue and attention, I was almost tempted to abandon the residue to their fate, when, about a week ago, Mr. Foster handed me the last number of your Agricultural Journal, which Mr. Pomeroy had given him but wheih he had not found leisure to peruse; on looking it over, I found that General Humphreys had described all the diseases of my flock, and lost no time in ascertaining from the heads of several which had died that the worms had occasioned all the mischief. This relieved my mind from much uneasiness, and I immediately commenced my operations with the syringe and vinegar, to which I added a small quantity of camphorated spirits, this I have found effectual in some instances by causing the sheep to throw out the worms, but in others death has ensued after several have been discharged; this was unfortunately the case with two of the young bucks—from the head of one I extracted upwards of twenty maggots, principally from the cavity in and below the horn. The third buck was discovered to be affected on Saturday last, and as Mr. Foster was with me, I concluded to begin by sawing off the horns as closely as I could to the head. From these openings the poor animal was relieved of nearly forty of his tormenters; they in general seemed anxious to escape by those vents, and injections of vinegar and camphor by the the nostrils, induced others to follow their companions. This I have reason to hope will be effectual for his cure, without dropping in spirits of turpentine, which I apprehend would have injured the animal more than the remaining worms. I however covered the stumps of the horns with cotton wool wetted with a mixture of spirits of turpentine and the camphorated vinegar; and as I perceived the respiration is partly conducted through those apertures, I think the effluvia of that mixture will be destructive to any worms which remain, especially, as I continue the injections by the nostrils. I am now practising the same method with such of the horned sheep as I suspect to be infected. With some who are hornless I adopt another mode—cutting away the hair or wool which covers the spot where the horn *should be*, then wetting the spot with spirits of turpentine and camphor, using also the injection at the nose. This I am confident greatly disturbs the nest of worms and perhaps may destroy them. Should this mode prove unsuccessful I must have recourse to the trepan. From a minute inspection of at least twenty heads,I am satisfied that that spot is most preferable for its use, as that appears their principal harbor. I frequently find the smallest maggots at the greatest distance from the nose, which has led me to suppose that the worm as soon as hatched, endeavours to ascend by the nasal ducts to the roots of the horn, where it finds sufficient nourishment and less interruption than if situated below When it has attained its growth, it may possibly descend the nostril and fall to the ground. previous to reaching its chrysalis state. This idea has suggested itself from my discovering in every head which I have opened, that such maggots as I find in or near the nostrils are in a descending posture, their heads pointing towards the nose. Perhaps however, they may have only come there in search of food. I have likewise found the cavity under the horn so much crowded that as soon as they could find a passage they made their escape.

In no one instance have I perceived that the skull is perforated or the brain destroyed or injured by the worms, whose ravages appear to have been confined to the sinuses in front of the head In some instances I have found only one or two worms, and in none, till within three days, have I discovered more than five. The greater number are white, one olive brown worm only have I seen which appears to have attained its growth—some are of a light brown, from half to three fourths of an inch in length. I attribute the great increase of the fly, not to the introduction of the merino breed of sheep, as some are disposed to believe, but to the prevalent custom of leaving the carcases of dead sheep unburied, and exposed, in the neighbourhood where large flocks are kept. I should therefore recommend that the heads of all sheep which die of themselves, should be buried or burned—the latter mode I have adopted this season, and flatter myself with some good preventive effects by continuing it. This complaint is considered as new in this part of the country, not one person in an hundred having ever heard of such a thing. I am endeavouring to give it every publicity and expect some beneficial results. Having frequently heard of the disorder, I am surprized the thought did not occur to me, but my attention was directed to every part but the head—had it been otherwise I should have been preserved from a deal of anxiety and some expense, and by seasonable precautions I might possibly have lessened the number of deaths in the flock. I hope we have now seen the worst of it. About eight or ten of the ewes have fallen victims to the complaint, but the wethers have suffered in a much greater degree. Two flocks of young sheep which were sent up in the fall, and are kept on two farms in my neighbourhood, are suffering severely under this scourge. I hear also of several other flocks within a few miles wherein sickness and death have prevailed without the cause being discovered. I sustained a loss in several sheep of my own flock, which I had put out to board the last season. Some have died, and others are brought home to me for the purpose of being cured, on these I am practising experiments of various kinds. I have not yet used tobacco, except as snuff, to cause sternutation, but have an idea that a decoction will be beneficial if injected in small quantities through the aperture at the root of the horns; my endeavours have been to make use of such applications as may be most noxious to the vermin and the least annoying to the sheep, whose sufferings under the disease are bad enough without unnecessarily increasing them by the remedy. I write this rather in haste and under frequent interruptions. I shall embrace a leisure moment shortly, if such can be allowed me, to give you further information of my proceedings.

I am, &c.

H. B. BROWN.

AN ECONOMICAL MODE OF PROCURING MANURE.

Brookfield, December 15th, 1806.

THREE years ago I deposited under my horse and cow stables about twenty loads of common earth, taken from a spot where the loam or soil had been previously removed. After it had remained in this situation for two years, it was spread, in the common quantity for a top dressing, upon a tract of mowing land. The hay and after feed, produced upon the piece thus manured, was double the quantity produced by the other part of the lot lying side by side, and of equal quality.

The manure thus made is a clear saving. The method of it is practicable to every farmer, who, in this way, if he please, may turn a small portion of labour to very considerable profit.

G. WILLISTON.

To the Trustees of the Brookfield Agricultural Society.

METHOD FOR RAISING EARLY CABBAGES.

In November, 1805, I pulled from my seed bed some plants of considerable size and broke off their large leaves. I then laid them upon the cellar bottom and covered them with a little earth. Some time in the April following I set them out in my garden. They grew and flourished very well, and from them I cut good heads a month earlier than from the seed sown at the usual time.

ELIJAH RICE.

Brookfield, December 24*th*, 1806.

VIRGINIA WHEAT—USE OF ASHES TO DESTROY WORMS WHICH INFEST FRUIT TREES—USE OF TANNER'S BARK FOR SAME PURPOSE.

[Communicated by Justin Ely, Esq.]

Last fall a considerable quantity of the early Virginia seed wheat, the whole of which was white, was brought into this vicinity, and sowed by our farmers. It is said not to be blighted like other wheat. The early Virginia seed wheat (but not wholly white) has been more productive here than any other kind, yielding from twenty to forty bushels to the acre.

Mr. Yates, a respectable farmer of Petersham in Worcester county, lately informed me, that the insects which occasion black bunches on plum trees, are prevented by digging around the roots in the spring, and putting in half a bushel of ashes and covering them with earth.

Also, that the slugg worm is destroyed by putting tanners' bark around pear trees and other kinds of trees; it was mostly hemlock bark with a little oak bark mixed with it. I have never tried either of the above. I never before heard of any way of saving the plum trees. I was informed about two years ago by Mr. Davenport of Milton, that his Saint Germain pear trees and those of his neighbours were decaying, and he expected they would all die. I told him our pear trees of that kind were not suffering like his ; he said it was generally so in that part of the country, and would soon be so with us. It is possible the slugg worm occasions their decay, if that is the case I think the tanners' bark should be tried.

West Springfield, Feb. 19, 1816.

ON THE PREPARATION OF SEED BY STEEPING IN BRINE, &c.

[To the Corresponding Secretary.]

SIR,

HAVING lately read with attention a communication made by B. Taft, jun. Esq. through you to the Society, on the subject of the growing of spring wheat, I am desirous, through the same channel, to communicate some further observations on the same important subject. Admitting, as I do, to the utmost extent, the efficacy of preparing seed wheat for sowing in the manner prescribed by Mr. Taft ; and with due deference to his views and experience, I beg leave to suggest, for the good of society, a different method of preparing, not only seed wheat, but rye also, which my experience has convinced me, beyond a doubt, to be far more safe and efficacious—it is the washing and soaking or steeping our seed in a strong pickle, rolling in lime, (that in which meat has been saved and especially in curing which salt-petre has been freely used) is considered preferable. My method for many years has been, after preparing a sufficient quantity of strong pickle, as strong as soap will make it, to pour in the seed moderately, skimming of whatever may rise on the top, then stir and skim as long as any thing will rise, taking care not to pour in too much seed at once, so that the foul stuff will have room to rise above the solid wheat. When one batch is done the clean wheat may be skimmed out or the pickle be drained off by turning the wheat and pickle into a basket, placed over a tub or cask. When I have done washing, I put the seed, soaking or steeping, into the same pickle for three or four days, then drain off the pickle through baskets, letting it stand until it has done dropping. I them mix with it, *just before I sow it*, slacked lime, never less than eight quarts to a bushel, and I have sowed with great success a bushel of lime to a bushel of wheat or rye. Although that quantity of lime will not all adhere to the kernels of the grain, yet that quantity, or almost any quantity, may be sowed with the grain; and lime is well known to be a strong and rich manure, and especially when mixed with other compost. The land of no country need ever be poor when lime stone is plenty. In this way of preparing my seed I have raised great crops on very light soils. I have on a very light thin soil raised more than twenty-five bushels from one bushel (and it was most excellent wheat,) from about seven-eighths of an acre; it was however warm land. I one year sowed four bushels, one bushel of which being sowed on poor land, produced very little. From the four bushels however I had eighty-two bushels and about twelve quarts, of excellent clean wheat. I do not recollect ever weighing but one bushel of my spring wheat, that weighed rising sixty-four pounds. It was heavier than any winter wheat I ever raised. A strong pickle will buoy up, not only the oat grass seed and other foul stuff, which is apt to be mixed with spring wheat, but also the small light kernels of the wheat, in sowing of which I consider there is no use; if they grow, they seldom produce any grain, and only incumber that which is productive, and I do believe that from one bushel of wheat cleaned in this way as many or near as many efficient stalks will grow to maturity, as from five pecks of wheat, as is too commonly sowed by our farmers generally. It therefore follows, that one bushel thus cleaned, is sufficient or very nearly sufficient to seed an acre. Since I have been in the practice of thus preparing the seed, I do not recollect finding a single kernel of smutty wheat, though within the time, having to buy my seed. I have sowed that which was very smutty. And for myself as it might respect the crop, I would as soon sow smutty wheat as any, and if prepared in this way, I consider it very immaterial where the seed is raised, whether on the same farm or brought from a distance; I have tried both with equal success. I was led to this discovery from reflection on the rule we used to adopt in putting up provisions for exportation. We practiced making our pickle so strong as to buoy up or swim a potatoe; it occurred to my mind, that the same substance would also buoy up the foul stuff amongst wheat and especially oats. I tried it with success, and either on account of bad weather, or some cause which I do not now particularly recollect, I let my seed remain some time in the pickle, sowed it, and had an uncommonly good crop, and I have ever since been in the habit of preparing the seed in the same way with equal success, and have even been able to raise more bushels of wheat than I could of rye, without thus preparing the seed, on the same land. Soon after adopting this mode of preparing my seed, at a time I was making my pickle, a neighbour observed to me that,in his opinion, I ought to be careful not to make my pickle strong, nor let the seed remain in it long, least it should so kill the kernels as to prevent its growing ; on which, differing with him in opinion, I took a vessel and filled it with water and salt, say double the quantity of salt that the water could dissolve, in which I also put fifty kernels of wheat, and let it stand longer than I ever soaked my seed ; I then planted the wheat, pickle, and undissolved salt together in my garden, and the result was that not only every kernel came up, but it came up and grew uncommonly strong and rank.— A neighbour of mine once steeped his seed in some pickle of mine and the weather was such that he could not sow it for eight or nine days afterwards. (I think nine,) it however grew and did well, so that there can be no danger on this score ;—not so with lie. A neighbour of mine last spring had a mind to try Mr. Taft's mode of preparing his seed, and either by making his lie too strong, or steeping his seed therein too long, or both, he killed the whole ; so that, having stocked his land with clover seed, he had to harrow in other grain. As to the land proper to grow spring wheat, it ought to be land well subdued and a light warm soil—this is the best—nor do I think it absolutely necessary that it should be very rich The sowing it early is of great importance, it cannot be sown too early—I have once sown with success in the month of February. I am clearly of opinion that if any one has land suitable to fallow and sow with winter wheat, if they would fallow, subdue and prepare their land completely for thus sowing, then let let it remain until early in the spring, then sow it with spring wheat prepared as above, they would reap a better crop than if the land was sowed with winter wheat. And I do consider good clean spring wheat such as we may raise, a better bread stuff than that of winter. I would further observe that I should always like, if I could, and especially in a stiff soil or when heavy rains shall immediately succeed the sowing, to harrow over my wheat ground with a fine sharp toothed harrow after the wheat has sprouted. I have done this with success when the main root of the kernel had got to be an inch long. Perhaps it had better be done somewhat sooner; it seems to forward and invigorate the growth. I have for many years steeped my Indian corn in a strong pickle, rolling it in plaster, omitting the lime, that being somewhat harsh for the fingers of the planters. With regard to washing of wheat for consumption, I never dry it in the sun; I let it remain in the water as short a time as possible, then drain it in baskets for the space of, say half a day, then spread it thin on a dry floor under cover, in some airy place, stirring it often until dry, in which case the bran will not chop up in grinding. The foregoing observations, very hastily sketched, are humbly submitted to the consideration of the Society, who will notice them, as they may deem fit and proper.

I am, Sir, &c.

SILAS PEPOON.

Stockbridge, April 1, 1816.

N. B. How this method of preparing seed may succeed near the salt water, I cannot undertake to say, having had no experience of the kind. I have no doubt but land well fallowed and prepared in the summer and fall and sown with spring wheat early the next spring, will produce as well as any other land, and corn stalk ground is good for the growing of wheat. The cultivation of winter wheat is almost entirely laid aside in this part of the country.

STATE OF AGRICULTURE IN FRANCE.

[Berbeck's notes, 1814.]

In the Agriculture of France there is a great sameness. The arable land, which comprises almost the whole surface of the country, the vineyards and a few tracts of mountain excepted, may be divided into five classes, according to its fertility, without regard to the nature of the soil The first bears a crop every year, as in Auvergne, in the neighbourhood of Toulouse, in some parts of Normandy, &c. This description is highly cultivated, and on a principle well adapted to soil and circumstances. The second, somewhat inferior in quality, but good land, is also judiciously cultivated, with the intervention of a fallow once in six years ; as about Dieppe and Rouen. The third land of middling quality, which embraces a very large part of the kingdom, is managed on the old plan of fallow, wheat and oats. The fourth, poor land, which also covers a large space, is fallow and wheat alternately The fifth, land still poorer, is cultivated in the round of fallow, rye rest, without grass seeds.

The first and second include what there is of variety and spirit in French husbandry. In the south, Indian corn alternating with wheat, exhibits management as good as the beans and wheat of the best English farmer : and the various routine, observable in the north, affords many proofs of a spirited and judicious culture. It is the three last which betray its weakness : if they comprise half the cultivated surface, which I believe is not over-rating their extent, half of that portion being fallow, it appears that one-fourth of the whole country is lying in a state entirely unproductive, a few weeds, mostly thistles excepted ! A very few half starved sheep are kept to pick over the constantly recurring barren fallows, often accompanied by three or four long-legged hogs. On the borders and out of the way corners, you may see a cow or two with an attendant. But there appears so little for any of these animals to eat, that you wonder how even they are supported.* The *prairies artificielles* (the ar-

* Among the circumstances of constant occurrence in which France differs totally from England, is the frequency of *commons* in the latter, whilst in the former, there is no single instance, which came under my observation, of what we call a *common*. No animal of whatever kind is suffered to graze at large in France without an attendant. This regulation, though from the open state of the country absolutely necessary, occasions some inconvenience. You see a single cow, half a score of sheep, or perhaps a single hog, followed by a boy or girl, who might be better employed. Not unfrequently the cows, and the hogs, and the sheep of different people are collected in some by-corner, and their keepers form a party almost as numerous as the animals they are tending. However, the loss of time and misapplication of labour is reduced, in this economical country, by the universal practice of spinning or knitting or picking hemp. You never see one of these females without some work or other in her hands.

tificial grasses as we less properly call them) of which so much is said by the *amateurs*, are like specks of green on a desert. Clover and lucern are cultivated with great success on the two first classes of land; but very rarely indeed on the others Thus there is probably as much realy waste land in France as in England, and it is of an expensive kind; whereas our wastes support much more stock than theirs, without any expense whatever.

It has been said, that it would be in vain for the French to increase their flocks, because they have already as much mutton as they consume; and there would be no market for more. This sort of argument would hold equally against every other improvement. The price of mutton is fully in proportion to that of grain. Mutton is 5d. per lb., wheat 5s. per bushel. With us mutton is 10d. per lb. and wheat 10s. per bushel. Cheese and butter rather exceed in price this proportion, beef is about the same. Thus it appears that stock pays as well in France as in England. The French sheep are chiefly remarkable for their long legs, thin carcases and coarse wool. The same characteristics prevail from north to south, except that in the north they are larger, stouter, and bear finer fleeces; in fact they are better treated than in the south. The best flocks we saw in the country, were here and there one of the Spanish breed, which we took care to visit when we heard of them.

INTELLIGENCE.

To Wool Growers.

I TAKE the liberty to address you on the subject of wool,—supposing that every degree of information will be acceptable at this season respecting the state of the market and prospect of future sales.

Within a few weeks the demand for washed wool has moderately increased, though the prices have rather declined—the manufacturers have learned what they can afford to give, and it is hard to get them above.

Of late there has been no demand for unwashed, especially that of fine grades; indeed it has become almost impossible to obtain an offer for it. It cannot be too strongly recommended that Sheep be well washed before shearing, and every precaution should be used to keep it clean and in good order—the best of tow cloth is none too good for bags; but as it may be too late in the season for advice on this subject I shall omit any thing further. The prices for the ensuing season remain to be established, which will probably be in the course of the month. The probability is that it must sell something lower than was generally obtained last year. I think we may expect the demand to continue to increase until July and August, in which months I look for the best sales of the year. As there is an increase of manufacturers on superfine goods, we may expect a good demand for fine wool if washed.

As the most of old wool now remaining in market is in the dirt, I am making arrangements to sort and wash for those who may think it for their interest, provided a sufficient quantity should be offered to render the expense sufficiently low. This may be a convenience to some who cannot conveniently wash their sheep.

ZEBAH HAYDEN.

Boston, June 1, 1816.

ANNUAL CATTLE SHOW,

AT BRIGHTON, IN THE COUNTY OF MIDDLESEX.

The Trustees of the Massachusetts Society for Promoting Agriculture, taking into consideration the importance of improving the breed of domestic animals, and influenced by the example of enlightened societies in all parts of Europe, who have established annual exhibitions of such animals, and encouraged the cultivators to produce them by suitable rewards, and wishing as far as possible to fulfil the expectations of the Legislature of this Commonwealth who have liberally patronized this institution, have determined to establish an *Annual Show of Cattle* in a situation, and at a season of the year, the most convenient for the citizens at large.

They have therefore adopted the following regulations, of which the Farmers throughout this State will please to take notice; and in order to save trouble to the Trustees and themselves, they will conform thereto, whenever they may see fit to become competitors for the prizes.

I. The annual show of cattle patronized by this society shall take place at Brighton, on the second Tuesday in October in every year, the first to be exhibited on the second Tuesday of October, 1816.

II. In order to assure to the competitors the most perfect fairness in the distribution of the Premiums, the Trustees will nominate three judges from among their own members, and two other gentlemen well skilled in such subjects, to be joined with them; the decision of a major part of whom shall be final, and the premiums shall be paid accordingly.

III. The Premium shall be divided into two classes, with respect to each description of animals, in order to encourage those who, having failed to attain the first premium, may yet be entitled to some reward for their exertions.

IV. The object or animals for which premiums shall be awarded, and the rates of such premiums, shall be as follows, viz.

1. To the person who shall produce the finest Ox fitted for slaughter, of not less than thirteen hundred pounds weight, *forty*

dollars, or a *silver cup* of equal value, at his option, which cup shall be ornamented with a suitable inscription.

2. To the person who shall produce the next best Ox fitted for slaughter, *twenty dollars*, or a *silver cup* of like value.

3. To the person who shall produce the best pair of working Oxen, *forty dollars*, or a *silver cup* of equal value.

4 To the person who shall produce the next best pair of working Oxen, *twenty dollars*, or a *cup* of equal value.

5. To the person who shall produce the best Bull, having regard to his size, form and other qualities, *thirty dollars*, or a *silver cup* of equal value.

6. To the person who shall produce the next best Bull, having regard as aforesaid, *twenty dollars*, or a *silver cup* of equal value.

7. To the person who shall produce the best Milch Cow, with the requisite proofs of her goodness as to quantity and quality of milk, *twenty dollars*, or a *silver cup* of equal value.

8. To the person who shall produce the next best Milch Cow, *fifteen dollars*, or a *silver cup* of equal value.

9. To the person who shall produce the best Merino Sheep, not less than five in number, whether rams or ewes, having regard to their forms and fleeces, *forty dollars*, or a *silver cup* of equal value.

10. To the person who shall produce the next best Merino Sheep, being at least five, *twenty dollars*, or a *silver cup* of equal value.

11. To the person who shall produce the best native Sheep, whether rams or ewes, being at least five, having regard to their size, form, quantity and quality of fleece, *ten dollars*, or a *silver cup* of equal value.

12. To the person who shall produce the best Swine, not less than *two*, and not less than one year old, *ten dollars*, or a *silver cup* of equal value.

13 To the person who shall produce the next best Swine, not less than *two*, and not less than one year old, *five dollars*, or a *silver cup* of equal value.

V. The said premiums shall be adjudged on the day of meeting and shall be paid within ten days after the meeting, or sooner if convenient, and if the party shall elect to receive money.

In case any of the Trustees shall be competitors, one of the Trustees being a member of the Board shall be replaced by a person not a member of the Board, so that in such case the judges not being members of the Board shall constitute a majority.

The Farmers, it is hoped, will view this attempt to improve the breed of our domestic animals with favour, and as an additional and much stronger inducement to enter into the competition; they will of course reflect, that this *Cattle Show* will draw together a great collection of persons and thus will much facilitate the sale of their cattle, and also that the animals, which shall command the prizes, will sell at very much enhanced prices, either for Boston market, or to Connoisseurs who may be desirous of improving their own breed.

AARON DEXTER, *President.*

Officers of the Society.

AARON DEXTER, M. D. *President.*
SAMUEL W. POMEROY, Esq. *1st Vice President.*
THOMAS L. WINTHROP, Esq. *2d Vice President.*
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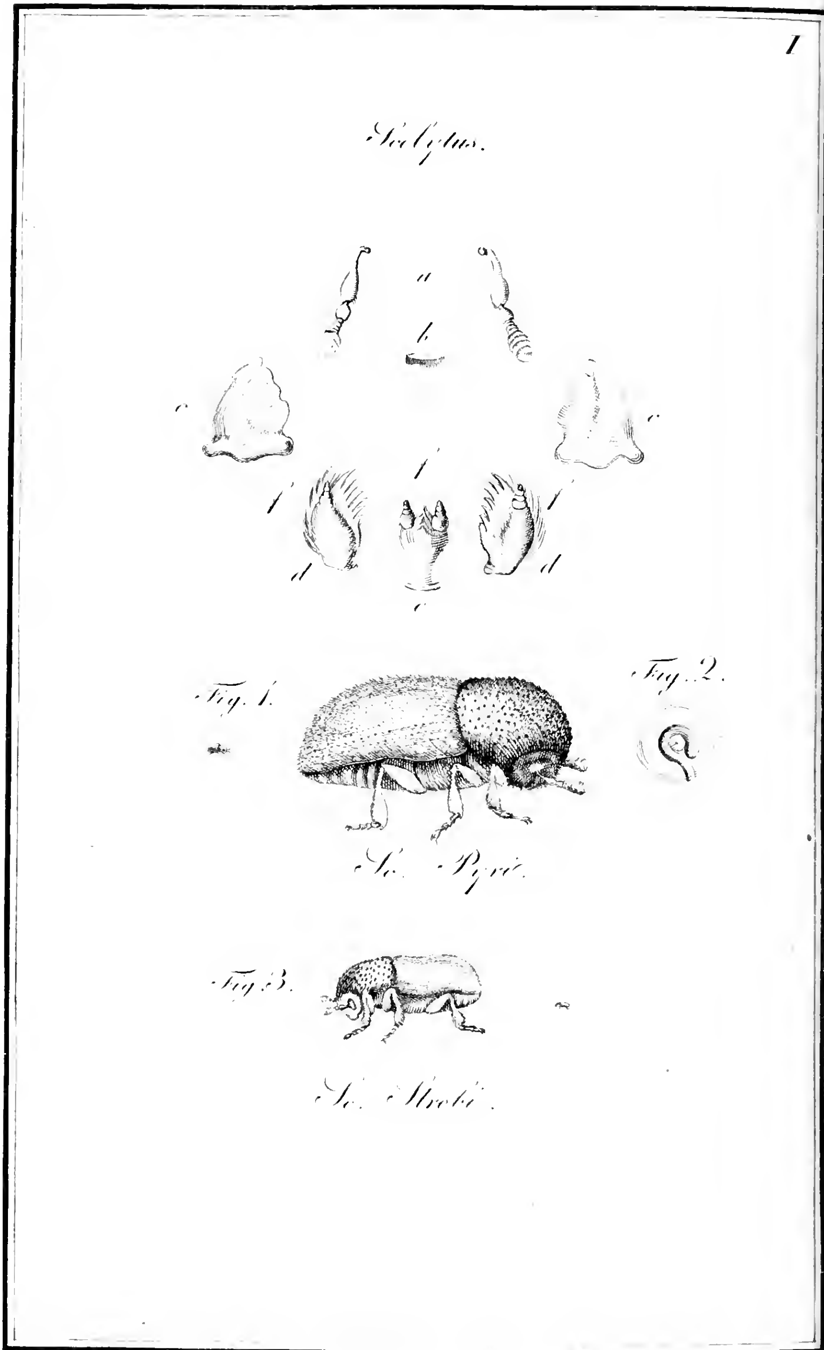
EBENEZER PREBLE,
GORHAM PARSONS, Esquires.
} *Trustees.*

ERRATA—No. 1. Vol. 4.

Page 1st, 10th line from bottom, for *vegatation* read *vegetation.*
21, line 22, for *manner* read *manure.*
35, for *W. Rogers* read *M. Rogers.*
40, in note, for *polhos* read *pothos.*
90, 13 lines from bottom, for *hur psuedo* read *acer pseudo.*
90, line 14, for *traxinus* read *fraxinus.*
92, top line, for *orce* read *force.*
94, 7th line from top, for *seen as* read *seen at.*


I
Scolytus.
a
b
c
c
f
f
f
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d
e
Fig. 1.
Fig. 2.
Sc. Pyri.
Fig. 3.
Sc. Strobi.

Rhynchaenus Strobi.

Fig. 1.

Fig. 3.

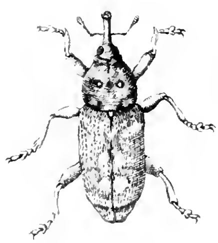

Fig. 2.

Fig. 4.

W.D.P.

MASSACHUSETTS

AGRICULTURAL JOURNAL.

VOL. IV. JANUARY, 1817. No. III.

On the Insects which destroy the young Branches of the Pear-Tree, and the leading shoot of the Weymouth-Pine.

BY W. D. PECK, ESQ.
Professor of Natural History and Botany, at Harvard University.

[*See Plate.*]

A YEAR seldom elapses without our discovering some new injury, which our trees or shrubs have received from insects. As the forests are removed, the insects, which naturally find their sustenance in the spontaneous productions of the country, attack the cultivated trees and plants; although the latter may be very different from those of the forest, on which or in which they naturally feed.

This remark is confirmed by a fact, which at first surprised me, which is, that the same insect which has almost wholly destroyed the Robinia Pseudo Acacia or locust, in New-England, is also found in the Black-Oak, Quercus tinctoria of the younger Michaux; a tree as different from the Locust in the structure and texture of its wood as any two trees of the country.

For several years past, the ends of the branches of the Pear-Tree have been observed to perish suddenly, insomuch that it has been attributed to lightening. Mr. Lowell believing it was caused by insects, on examining the dead part of the branch, proved the correctness of his judgment. He presented me one of the insects with a part of the branch, which contained it in its perfect state; which is the occasion of this communication.

The branches attacked by this insect are known by their leaves withering and turning brown. This happens in June or

July: the insect has then passed through its pupa or chrysalis state, and acquired its perfect form. As it is only after it has arrived at this period, that it can continue the species, it is probable that it deposites its eggs before the month of August is passed. The egg is probably deposited behind a bud, i. e. between the bud and the stem, and is hatched soon after; the larva or grub eats its way inward through the sap, into the hardest part of the wood.

The piece of a branch which I had, was three years old; it had, therefore, one layer of sap and two of wood. The grub had eaten the inner layer of wood, a part of the medulla or pith, and about half of the second layer of wood, in a circular direction, leaving the alburnum or sap-wood untouched, except at its exit. This is shewn at Fig. 2, which represents the end of the wood at the place where the insect was lodged. The external dark circle represents the bark: the centre, the medulla; the other dark portion is the excavation made by the grub.

The genus to which this insect belongs, is called Scolytus.*

* The first entomologist, I believe, who accurately observed the characteristic traits of this genus, was Geoffroy, in France, who named it Scolytus. Linnæus had before seen several species, which he placed in his genus Dermestes; from which, and, as Geoffroy justly observes, from every other genus, it may be easily distinguished by the peculiar form of its antennæ: (these are shewn in the upper figures at *a*.) The excellent French entomologist Olivier has adapted the name given to this genus by Geoffroy. The insect in question is then a Scolytus of Goffroy and Olivier, but not of Fabricius, who has given this name to a very different insect, and has framed a new genus, which he calls Hylesinus, in which he includes the only species of Scolytus Geoffroy knew. The antennæ of these insects are singularly formed. Those of Scolytus Strobi are shewn, very much magnified at *a*. The first joint is as long as all the rest; at the smaller end they are curved and terminate in a round head, the diameter increases toward the other extremity, the second joint is cup shaped and nearly equal in diameter with the first; the third, fourth, fifth, sixth and seventh, are so short and close that their separations can scarcely be distinguished, they are gradually broader to the seventh, which receives the terminating knob; this is composed of three joints. In the species mentioned by Geoffroy, the third joint forms almost the whole of the knob, which probably induced him to call it clava solida. The labium superius *b* is very small and fringed with bristles; the mandibulæ *c c* are short, thick on the outer edge and pointed, the inner or cutting edge thinner and undulated; there is a small notch below the

Of this genus it is an undescribed species. It is precisely $\frac{1}{10}$ or $\frac{10}{100}$ of an inch in length, $\frac{4}{100}$ in diameter; of a deep brown colour, the legs and antennæ paler and of a rust colour; the thorax in front is rough with small tubercles, which point upward and is studded with erect bristles, as are also the elytra or wing-cases and other parts of the body. The elytra are striated with slightly impressed points, and between the series of points are rows of bristles. The plane of the anterior opening of the thorax, which receives the head, is nearly at right angles with that which joins the abdomen, so that the head is entirely underneath. The eyes are oblong, and the antennæ inserted at their lower and anterior edge. This species may be called Scolytus Pyri.

The mischievous effects of this minute insect are observed in June and July; the dead part of the branches of the pear-tree should be immediately cut off and burnt without delay, as the insects have not then left them.

In examining the leading shoot of the Pinus Strobus, or Weymouth-Pine, I found another species of this genus in the terminating bud. The bud was put into a small phial, and half a dozen of the insects were obtained. Three of these I destroyed in dissecting the heads, to obtain a knowledge of the parts of the mouth, which are represented in the drawing, where *b* represents the labium superius or upper lip; *c*, the mandibles or exterior jaws; *d*, the maxillæ or interior jaws; *e*, the labium inferius or lower lip; *f*, the palpi or feelers; those attached to the maxillæ have four, and those of the lip three joints. The number of pieces which compose the feeding apparatus, will shew in part how complicated a machine an insect is.

This is also an undescribed species, which may be called Scolytus Strobi. It is very minute, being only $\frac{6}{100}$ of an inch in length, a little more than $\frac{2}{100}$ in diameter, and is therefore

point. The maxillæ *d d* are torose and rounded on the outer part, and truncated on the top of this part, to receive the palpi; the inner part thinner and fringed with about eight awl-shaped, slightly curved, oblique teeth, with bristles intermixed. The palpi *f f* are conical, consisting of four joints, the lowest much the largest, the uppermost very small. The ligula or labium inferius *e* is narrow somewhat ovate, set with bristles, its palpi *f* conical and of three joints. The mandibulæ and maxillæ are shewn as seen on the inner side.

more slender in its structure than the former species. It is black and polished, the feet pale brown, the antennæ dusky. The Elytra are set with short bristles in longitudinal rows, the thorax with longer ones and more dense, the front of the thorax roughened with prominent points.

I am uncertain whether this insect attacks the terminating bud before the parts below it are infested by the insect, which attacks the body of the leading shoot. Olivier describes twenty-three species of this genus, most of them European, four North American. Besides the two mentioned in this paper, I have four other undescribed species in my collection, which were taken in the District of Maine, and probably many more will be discovered, as the different trees of the country shall be more particularly observed.

One of the most beautiful and the loftiest of the evergreens of New-England, is the Pinus Strobus, the White or Weymouth Pine. The straightness of its trunk is one of its beauties, as it brings to mind the recollection of its utility in masting and for other important purposes. It has been known to acquire the height of 140 or 150 feet, and a diameter of more than seven feet and an half at its base.

The lofty stature of this tree depends upon the constant health of the leading shoot for a long succession of years. If the leading shoot is destroyed, the trunk can rise no higher, although it may happen that in the circle of branches immediately below it, one more vigorous than the rest may be forced by those on each side it, into a more ascending direction, and become a kind of leading shoot; yet the tree is deformed.

It has been observed that in many of those which are cultivated in ornamented grounds and gardens, the leading shoot is destroyed. This is the work of insects, especially of a species of weevil. The species which is so injurious to the White Pine, is, I believe, pretty generally diffused over our country and is undescribed. I have seen it often and in many places, but knew not till the last year, the particular task assigned it in the economy of nature. It is a species of Rhynchænus of Fabricius, a genus which constituted a tribe of the Curculio of Linnæusit; is about $\frac{3}{10}$ of an inch in length. The ground-colour of the shelly coat and legs is brown, and covered with brownish and rust-coloured scales, with white ones scattered among them, which give it a reddish grey or a kind of roan colour. The thorax is darker, the elytra more rust-coloured. The head is lengthened out into a horny proboscis, at the end of which the feeding apparatus is placed. These are shewn much magnified in plate 2, where *a a* represent the mandibles as viewed on the inner side; they are externally rounded, internally marked with two excavations, the edge cut into three large bluntish teeth. *b b*, The maxillæ torose or swollen toward the base, crowned with conical palpi (*p p*) of four joints; on the interior edge divided into about eight short, curved teeth and set with bristles; below these a tuft of strong bristles, which turn upward or toward the points of the maxillæ. *c*, The ligula somewhat squared and terminated with two conical palpi (*p*) of three joints. There is no labium superius that I could perceive. The head with the snout is about as long as the thorax; the antennæ of about the same length, the first joint is largest forming nearly half the length of the antennæ, the other ten are shorter, the three last of these thicker, forming an oval knob; each of these joints is fringed with short white scales. The eyes are small, lateral, at the base of the snout; the head is small and received by the thorax, which is narrowed to fit it. The thorax is then enlarged, but is not so broad as the back across the wing-cases; in the middle of the thorax are two small white dots, which form a triangle with a white spot behind them at the junction of the elytra. The elytra are striated or furrowed, but very lightly and are covered with small scales, pretty closely set, those of a rust-colour are the most numerous; the elytra are suddenly narrowed toward the ends; a little before this contraction is an irregular white blotch on each. The feet are all nearly of equal length without spines and scaly. Fig. 2 and 3 represent the Rynchænus Strobi, or White Pine Weevil of its natural size and magnified.*

This description is sufficient to distinguish this from all the other species hitherto known. The insect is so small that it is impossible to detect it in the act of depositing its eggs, which are probably placed under the thin skin or epidermis of the

* In technical language, it may be called Rhynchænus Strobi, femoribus muticis, rufo-griseis; thoracis punctis duobus, scutello, maculaque versus elytrorum apicem, albis.

shoot. I suspect that the larva remains in the wood more than one year, and that the shoot dies the second year after the eggs are placed in it. The larva is a soft white grub, with only the head shelly, and armed with strong mandibles.

When the feeding state is passed, and before the pupa state comes on, it prepares an exit for itself by opening a passage outward, but leaves the exterior skin of the bark untouched. so that it is perfectly secured from any injury by rain. The pupa remains quiet for a time, and the perfect insect has only to cut away the epidermis to escape.

The perfect insects begin to come out early in September, and continue to leave the wood through that month and a part of October; the shoot at that time is pierced on all sides with small round holes. sometimes thirty or forty may be counted in one shoot. But an unlimited increase is not permitted to this destructive insect, if it were, our forests would scarce produce a single mast.

One of the means provided by the Creator to restrain the increase of the White Pine Weevil. is a species of Ichneumon, which deposites its eggs in the body of the larva of the weevil, and is furnished with an instrument precisely adapted to this purpose. It is a small four-winged fly $3\frac{1}{2}$–10ths or $\frac{7}{20}$ of an inch in length, exclusive of the antennæ and the sting. The sting is about as long as the body, the antennæ about $\frac{2}{3}$ that length. It is a full shining black; the abdomen consists of eight segments, the second, third, fourth and fifth are marked with a tubercle on each side; the first and second pair of feet are dull yellow, the third pair dusky brown; the nerves of the wings at the base. or at their union with the thorax, white; the antennæ are wholly of a dusky black colour; the sting is contained in a sheath formed of two semicylindrical valves; it consists of two pieces exactly alike and exquisitely pointed; it answers the double purpose of making an aperture to receive the egg, and of conducting it into the body of the grub. The parent fly is indued with sagacity to discover the individual which is conveniently situated, and within reach of its sting. The larva of the Ichneumon consumes that of the Weevil, which affords it a sufficient quantity of food to complete its growth; it then encloses itself in a thin covering analogous to the cocoon of the silk-worm, passes through the pupa state within the wood. and makes its escape in its perfect form.

The first shoot I examined was cut in August the last year, about the fifteenth. In order to examine it thoroughly, I broke it into pieces of two or three inches in length, and divided these pieces lengthwise with a penknife: I found some of the inhabitants in the larva form, others in different degrees of maturity in the pupa state, some of them nearly perfect. In one of the pieces I observed some other larvæ, which were those of the Ichneumon. This piece I carefully bound together again, and laid it in a small tight box; in the mean time my attention was called to other affairs, and the box was forgotten for several months; when on opening it, I was much gratified to find two Ichneumons, one of which accompanies this communication.

I know not when this insect places its eggs in the grub, nor when it comes forth in the winged state: my object being rather to know what it was, than the time of its appearance. The knowledge, however, that such an insect exists, and the use to which it is destined in the arrangements of providence, may excite our admiration of the wisdom, and our gratitude for the goodness which governs the creation. But the Ichneumon cannot destroy the species, nor can man himself; the most effectual remedy then in our power is, to cut off the leading shoot in August, or as soon as it is perceived to be dead, an inch or two below the dead part, and commit it to the fire.

December, 1816.

ON THE FIELD CULTURE OF VEGETABLES, AS FOOD FOR CATTLE IN WINTER.

BY HON. JOSIAH QUINCY, ESQ.

[To the Corresponding Secretary.]

Boston, December 22, 1816.

SIR,

THE importance, in a northern climate, like ours, of encouraging a general attention to the field culture of vegetables, for the purpose of obtaining an ample and cheap supply of succulent food, for the support of our cattle during our long winters, seems to be more considered than it was formerly. Some farmers begin to make trial of the system, upon a small scale, and others to admit its advantages. Among vegetables, also, the carrot is deemed very generally, I believe, both in Europe and America, to combine more advantages than any other, considering the quantity and quality of its produce, and the effect of its cultivation, in deepening, cleaning, and ameliorating the ground, and in making the best preparation for subsequent crops of grain and grass. All this is familiar, and seems to be agreed by all farmers acquainted with the subject.

A prejudice, however, prevails against carrot cultivation, from an opinion of its expensiveness. The trouble of keeping clean a small bed of carrots, in a garden, and the labour requisite for that purpose, in the way it is usually conducted, leads farmers to imagine that the cultivation of them, upon a large scale, cannot be carried on without an expense, which will be, at least, a balance for any advantages that may result.

In order to put this opinion to a fair test, and as far as experiment would do, contravene this prejudice, so universal and so injurious to this species of cultivation, I selected in the spring of this year, two pieces of land, and caused an accurate account of the labour bestowed upon them to be kept. The result, as well as the mode of conducting this experiment, I shall state, in conformity to the wishes of the Trustees. In the mode, I do not pretend to any novelty, but it is not possible to give a correct idea of the expense of the cultivation, without stating the manner in which it was conducted.

In the spring of this year, I selected two pieces of land, each containing, by measurement, three acres and one fourth; in the whole, six and a half. They were situated in different parts of my farm. One piece had been cultivated the preceding year, (1815,) with potatoes, and with an ordinary quantity of coarse manure. The soil of this piece was a light loam, a little inclining to sand. The other had been cultivated the same year, (1815) by having had carrots raised on two acres of it, and on the residue, indian corn, and had been manured as is usual for such crops. The soil of this piece was, for the most part, a deep loam; a part, however, inclined to gravel. Both pieces had been suffered to remain during the autumn of 1815. and the winter succeeding, in the same state, in which they were left, when the crops of that year were taken off.

In the beginning of last April, I ploughed both pieces with *a heavy plough and six oxen*; the plough carrying a furrow of at least *twelve inches deep*. The land was then harrowed level. Next, *fifty-nine buck loads* of well rotted manure of the farm yard, was carted on each piece; equal to about *eighteen loads to the acre*. This was spread equally over the surface, and immediately ploughed in with a light plough (carrying a furrow of about six inches,) and four oxen. Both pieces were then well harrowed.

The next process was to strike the land into ridges. This was done by a double mould plough, running with four oxen, and laying the ridges about *two feet apart*, from center to center. The ridges were then trimmed and flattened with hand rakes. After which, the seed was sown by a drill machine, which sowed one row upon each ridge. The seed having been previously thoroughly cleaned and made smooth, by being rubbed by the hand, and winnowed. The quantity of seed sown upon both pieces, was something less than *four pounds*. The whole was finished early in May.

About the 20th of June, the first weeding commenced, and terminated the 4th of July. The second weeding began on the 15th of July, and was continued occasionally, until the 20th of August, at which time it was finished.

The weeding was done by a light garden plough, drawn by two men, and directed by a third, by which the sides of the ridges were thrown off from the plants, as near as possible, without doing them an injury. The plants were then weeded and thinned by hand. The person weeding, using occasionally a light weeding knife, affixed to a long handle, by which the edges of the ridges might be pared nearer to the plants than they could be by the plough; and thus the labour of weeding by hand, was, in a degree, farther diminished. After the weeding was finished, the earth which had been thrown off into the furrows, was returned to the ridges, by the means of the same garden plough.

The harvesting commenced on the 15th of October, and terminated on the 28th of the same month.

This was done by men passing down the ridges, and starting the carrots with dung-forks. Other men followed, who pulled and cut the carrots, throwing the roots into heaps on the ground, and the tops into baskets. The tops were thrown into carts and given to my cattle, or spread upon grass land, in order to dry, for the purpose of fodder. The roots were thrown into carts, and at once deposited in the cellar. This was the whole process.

Some spaces having occurred, in which plants were missing, either in consequence of the too great heighth of the ridge, whereby it happened that the seed was washed into the furrow, or owing to the failure of the seed, or of the machine, or to carelessness in weeding. These spaces were sowed with turnip seed, in the latter end of July. This is done with great facility and exactness, however numerous, or however small those spaces may be, by means of a very simple instrument. A tube, made of tin, capable of holding two or three ounces of turnip seed, and having a nozzle, or little spout, with an aperture so small as to be just sufficient for a single turnip seed to pass at a time, is fixed to a small garden hoe, so as that the nozzle shall be in a straight line with the flat part of the hoe. To work with facility, the hoe handle ought to be at least six feet long, so as to go under the arm-pit, and give a firm purchase to the hand. The person using it, slightly strikes the spot with the hoe, and by a simple turn of the wrist, drops the seed from the nozzle, into the opening, and by another stroke with the hoe, covers the seed. The great advantage of this instrument is, that the seed is sown just where it is wanted, without stooping, without any fumbling after seed, and so rapidly, that it is done almost as fast as a man can walk. One man, by means of this instrument, sowed in eight hours, all the missing spaces of three acres and a half, and from which I harvested *one hundred and thirty-five* bushels of turnips.

The labour on the above pieces, including that of men and oxen, reckoning that of a yoke of oxen equal to the labour of a man, was as follows:

On the first mentioned Piece.

First ploughing,	10½ days.
Second do.	4½
Twice harrowing,	3
Carting out manure,	8
Amount to next page	26

On the second Piece.

First ploughing,	13 days.
Second do.	5
Twice harrowing,	3
Carting out manure,	6½
Amount to next page,	27½

Amount from last page,	28	
Spreading do.	2	
Striking out ridges,	5½	
Raking,	3	
Sowing carrots,	1	
		39½ days.
First weeding, from the 2d July to the 4th,	14½	
Second weeding, from the 25th July to 20th August,	20	
		34½
Labour in harvesting, including that of both men and oxen, to the putting into the cellar,		42
Total labour on this piece,		116 days.

The product of this piece, was—
704 bushels of Carrots,
135 do of Turnips.

839 Total.

Amount from last page,	27½	
Spreading do.	1½	
Striking out ridges,	6¼	
Raking,	4	
Sowing carrots,	2¼	
		41½
First weeding, from the 20th June to the 4th July,	23	
Second weeding, from the 15th July to the 7th August,	41	
		64
Labour in harvesting, including that of both men and oxen, to the putting into the cellar,		64½
Total labour on this piece,		170 days.

The product of this piece, was—
1613 bushels of Carrots,
110 do. of Turnips.

1723 Total.

In addition to the above, I had *sixteen tons* of carrot tops, ascertained both by the number of waggon loads, and estimated, also, by weighing a sufficient number of tops, cut from a bushel, to fix an average, and thus ascertain the whole quantity. I have no doubt the amount was greater; but I set it down *at sixteen tons*, as an amount on which I have no question.

The general expense of the cultivation, then, was—

On both pieces, 286 days work, estimated at a high average rate of wages, at $1,	$286 00
Rent of 6½ acres of land, at $4,	26 00
Four lbs. of carrot seed, at $2,	8 00
Expense of sowing turnips,	2 00
Whole expense,	$322 00

For this expense I harvested 245 bushels of turnips, and 2317 of carrots; equal in the whole, of both kinds, to *twenty-five hundred and sixty-two bushels, besides sixteen tons of carrot tops.*

If the carrot tops be estimated only at $3 the ton, and the value cannot be less; and if the amount, $48, be deducted from the whole expense, and the balance, divided by the whole number of bushels harvested, the result will be that the whole expense of the cultivation was *less than eleven cents the bushel.*

In this estimate I have not made any account of the value of the manure, because it was common barn-yard manure, made on the farm, and because the state of the land, after the crop was taken off, not only from the high cultivation in which it was left, and the little exhaustion from the crop, was, in the opinion of judicious farmers, a full compensation for the value of that article. If, however, any one think that the whole value of the manure ought to be charged to this crop, let him add one hundred and eighteen dollars, valuing it at a dollar the load, and he will find that the whole expense of the cultivation, manure included, will be *fifteen cents the bushel.*

I have been thus minute, because I deem it extremely important to counteract the opinion of the great expensiveness of this cultivation, compared with its product, when conducted upon a large scale. I ought to observe, also, that this experiment, although, as I apprehend, it is sufficiently satisfactory, is far from being a just criterion of the real productiveness of this cultivation, compared with its expense.

In the first place, this experiment was conducted with no particular regard to economy. My only care was that the labour actually applied should be ascertained. The work was, in a great measure, done without personal superintendance. A farmer, labouring himself, and present, at all times with his workmen, would, of course, do it better, and in a shorter time. Besides, the product was very far from being as great as might reasonably be expected in ordinary seasons. The first piece being on an upland, and rather on a sandy soil, was checked by the uncommon drought of the last summer. The other piece suffered also from the same casualty. The weeding, by a hand-plough, rather than by an ox-plough, and the loosening the carrots, at the harvesting, by forks, rather than by a plough, which circumstances happened to render to me this year expedient, all added to the expense. I have no doubt that if the season had been favourable, and the whole had been conducted by an active, intelligent farmer, leading his own labourers, that the product of these six acres and a half would have been between three and four thousand bushels, and the expense of cultivation, exclusive of manure, would not have equalled *nine cents the bushel.*

Two or three principal farmers in my vicinity, satisfied by my experiments in former years have tried the same cultivation with such success and satisfaction, for the two seasons past, on a scale not exceeding half an acre, as to lead them to purpose continuing and enlarging it. They agree that the expense, compared with the product of the cultivation, is not greater, if so great as that of potatoes. The value of the product, as a food for stock in the winter, is far superiour, it is agreed on all hands. Other farmers in this vicinity, also, have assured me that satisfied with the result, they are preparing the next year to make trial, on their own farms, of the field culture of this vegetable.

I am, Sir, yours, &c.

JOSIAH QUINCY.

ON THE ROW CULTURE AND HORSE HOE HUSBANDRY.

[The practice of sowing *broad cast* for grain crops is, we believe, general throughout this Commonwealth. Why it is preferred to the *row culture* it is difficult to conceive. If because the latter requires more labour in preparing the soil for the seed, and more afterwards in the care of the growing crop, this objection will vanish upon a fair consideration of the merits and defects of the two kinds of husbandry. The following summary of the advantages of sowing seed in rows instead of scattering it *broad cast* may induce the reader to look into the subject more at large—we promise him much satisfaction in the perusal of the subjoined extracts from the Farmer's Calendar. This work is from the pen of an Englishman, and, being addressed to his countrymen will be found to contain some terms and to allude to some local peculiarities in husbandry, not known or not familiar to our farmers. The part however which might, properly, be omitted is very small.]

SUMMARY OF THE ADVANTAGES OF THE ROW-CULTURE.

1. Superiour quantity and quality of product, with considerable saving of seed.

2. Perfect command of the land under culture, for any needful purpose, of hoeing, weeding, dressing, thinning, gathering, &c.

3. The most precious opportunity of the total ERADICATION OF THE WEEDS, of applying the whole strength of the soil to the growth of useful vegetables, of keeping it in constant heart and condition, and of superseding the necessity of change, or of particular courses of crops.

4. The power of depositing the seed at its proper depth, securing it from birds, insuring a more regular and certain crop.

5. The benefit of tillage while the crop is growing, by which the soil is *fallowing* for a future crop; this benefit is also of the utmost importance to the growing crop, in hot and dry summers, securing to its roots all the moisture descending from the atmosphere in dews, which in such seasons are very copious and constant.

6. Little or no danger of the crop lodging or falling, the weight of the ears being supported by the strength and shortness of the straw, which is further strengthened by earthing up in the last hoeing.

7. Less danger of blight and mildew, and opportunity of gathering separately, and at a small expense the ears, which may chance to be blighted.

8. Less charge at harvest, and less danger, there being no green weeds.

9. The necessity of a tillage superior to the common, a circumstance of the most beneficial tendency in slovenly and ill-tilled districts.

10. A delightful and garden-like neatness, which must be highly gratifying to the proprietor of the soil, both creditable and profitable to the cultivator, and honourable to the agriculture of the country.

THE ROW-CULTURE.

THE cultivation of corn in rows, for the purpose of admission to destroy the weeds, by one of those seemingly strange revolutions in human affairs, now styled the New Husbandry, is, in reality, the primitive practice, and derived from the most remote antiquity. There needs no better proof of this, than the existing practice of various nations in the east, where, it is well known, they have ever retained the customs of their ancestors, with the most superstitious veneration, and, where according to the most authentic records, no change in their agricultural system has obtained for thousands of years. According to the latest accounts, they both drill and dibble their corn, of every species, in Arabia, China, and Japan; in the latter of these countries they use a drill-barrow, of very simple construction, drawn by hand; and in three points, the most important in the whole range of the husbandman's art, I fear they are at least a century before this boasted seat of improvements; they cultivate their whole country, even to the summits of the hills; they collect, with unremitting attention, every possible article of manure, and they suffer not the existence of a weed upon the surface of the earth. The Belgic districts, on our own continent, justly boast a similar superiority over us.

The drill-husbandry has been probably known, and practised by individuals of this country, for ages; but was first essayed upon a regular and permanent plan, about a century since, by the learned JETHRO TULL, who professed to have caught the idea from the vine-culture upon the continent, and to whose ingenious mind the mechanism of an organ suggested the rudiments of an implement for the delivery of seed in drills. In the course of thirty years culture of his own grounds, under every disadvantage of ruined health and embarrassed circumstances, this enthusiastic and splenetic genius, reduced the tillage, seeding, and weeding of land, to a system, which being founded in nature and philosophical truth, we may venture to predict, no length of time will be able to overturn. Most of our drilling and hoeing implements, are either copies, or improvements upon the invention of Tull; and his book, in which theory and practice are properly blended, evincing the labour of an acute and penetrating mind, ought to be in the hands of every agriculturist, who aims at principles, and who is laudably ambitious to take his draught of science at the fountain-head. The grand error of Tull, has not always been fairly, or accurately stated. He no where denies, that dung is an improver of land; but with that inequality of reasoning, generally to be observed in men of strong prejudices, he weakly attempts to support the fanciful notion, that dung acts merely by dividing the soil, without being, in any sort, the food of plants, which quality he attributes exclusively to earth—as if dung, to go no farther, was not naturally and spontaneously convertible to earth. It is extremely probable, this notion of Tull, was the pure offspring of his spleen. Like too many other cultivators, he had no knowledge at all of cattle. His pride took the alarm at the vulgar occupation of a grazier, although not sharp-sighted enough to perceive any derogation in the business of a mechanic. Such things are hobby-horses. A late writer has drawn, as he supposes, powerful arguments against the drill-husbandry, from the ill success, in pecuniary affairs, of Tull, without reflecting, that a man of genius, may just as easily broadcast, as drill away his money. But whatever were his defects, it would probably be difficult to name a man whose works have conferred a more solid and permanent benefit upon his country: yet whilst so many others, for services of a very different nature and tendency, have enjoyed the most splendid rewards, Jethro Tull, whose honest labours were to contribute to the feeding, and the employment of countless millions, was suffered to pine out his days in misery and distress; his reward consists in the glory of being hailed by posterity, as *the illustrious father of the horse-hoeing husbandry.*

Dibbling, or setting corn in the earth, grain by grain, was known long ago in this country, and practised early in the last century, but laid aside; about thirty years since, the practice was revived by Mr. Varlo, author of the Yorkshire Farmer, and has spread considerably in Suffolk, Norfolk and Lincolnshire.

To a man unacquainted with the proverbial aversion of the generality of English farmers, to all improvements, and their rejection of the most obvious benefits merely on the account of their novelty, the slow progress of the row-culture, with its perfections staring even indolence itself out of countenance, would indeed seem somewhat miraculous. But what conclusions are we to form from a perusal of the works of certain of our most profound writers on agricultural topics, where they tell us, with so much apparent gravity, that we may, or rather must drill or dibble pulse; but that we may not *drill* white corn, and yet notwithstanding, we may *dibble* white corn! Out of respect to those gentlemen, from whose writings I have received so much instruction, I shall suppose they have argued in this way, from pure complaisance to the majority, whose hour or minute of conversion was not arrived, who were not yet bit for drilling.

To prove the practicability of setting corn in rows, or to disprove the necessity of scattering it about at random, for the benefit of all the fowls of Heaven, is a task, which carries very much of the ridiculous about it: and yet seems to be necessary. As to the first, whole countries have immemorially performed it, on soils of every possible description, upon the plain, in the valley, and to the very summit of the mountain. The most enlightened men of this country have preferred, and successfully practised it, upon every kind of soil. If light lands are best adapted to the practice, so also are they to every other species of culture, but beans are both drilled and dibbled, by custom, upon the stiffest and roughest soils, which demonstrates the practicability with other corn. The quantity of land in this country, which cannot be either drilled or dibbled upon, is indeed very small, and in my opinion, the setting corn of all kinds in rows, upon the steepest ascents, where the operations of the hoe-plough are inpracticable, would amply repay the extra expense of hand-hoeing.

Where now lies the pretended impracticability of setting all plants in regular rows, upon the farm, as well as in the garden? No where upon earth, but in the breach of sacred custom, and in the indolence of those who can live without breaking it But the vast expense of the practice—What of that?—since granting it doubled, or even trebled, the bounteous earth repays all. I must repeat, that in business, *it is not the expense of a measure which ought to be the question, but whether there be a certainty of spontaneous repayment;* and here generally lies the grand error of persons unhabituated to calculation. To allow this (greater cost) is merely gratuitous on my part, for I am convinced, that the drill-culture in its most expensive variety, if judiciously conducted, is far cheaper than the broad-cast; that it may cost more money at the outset is beside the question. It has been said, where shall we find skill and labourers? I answer, seek and ye shall find. No man in the country, who has *diligently* sought in this business, has been ever yet disappointed; and our population, in the despite of Dr. Price and his disciples, has been upon a progressive increase for a long series of years, and obviously so much of late, that the want of labour is likely to become a very dangerous want, and one that should be instantly supplied. As for the skill required, to borrow the sense of Tull, and to acknowledge the obligation (which, by the by, I wish every one would do also) surely our trouble is well repaid, in learning a beneficial art or science, whether it be corn-drilling, geometry or navigation.

The very best conducted system of random, or broad-cast husbandry, is liable to great defects, all which, as far as possible, are remedied by the row-culture. As to the worst part of the common husbandry, it has ever been, and of late especially, most highly injurious to the first interests of the country. The place occupied by weeds and fallows, and the seed wasted, would supply a very large part of our population with bread and flesh provision.

The theory of vegetation is well enough known, in the general, that is to say, well enough for the advantageous practice of husbandry. A plant, like an animal, is furnished by nature with organs for the attraction of its food, the ejection of its excrement, and the respiration of the common air. These organs are the fibres or suckers of the roots, and the filaments and vesicles of the leaves. The earth is a pasture to the animal plant, the substance or essence of which it absorbs, most probably, as has been already said, in the form of vapour or gas, the recrement of which is excreted through the leaves into the atmosphere, whence, in due time, it again returns to the earth. The matter which descends from the clouds must, I conjecture, ever be received by the roots of plants, through the pores of the earth, and not by the leaves, which only perform the function of lungs, and do not appear to me to possess recipient organs for any substance excepting air, which is necessary to them as to animals, for respiration only. I am thence inclined to slight the notion of vegetables with large and succulent leaves, drawing their chief nutriment from the air, which must be a light and windy diet to either plant or animal; and, to conclude, that their supposed quality of non-exhaustion is to be attributed to a very different agent; the hoe probably.

We see, in the case of weeds, most plainly, that pulverization, or reducing land to the finest particles possible, rapidly promotes vegetation. Seeds are locked up and may perish in hard, cloddy earth, and growing plants are starved and stunted in such; but by reducing it to fine particles, the delicate and minute vegetable fibres are enabled to shoot through it, and extract their nutriment; and the fibres themselves, with analogy to those of the animal body in certain cases, increase with the increased quantity of food, until the plant has attained its greatest possible size. By this loosening and rendering fine the soil, another indispensable point is gained, it is made pervious to the genial heat of the sun, to the corrective rigour of the frosts, to the dews, and to all the fructifying bequests of the atmosphere. The surface of the earth being hard and impenetrable, the atmospheric manures cannot find admission, but remain to be dried up and exhaled by the heat of the sun.

We now approach the celebrated hypothesis of Tull. He contends, that earth being the sole food of plants, infinitely divisible, and possessing within itself the means of restoration, can never be exhausted, provided we are constantly giving those vegeto-animals fresh pasture, and destroying their competitors, the weeds, by *pulverizing the soil*, which operation, both on the score of penetrating to sufficient depth, and of economy in point of expense, must be performed by the *horse-hoe*.

Without giving up the sovereign use of manures, particularly the animal, I freely acknowledge I have ever been disposed, respectfully to accompany this philosophic agricultor a great length. The case is equal between the poorest and the richest soils, the produce will be proportional in both, with or without manure. What tracts of land there are of all degrees of quality, which have been tilled time out of mind, with barely manure enough to make a difference in the question, and yet have produced and supported their occupants. I have known a man who farmed near fifty years without a fallow, and with very little attention to manure, and yet his crops were generally on a level with his neighbours'; what is truly singular, he was a man of the old stamp, in all other respects, and lived in a fallowing district. These are not conclusive.—But to come closer—suppose the manure bestowed upon land is barely adequate to the support of the weeds suffered to grow upon it, you may then just as well omit the manure, and extirpate the weeds. In the old husbandry, quere, whether the quantity of manure ever exceeds, does it equal, the fair demand of useless vegetation? I am convinced that many farmers of that sort within my knowledge, would succeed, at least equally, upon the Tullian plan, rejecting manures altogether. Their lands would have less straw, no weeds to support, and from pulverization, enjoy at least the benefit of the dew of heaven. As it is, they are doubly cropped with corn and weeds, their surface is ever rough, and the quantity of manure bestowed, scarcely worth a note. A certain young farmer of my acquaintance, once lost a favourite Chinese boar for several weeks; after searching all the country for twenty miles round, the hog was at length found asleep, in a cover of docks, thistles, and oats, upon a fallow into which the men were about to plough some manure, in order for wheat seed. This piece had grown oats the year before, and six weeks previous to the time I am now speaking of, a few small heaps of dung had been deposited, which the rays of the sun had reduced to a powder.

I will now submit the making up of my mind on this subject to better judgments. I believe the mere horse-hoeing system, without any artificial manure, far superior to the old English one in which the land was and is, in many cases, exhausted by weeds in a three-fold greater degree then benefitted by dung; with this important superiority of the hoeing plan, that supposing the arrival of both parties at stark poverty, or mere *caput mortuum* in the soil, the latter would possess the striking advantage of being sent to Bath, that is, fallowed for grass, perfectly clean, and in a proper state to receive all the restorative benefits nature has to bestow; whereas, in the old way, land is always turned to grass with its surface and its bowels full of the most devouring and exhausting trumpery, which is nourished with the crop, adulterating and poisoning it, and attracting to itself great part of the benefit of the fallow. Hence there can be no pure, or sufficiently ample grass-crops, on the old plan. I hold the present improved broad-cast system, with sufficient courses of pulse and green crops hoed, for the attainment of the *due* quantity of manure, far superiour to the naked system of Tull: but, after mature reflection, reading all I have been able to lay my hands on, upon the subject, and attending to a number of experiments, I give a decided preference to Tull's practice, aided by manure. It being left to my election, I should just as soon think of broad-casting cabbages, as wheat or oats. The admission of air and of moisture to the roots, through the loosened soil, is of the first consequence to all plants equally, culmiferous, or otherwise; and if space and hoeing will cause beans to kid to the very bottom of the stems, it will also occasion wheat to tiller and ear in proportion. If beans require more space than wheat, it is simply on account of their greater bulk, and for the same reason that a cart-horse may need a larger stall than a saddle-horse.

OBJECTIONS, WITH REPLIES.

It is remarkable without being at all wonderful, that nearly every individual objection, made at this time, to the drill husbandry, has been previously made, and satisfactorily answered by Tull. In truth, the *wholesale* practical answer, that drilling has had for years together the most unquestionable success on all soils, and is still in a prosperous course, might well preclude the use of any detailed replies.

The same mode of rejoinder, in the behalf of Mr. Kent, may well serve for Mr. Brown, author of the survey of the West Riding of Yorkshire. Equally strong and wet, probably stronger clays than Mr. Brown ever has had the opportunity to cultivate, have been long and advantageously tilled in South Britain, without fallows.

Objection.—1. The difficulty of obtaining proper implements, and well-skilled labourers.

Reply.—Those farmers who may be inclined to make an experiment in drilling wheat* or other grain, but may neither choose the expense or trouble of using new implements, may do it to every satisfactory purpose, in the most simple way, and with the most common tools. They may make their first essay upon a single well-tilled acre, pursuing afterwards, or rejecting the practice, as they shall be warranted by success.

2. The fine tilth necessary.

Reply.—A most unlucky objection. If it be meant that some land cannot be made fine enough, the remark is groundless: no land should be sowed in a state of puddle; if properly dry for seeding broad-cast, it may be drilled, or dibbled as beans are on clays, in the spring. A certain farmer said, if he

* The Trustees of the Massachusetts Society for promoting Agriculture, will readily afford any information they may possess in regard to machines used in the drill husbandry, in foreign countries, or in Massachusetts.

took the pains to get his land sufficiently fine for drilling, he could then get a good crop independently of it; granted. But could he get as good after-crops, and as clean?

3. The danger of too *thin*, or too *rank* a crop, subjecting the corn thereby to blight and mildew, or to being beat down.

Reply.—A common risk to both methods; but if any practicable remedy, surely more so with corn in rows. All experience seems to prove drilled corn least subject to blight and mildew. As to lodging, it was perfectly reasonable to presume strong, elastic stems the least liable, and experience has confirmed that theory.

4. The plants too thin upon the ground, and land lost in the intervals.

Reply.—No. Because most drilled crops exceed the broadcast in quantity. Is there any advantage in the spaces being occupied by weeds, which they undoubtedly would under the random-culture? Drilled crops producing more, or even equally on less space, is a sufficient answer.

5. Later at harvest. I have neither observed this of drilled crops, nor have I heard such a complaint from the drill-husbands. It may probably have arisen from too late sowing of Lent-corn.

6. Straw for fodder rank and coarse.

Reply.—Mr. Exeter consulted his oxen on this head, and received a very satisfactory answer. I think it not improbable that the straw may be more substantial and nutritious. Granting the validity of the objection, it is infinitely overbalanced.

The objections to drill-husbandry, which Mr. Young has lately brought up from Lincolnshire, amount simply to this, the farmers are there too rich to attend to so troublesome a process; for example, Mr. Harrison at Norton, after trying it upon a friable sandy loam, laid Cook's drill aside, not from any defect in the tool, but that the husbandry "wont do here;" a good old-fashioned reason, which, it is probable, his father or grandfather before him, applied also to the culture of clover. There was a time, (see Ellis, Tull, and later writers) when both clover and turnips *would not do here*. Mr. Graburn, of Barton, has been a successful driller of barley, and various other crops, yet he finds *the system so tedious* (there's the rub) that he has given it up, and now sows all broad-cast. We all remember Mr. Billing's successful culture of carrots, and his (surely not consequent) relinquishment of that culture. Twenty-five years ago, I remember a farmer took it into his head to cultivate twenty acres of fine rich land, with a certain garden crop; he made an immense profit, yet although the London seedsman, who was the purchaser, year after year, importuned him to repeat the crop, it was all to no purpose, the farmer was inflexible, never would, nor ever did, to the day of his death. I leave it to the naturalist to account for these phenomena.

Mr. Cod, of Radby, approves the Drill for turnips, and all corn but oats, with which he could obtain no success, assigning, I think, a whimsical reason for his failure. Drilling of oats has been successful in every quarter, as far as I know, without excepting Lincolnshire. From this accidental deviation, which, on a near inspection, would no doubt, be easily accounted for, this gentleman (as has ever been the fashion amongst agriculturalists) will no doubt form an erroneous general conclusion. It is thus agricultural *principles* are fabricated, without any very near relation to nature or logic. A respectable farmer and stock-breeder in Sussex, I am told, will not hoe his broad-cast wheat, because the hoe destroys the fibres of the roots; now as those fibres are and ever have been increased both in number and strength, by the salutary operation of the hoe, *upon all sorts of soils*, it is perfectly allowable to place the objection to *the old account*. A writer (in a note M. S. of the Board) never knew drilling to answer any good purpose, but for beans; for those it was the best method. Which being interpreted will stand thus:—The *custom* of drilling beans is established. As to the comparison of drilling beans with drilling white corn, is as follows: Broad-cast either beans or wheat on a clean tilth, and one may get a good crop; drill them, and in all probability you will get a better, and in much the same proportion.

Mr. Walker has drilled all corn to a large extent; from drilling nine gallons an acre of wheat, he has had forty-four bushels per acre, over eight acres, yet has totally left off drilling except of turnips. Mr. Young has spoken sufficiently of the ample crops of thistles, and other similar blessings of husbandry, in Lincolnshire. All arguments on the subject are superfluous.

It is now necessary to exhibit some actual experiments, as specimens of the practice of drilling, and these, in preference to any memorandums of my own, I shall select from the authorities of our most celebrated cultivators. I shall begin with Mr. Amos, author of the Theory and Practice of Drill Husbandry, and Manager for Major Cartright, at Brothertoft, Lincolnshire, who has favoured the agricultural world with a connected series of comparative experiments, of nine seasons continuance.

Mr. Amos began the experiments in 1783, upon various kinds of soil, and in every one of them, employed two acres of land, laid up in eleven feet ridges, and drilled, and sown broad-cast alternately.

1. Experiment on Oats.

Drilled acre.	*l. s. d.*	*Broad-cast acre.*	*l. s. d.*
Expense,	2 5 0	Expense,	2 8 3
Crop, 56 bushels,	6 6 0	Crop, 50 bushels,	5 6 3
Profit,	4 1 0	Profit,	2 18 0

Superiority of Drill crop, *l.*1 3 0

2. Beans after Barley.

Drilled acre.		*Broad-cast acre.*	
Expense,	2 9 6	Expense,	2 9 9
Crop, 36 bushels,	6 6 0	Produce, 30 bushels,	5 5 0
Profit,	3 16 6	Profit,	2 15 3

Superiority of Drill crop, *l.*1 1 3

3. Wheat.

Drilled acre.		*Broad-cast acre.*	
Expense,	2 11 10	Expense,	2 13 3
Crop, 36 bushels,	9 18 0	Crop, 30 bushels,	8 5 0
Profit,	7 6 2	Profit,	5 11 9

Superiority of Drill crop, *l.*1 14 5

4. Turnips.

Drilled acre.		*Broad-cast acre.*	
Expense,	3 4 0	Expense,	3 0 3
Crop,	3 15 6	Crop,	3 3 0
Profit,	0 11 6	Profit,	0 2 9

Gain by Drill, *l.*0 8 9

5. Potatoes, on a light, sandy, loam.

Horse-hoed acre.

	l. s. d.
Expense, - -	6 3 0
Product, 500 bushels,	16 13 4
Profit, - -	10 10 4

Hand-hoed acre.

	l. s. d.
Expense, - -	7 3 6
Crop, 420 bushels,	14 0 0
Profit, - -	6 16 6

Superiority of Horse-hoed crop, *l.*3 13 10

A single word, by way of commentary on the above experiments, would be unnecessary. When two and two, by the obvious rule of addition, are made into four, men neither make objections, nor call for an explanation. It will be much more to the purpose, to make public demonstration of our gratitude to this sedulous and respectable cultivator, and to profit by his rules. In various other trials upon inferior land, worth about twelve or fourteen shillings per acre, Mr. Amos declares he never found the profits less than twelve or fourteen shillings per acre per annum, in favour of the practice of drilling. Mr. Amos' drill-machine is an improvement of one recommended in Duhamel's Husbandry, constructed with spherical cups. It sows 8 rows at 8—7 at 9—6 at 10—5 at 12—4 at 16 and 18—3 at 20—24 and 2[illegible]—and 2 from 28 to 56 inches between the rows; and with one man, a boy, and a horse, can drill an acre of land in one hour. Expense of workmanship and materials for this machine, six guineas. It plants all kinds of grain, pulse and seeds, turnip, carrot, rape, &c. also acorns, haws, holly-berries, or the like, on any kind of land, in any given quantity, and at any depth and distance required.

The following extracts are from the prize essay of Mr. John Exter, of Pilton, Devon, for which he was lately rewarded by the Bath Society, with a piece of plate, value ten guineas. Mr. Exter is a cultivator of character and eminence in the West, a correspondent of the Society, and of the Board of Agriculture: and in the habit of instructing pupils in the theory and practice of husbandry. Mr. Exter's experiments, during six years, made with a critical and impartial attention, upon an extensive scale in every soil and situation, have uniformly and decidedly proved the superiority of the drill-culture.

He began in 1790, by drilling barley, at six inches, with Winter's machine, on a small part of a field, the intervals of which were hand-hoed. The success of this, under other disadvantages, besides poverty of soil, convinced him of the advantages of the system under better management, and excited him to make farther comparisons between the drill and broad-cast methods.

In November, 1791, Mr. Exter received, by sea, from London, Cooke's Drilling Machine, which he prefers. This, I believe, is on the same principle and construction with that of Mr. Amos, already mentioned. The implement arrived somewhat too late for the seed-season; but Mr. Exter drilled with it, on a piece of too acres and a half, one bushel per acre, red Lammas wheat, in rows with nine inch intervals. The land was light, dry, loamy, barley soil, worth twelve shillings per acre, but in the state of a very foul and poor pea-stubble. A servant-man, thoroughly orthodox in the old system, and extremely averse to the supposed complexity, and loss of land by the intervals in drilling, was directed to fix on any part of the field which he considered as best in tilth and condition, to sow broad-cast, and manage as he should think proper. He confessed, the part he chose was better than the average of the drilled land, by five or six shillings per acre, and sowed his part, at the rate of two bushels per acre; and, during the growth, paid unusual attention to keep it clean from weeds. The drilled crop being thin sown, made but a poor appearance until June: the broad-cast, on the contrary, looked much more verdant and thriving, during winter, and the beginning of spring, till the end of May, at which time, it became rather sickly and yellow. The drilled crop was scarified once in March, and horse-hoed in the last week of May; after this operation, it improved greatly, and began to shew a decided superiority over the broad-cast, which evidently continued to decline. At harvest, the drilled part yielded nineteen bushels, three pecks, nine gallon measure, per acre; the broad-cast yielded not quite five bushels per acre.

In March, 792, drilled one bushel white Lammas wheat, on one acre potatoe-fallow, worth a pound rent, prepared by once ploughing and harrowing. The plants when double-leaved, had one scarifying; and immediately after were harrowed across with the common harrow, and were horse-hoed when six or eight inches high. The crop very thin till after Midsummer, yet a great product both of grain and straw at harvest. The acre yielded twenty-nine bushels, three pecks of wheat, nine gallon measure. This successful experiment on *spring wheat* is most important, and deserves the utmost consideration in the present state of the country.

The same spring tilled thirty acres of land, worth from 35 to 40*s*. per acre, with barley; fifteen acres were drilled at two bushels per acre, with rows at nine inches; and fifteen acres broad-cast from three to four bushels per acre; the preparation of the land, manuring, &c. in every respect alike. The season very wet, both during the growth of the crop, and at harvest. The broad-cast was lodged, stained, and with great difficulty harvested at all. The drilled stood better, was scarcely at all lodged, and being free from grass and weeds was all saved, without the least injury, at half the expense of the broad-cast; the produce of grain from ten to fifteen bushels per acre more, and a shilling per bushel better; and this, notwithstanding the whole of the broad-cast crop had been first sown, a remarkable advantage that year.

In the following October, Mr. Exter tilled and manured a field of ten acres, for wheat, drilling at nine-inch intervals one half the land, with half the quantity of seed with which the other was broad-cast; but, as some doubts were advanced respecting the value of the land, in different parts of the field, two twelve furrow ridges, by way of proof, were gathered through the middle of the part intended to be drilled, and the drilling was begun on each side of those ridges. The ridges were ploughed, sowed and manured, according to the common husbandry of the country, by the person before-mentioned, and every attention paid to weeding them in the spring; the drill-crop was scarified and horse-hoed once. At harvest the two ridges were cut first, and immediately after a breadth of the broad-cast on each side of the ridges was cut, and each part stacked and kept separate, until it was dry enough to thrash, when it was carted into two different barns, and immediately thrashed and winnowed; when the drilled crop yielded 29 bushels 3 pecks, the broad-cast 20 bushels 1 peck. In order to guard against any suspicion of fraud, the whole was winnowed and measured by the same man, the person who was so very averse to the drill system.

From these successful experiments, Mr. Exter has been induced to drill the whole of his white-corn crops ever since, excepting only a part, sown in the random method, by way of proof; and, in all his trials, has experienced an invariable superiority in the drill-culture, without even a single instance of equality of product in the broad-cast method. All the pulse-crops he leaves out of the question, since, with regard to the superiour fitness of the row-culture for them, there seems to be but one opinion; but he avers, confidently, the same thing, respecting turnips, in which opinion I have the fullest conviction he is right. To drill turnips, is to put in for a fair chance of doubling the worth of the crop. Having reconsidered the matter, and, from some late observations, I would also advise the drill and horse-hoeing culture for carrots, more particularly if manure be scarce.

This worthy disciple of the Tullian School, exhibits an account of several farther experiments on barley, oats, and turnips, drilled at twelve inches apart, in which the result was similar to the above stated, with the mention of a fine crop of beans drilled in two rows, at nine inches, with an interval of twenty-seven, which became quite a thicket. It happened, from this luxuriance of growth, that part of the rows could not be hoe-ploughed a second time, which fortunately served to demonstrate the immense difference that omission made, in the friability of the fallow, and the vast importance of the horse-hoe; the part twice-hoed, worked afterwards better on a single ploughing and harrowing, than the other part would with three times the tillage. The one appeared a fine mellow loam, the other a clay. Mr. Exter also records Mr. Secretary Young's frank acknowledgment of the superiority of the drill-culture; a circumstance which will, as it reasonably ought, have great weight with the majority of our cultivators.

The following facts and opinions respecting the mode of culture in question, are also extracted from the papers of the Bath Society, being the substance of a letter from the Rev. H. J. Close, of Hordle, near Lyminton, Hants, a worthy and estimable character, as his various agricultural correspondence, for many years past, fully evinces; and a real practical cultivator upon a considerable scale. I have a sincere pleasure in this opportunity of paying my share of that tribute of applause, due from his country, to this patriotic votary of the plough, whom I had formerly the honour to know personally, but whom I have not had the pleasure to see for near thirty years.

Mr. Close formerly asserted, that he saved full 200*l.* per year in seed, by drilling his corn upon 500 acres of land, although by no means so perfect in drilling and horse-hoeing as he has since been. In proof of this he gives the following quantities, which he actually has, and still continues to drill, on 131 acres, with a comparative statement of the quantity broad-cast in the common husbandry.

Expense of seed-corn upon 131 acres of land, sown in the usual broad-cast husbandry.

		bush. per acre.		*per bush.*	*l.*	*s.*	*d.*
31	Acres Wheat, - -	3	at	7s.	32	11	0
20	– Early Peas, - -	4		8s.	41	12	0
18	– Dun Peas, -	4		5s. 3d.	18	18	0
15	– Tick Beans, -	3		5s.	11	5	0
6	– Early Maz. Beans,	3		6s.	5	8	0
12	– Oats, - -	4		3s.	7	4	0
13	– Barley, -	3		3s. 6d.	6	16	6
12	– Vetches, -	3		6s.	10	16	0
				Total,	134	10	6

Expense of seed-corn upon 131 acres of land, in the present improved drill-husbandry.

	pecks.	*per bush.*	*l.*	*s.*	*d.*
31 Acres Wheat, per acre,	3	8s.	8	2	9
26 Early Peas, - - -	3	8s.	7	16	0
18 Dun Peas, - - -	1	5s. 3d.	4	14	6
15 Tick Beans, - - -	3	5s.	2	16	3
6 Mazagan Beans, - -	3	6s.	1	7	0
13 Oats, - - -	1 bushel,	3s.	1	16	0
13 Barley, - -	1	3s. 6d.	2	5	6
12 Vetches, - - -	1½	6s.	5	8	0
		Total,	34	6	0

	l.	*s.*	*d.*
Seed, broad-cast, - - - - -	134	10	6
—— drilled, - - - - - -	34	6	0
Saving in seed upon 131 acres, by drilling,	100	4	6

It is the opinion of Mr. Close, that a clear saving of *five millions* sterling a year might be made, in the article of seed-corn, and double that sum, in the produce, and application of that produce, by the improved system of husbandry, as at this moment practised by some few spirited farmers, that, (without pretending to minute accuracy of calculation) 8,000,000 bushels of wheat, 8,000,000 bushels of barley, 1,000,000 bushels of rye, 4,000,000 bushels of oats, and 1,000,000 bushels of peas and beans, which are yearly thrown away, in superfluous seed, might be saved, independently of the additional produce, which, by the new system, might be obtained. Thus it is possible to add fifteen millions annually to the national wealth! That more than double the present scanty portion of tillage, now given to the lands of England, would amply repay the farmers for their extra labour and expense; that four times the stock might be wintered, and the aggregate produce doubled. On the latter part, at least, of these statements, I agree with Mr. Close, without the smallest hesitation—they are capable of the most palpable and satisfactory proofs.

Mr. Close acknowledges his obligations to the agricultural as well as mechanical skill of the ingenious Mr. Cooke, by whose implements, namely the *Scarificator*, *Cultivator* and *Quitch-Rake*, he was enabled to pulverize his strongest land to the fineness of dust, and to cleanse it from weeds, at a little more than a quarter part of the expense necessary to make an equally good fallow, with the common implements of husbandry.

The following account of two crops of drilled turnips, is interesting in the highest degree. "Two adjoining fields were taken at Lady-day, from a little farmer, in a very foul and impoverished state; and well pulverized and cleaned, by frequent scarifying, rolling and harrowing. The quitch-grass was drawn out by the quitch-rake, and burned on the land. After these operations, which cleansed, levelled and pulverized the land about six inches and a half deep, one field of four acres was thrown on two ridges by one bout of the plough, three feet from the centre of one ridge to the centre of the other. A triangular sled of wood, drawn by one horse, and held by a boy, was passed at the bottom of each furrow, to make them about two feet wide, which operation was necessary, merely to widen the bottoms of the furrows, that the rows of plants might be exactly over the manure. In these furrows, some long wet straw from the farmyard, half rotted, was laid, about ten common carts per acre: the ridges were then split and reversed, throwing all the pulverized soil on to the dung: one horse and a boy, with a long bar of wood with handles, beat down the tops of two ridges at once, leaving a surface about eighteen inches wide, and prepared the land for drilling. The horses then walked in one furrow, each wheel occupied another, and four rows of turnips were drilled on the tops of two ridges, 11½ inches from row to row on each ridge, and 22½ inches interval.

"As soon as the turnips were in rough leaf, the corn scarificators were passed through them, a furrow was taken from each side of the ridge, with the common Suffolk plough, and the turnips in the rows, were hand-hoed. These operations were performed twice, and the whole land thrown up to the turnips by the common plough, which finished. The field was sowed in the first and second weeks of July. Before Michaelmas, no appearance of intervals could be seen, and the field exhibited the finest and most regular crop of turnips ever beheld; many of them weighed 25lbs. each, and measured three feet three inches in circumference. Agriculturalists and farmers from many parts of the country, visited the farm, and were astonished at the regularity of the crop, and the size of the plants. The average weight of each turnip about 12 or 14lbs. The acreable weight was ascertained by weighing a few rods, to amount to 55 tons. The turnips were most of them drawn, their tops and tails cut off, and stacked before the frosts, and are now, *this fifth day of March*, perfectly sound and good. Never, indeed, did bullocks fat faster than on these turnips: *They were lean, working beasts, put up the beginning of November, and will soon be very fat, as they already weigh about 45 score each, and it is supposed they will reach 50 score each, by the middle of April.*

"The other four acres were treated exactly like these, except being sown without any dung, and ten days later than the first field; yet, to shew what extra tillage, and throwing the whole of the soil to the plants will effect, these were a very even and beautiful crop of turnips, allowed to be the best in the country, excepting the adjoining field, and a neighbouring one, tilled in the same method. The advantage of this system must be apparent; the young plants, when the land is mucked, are absolutely on a hot-bed, and grow so rapidly, that they are in little or no danger from the depredations of the fly. The intervals admit sun and air, without loss of land. as the whole of the pulverized soil is thrown to the part of the land occupied by the plants. The land is better tilled by the use of the horse-hoe, and common plough, than it can possibly be by hand-hoeing; and the expense of hand-hoeing is reduced one half, by having merely to hoe the rows of turnips, and to single the plants. Thus a more complete fallow is made, and a much heavier crop obtained, at about one quarter the expense of ploughing four times, dragging, &c. as in the common system: but great success must not be expected, without first obtaining the most complete pulverization."

THE HALF-HUSBANDRY. The following experiments were upon a larger scale, but the accounts were reduced to an acre-able one, for the convenience of the reader. "One field was fallowed for two years, an ddressed very highly: September, 1795, thrown on two ridges, 4 feet eight inches wide, exclusive of the furrow. October 1st. every other ridge was drilled with red wheat, a little more than 3 pecks per acre, 11½ inches from row to row. It was twice horse-hoed in the spring, and the 4 feet 8 fallow ridge was ploughed up to the wheat, and back again, and then one furrow was thrown up to each outside ridge, on which the wheat had been drilled. The wheat was so very luxuriant, that it was laid in the grass. and I was obliged to feed sheep with it, until the middle of April. One row of potatoes was then planted on the centre of the fallow ridge; these were ploughed between, and well hoed. The produce of the two acres of land was wheat, seven quarters, three bushels per acre; potatoes, per acre, one row on each fallow ridge, fifty sacks.

"The following year, the potatoes were grown on the ridge occupied by the wheat the preceding year; and the wheat upon the fallow ridge, where the one row of potatoes grew. Both crops looked equally strong and good the second year; but the result was not ascertained. But there can be no doubt, that by thus alternately cropping and fallowing, the land would improve every year. A similar experiment was made in an adjoining field, trusting entirely to pulverization, without manure. From this field, two successive good crops of potatoes were taken, without any dressing. The potatoes were planted with three feet intervals, and ploughed between: the land was in very high tilth, drilled at the same time, and in the same method, as the other field. In the spring, the wheat looked thin, but of a good colour. It was twice horse-hoed, &c. At harvest, to Mr. C.'s surprise, this produced seven quarters, one bushel, per acre; only two bushels less than the field which had been manured at 5*l.* per acre expense. Forty sacks only, of potatoes, were produced from the one row, on each fallow-ridge in this field. The same year, in an adjoining field, there was a fine crop of broad-cast wheat, to appearance, after beans, well dunged; and the farmer assured me he had only three quarters and a half per acre. Indeed the ears of the broad-cast corn were very small, and about three or four inches long. In the drilled red wheat, were many ears eight inches long, measured by numbers of gentlemen who went to see the crop."

So convinced is this true patriot of the soil, of the superiority of the new, over the old, or random method of husbandry, and of the great public utility of having this superiority clearly ascertained, to the conviction of all farmers, that he has challenged all England to cultivate 24 acres of land in a six years course of crops, row against broad-cast, for *a thousand pounds*, the drill annually to exceed the broad-cast crops, one guinea per acre. Mr. Close, at the same time, most generously declaring his intention of bestowing the money, should he prove a winner, in charitable purposes: thus in fact he is, from pure motives of public good, nobly risking his own property against nothing. Bath papers, vol. 9. p. 44.

A. Collett, Esq. of the county of Suffolk, a cultivator of great skill and experience, as his observations in the report from that county fully evince, thus speaks of Cooke's drill, and of drilling in general. "It has nine coulters, goes with two horses, and will keep pace with the plough; in barley-sowing it finishes ten acres every day, with ease to the horses, and can never be affected by rain or wind, and will deposite the corn the same, whether the land is hilly or level. A one-horse roll should follow the drill, to close the land upon the seed, and then the more the land is harrowed the better. Farming should come as near to gardening as possible; but nothing will accomplish it like drilling. Let any judicious agriculturist examine the rows of peas or kidney beans, in a garden, and see which are most productive, the thick or the thin ones. Let him examine the young plants of clover in drilled barley, and in barley that is sowed broad-cast, it will soon be distinguished which has the preference. Dibbling and drilling corn have been attended with the best consequences to the poor, by encouraging the farmer to weed it in a ten-fold degree, to what he did when sown broad-cast; and, as the ploughing, rolling and harrowing, are more attended to by the farmer, the land is in a better state of tillage than ever was thought necessary before they were introduced."

In Mr. Collett's opinion, very little seed is saved by drilling; but the Rev. Mr. Hill, of Buxhall, same county, an experienced cultivator also, finds that he saves at least one half his seed, by drilling it; and I have been often enough convinced that he is right. This gentleman has found, by repeated experiments, a superiour produce of wheat, planted eighteen inches asunder, than at a nearer and more fashionable distance: in this particular, also, thorough tillage pre-supposed, I fully concur with him. In one crop, his eighteen-inch rowed wheat, produced more straw, (a thing uncommon,) than that at nine inches. The former produced 8 coombs, 1 bushel, 1 peck of wheat; the latter, 7 coombs, 1 bushel, 2 pecks.

In the section on implements, I have just mentioned those of the celebrated Mr. Ducket, of Esher; it may not be improper, in this place, to give a slight sketch of his drilling-system, as practised a few years since. He drills white corn at nine, tares, peas and turnips at eleven, and beans at eighteen inches asunder.

Mr. Ducket has, for a great many years, drilled all his crops. He was at first contented with hand-hoeing, until he discovered the vast superiority of the horse-hoe, to which he has ever since adhered. He has been accustomed to drill in both methods, that of East Kent, by striking out the furrows, but with a new implement of his own, having five shares, and then broad-casting the seed into the furrows; and also by delivering the seed from a drilling machine of his own invention. To the latter, I believe he has of late years given the preference; and he executes it as follows: his land being in fine tilth, and usually thrown into ridges, he draws five channels with the implement just mentioned, having as many shares and broad-boards; his dropping-machine follows, shedding the seed into five channels, which are closed by a harrow. The crop being high enough, he horse-hoes it with two hoes, each guided by a man, and these, at once, hoe five rows each. They work one on each side the furrow, which divides the beds or ridges: of course, hoeing at once five rows on each bed, or two half-beds. The horse is led in the furrow by a boy, and by the help of a long whipple-tree, draws both the horse-hoes, which completely hoes the ten rows. When the work is strong, two horses are used, but no injury is ever done to the beds, the horses always going in the furrow. He has also six shared tools, which, in course, hoe twelve rows at once.

Mr. Ducket preferring narrow furrows, his ploughs are constructed to turn them only nine inches wide; although so much work may not be done in a day with these as with larger tools, the soil is much better broken and divided. His trenching or skimming plough, is a most effective implement. It is double-shared, the one directly over the other, for the purpose of trenching, or taking one narrow, shallow furrow off the surface, and another beneath it, to any moderate depth desired; it will work from five to ten inches deep. The use of this implement, in putting in one crop on the back of another, in burying green manure, or long dung, out of the way of being a hindrance to tillage, is equal to every idea of excellence: it has turned in green rye, six feet in height, upon which a crop of turnips was immediately after obtained. Not an atom of the crop turned in remains sticking out of the furrow-seams: the whole is completely buried, and the surface left perfectly free and clean for the reception of seed.

This cultivator did not formerly aim at any great saving of seed, by his practice of drilling, since he used nearly as much, as many others do in the broad-cast method, even to the extent of two bushels and a half of wheat, three of barley, four of oats, three of beans, and two pounds of turnip-seed. He abides by no particular course or rotation of crops, but sows that which he judges, either from the fitness of the soil, or the state of the market, will answer best. He has cultivated spring-wheat with success, and even several years successively on the same land, which practice he recommends, whilst the price of wheat is high. In this intention he prefers the Siberian wheat, as of quicker growth, and not so great an exhauster as the common, and which nourishes grass-seeds, equally well with other spring-corn. He has reaped this wheat the 25th July, sown turnips on the stubble, fed those off by Christmas, and resowed the ground immediately with Siberian wheat; this course he has pursued three years successively. Wheat harvest being likely to prove late, he broad-casts turnip-seed upon the cultivated rows of corn, with a prospect of rain which buries the seed; but I should conceive it had better be rolled in by a short roll drawn by hand. One of the fundamental principles of his tillage is, the practice of alternate deep, and shallow ploughing. One deep ploughing with the trench-plough is given to every other or every third crop, with very shallow intermediate stirrings, by the two-share plough. From deep ploughing, fresh virgin earth is brought up for the nourishment of the plants, by not repeating it too often, the moisture is retained in the soil, being neither too loose to overdrain, nor yet too hard for the roots of the plants to penetrate.

The above particulars have been lately confirmed to me by an acquaintance of the Ducket family, from whom I farther understand, those eminent cultivators have abandoned the practice of broad-casting their seed, from a conviction, no doubt, that smaller quantities are equally productive, and that a great saving of seed, is really among the advantages of the genuine drill-husbandry.

But a truce with arguments to prove *the advantage to vegetation of a pulverized soil, the profit of growing corn, in place of weeds, or the probability that plants will prosper equally well, nursed and trained up, in regular rows, as if the seed were cast at random, and committed to the nursery of blind chance.* Some useful hints tending to forward the attainment of those advantages already proved, will be now more in place. The immense advantage of pulverization, as has been remarked, is fully proved by the sudden crop of weeds, sure to succeed the operation of fining land; and, to the finer powder it is reduced, by so much the more abundant will be the crop; and, that so many seeds fail upon sown land, is to be attributed to its clodded and rough state, whence they are actually starved, from inability in their tender fibres, to perform the act of absorption, on such a rugged surface. Were it possible for any farmer to dispute this fact, or to call for proof, amongst a hundred other instances, I could quote that of a certain field, which, previous ly to being pulverized for a crop of carrots, was the cleanest upon the farm; but, from the tillage afterwards given it, became such an entire bed of weeds, as to attract the notice of all who passed: yet, its subsequent cleanness was equally remarkable. Generally speaking, it is the powdered part of the soil, from which plants draw the chief of their nourishment, the entire, or unbroken, remains either perfectly useless, or affords them only a scanty and precarious subsistence. Land thoroughly powdered and tilled, during vegetation, will freely give up the whole of its genial virtue to the crop, and under incessant tillage, without a proportionate quantity of manure in return, will, after a certain period, when the food of vegetables shall have been completely exhausted, become totally barren and effete. Tull, it is true, has denied the possibility of exhausting land by tillage, and surely upon better grounds than we assert it; since it must be acknowledged ours are assertions only, his, proofs by long-continued experiments. Without any question, we know how to exhaust land most perfectly; but who among us has effected this purpose, with constant and accurate tillage? Tull so far proved the truth of his system, as to grow wheat and other corn many years in succession, trusting entirely to a constant powdering of the soil, and to freeing it from the exhaustion of weeds, without the aid of a single bushel of manure of any kind; and his crops were yet better than those of his neighbours, and his land, too far removed from fruitfulness by nature, still improved under his hands. I have now no need of Tull's arguments to convince me, that no kind of land, whether the best or the worst, can ever be exhausted; on the contrary, the most barren will be improved by cultivation, the tillage being perfect, and manure being in proportion to the quantum of food drawn by the crops.

Two grand objections to the drill-husbandry are, the intractability of clays and sands, the too great natural looseness and want of tenacity; the one species cannot be wrought sufficiently fine, the other is, conjecturally, apt to be rendered still lighter and more spongy by much stirring. Probably, as to light lands, the plea is merely notional and unfounded; partial and insufficient stirring may, indeed, render them still more hollow and spongy; but effectual and repeated work will consolidate, and make them lie still more close, an end obviously to be attained by comminution or reduction to small particles. Poor land, also, by being often stirred, acquires the more frequent supplies of elementary manure.

The difficulty of working clays and strong rough lands fine, for the row-culture, (bean-crops, however, form a good exception) has been the grand bar to its progress upon such, and yet upon clay-lands, of all others, it would be most signally advantageous, because of the benefit they would receive from the operations of the hoe-plough, in the attainment of the great object, friability, by which they are rendered the most powerfully productive of all soils. This kind of land must, at any rate, be tilled at the greatest expense; at least, although such is no where half tilled in any part of this island, within my knowledge, great strength is always kept upon a clay-farm, on that pretence. A part of this strength, generally misapplied or ineffectually employed, in a perpetual turning up of immense and solid clods by the plough, would pay excellently well by being applied to the cultivator and horse-hoe. This stubborn earth, from constant pulverization, would in time submit, become friable, and almost change its nature to a dark, crumbly and fruitful loam, a favourable metamorphosis, in consequence of stirring, which I have repeatedly witnessed with pleasure. It is known, although not so generally as its importance demands, that the most sour, harsh and infertile subsoil, of whatever colour or quality, by dint of exposure to the atmosphere, and by the aid of frequent stirring, will become good and fruitful land; what then may not be expected, by continually working a good strong clay, draining it, and at the same time, rendering it pervious to the enriching dews, which will otherwise remain to be exhaled, upon its hardened surface? The operations of the horse-hoe, immediately previous to the frosts of the winter-season, will have an effect equally beneficial; for, indeed nothing, whether natural or artificial, confers so great a benefit upon a clayey soil, as severe frost; manure comes in no competition with it, at least for present assistance; whence I have been always inclined to slight the advice of those who direct us to keep poachy land whole, or in ley all winter, for the sake of an earlier passage upon it in the spring; a very poor perhaps totally worthless recompence, for so capital an advantage as is given up; for, if the lands are well and skilfully fallowed up, before winter, it is probable you may approach equally early in the spring, and even if otherwise, that you will lose no ground by waiting a reasonable time. I once manured very highly, in the autumn, a piece of strong, deep, baking clay, intending to sow it. Much rain falling, the land changed into such a puddled, soapy state, its ill condition also doubly increased by the dung intermixed, there was no possibility of getting in the seed, with any good prospect. The land was therefore left as it chanced to be, in ridge and furrow, by which it was well drained, until the spring, and a hard frost intervening, it broke up in perfect powder, of a darker hue than usual; and with the dung (which had been laid on green) well rotted and mixed. In fact, it appeared the real *putre solum*, or rotten and mouldy soil, so highly celebrated, and fitted for the instant reception of the smallest seeds. It must be observed too, that, on trial, this beneficial effect reached no farther than the plough had penetrated, which proves the advantage of deep ploughing in autumn. A part of the same land, which had been left whole throughout the winter, turned up in the spring, in immense and stubborn clods.

The unsuccessful attempts at drilling, have chiefly arisen, either from an improper beginning, with a soil full of couch and root-weeds, under the vain expectation of eradicating them with the hoe, or from an almost total neglect of the hoe, after the first essays, and when the novelty of the work had become extinct. I pass over, in silence, the exertions of those redoubtable agriculturists, who have waxed weary of the labour of success. Land, intended for row-planting, should be, at first start, thoroughly cleaned from roots and grass, as well as in a finely pulverized state; the hoe will ever afterwards preserve this desirable condition.

To speak of strong soils, for in good truth, light ones present no difficulties at the outset, for drilling; I would not at all hesitate, upon such, to use the Devonshire clodding-beetle, if I found the land rougher, after the usual operations, than I approved. It stands for nothing to talk of the dearness of hand-labour, provided it pays, which it surely would, supposing it effective in this case. It would be only needed in the beginning. I have been told by a west-countryman, who worked for me, that there a man will break the clods over about an acre and a half, or more, in a day. The drill, or wedge-roller of Norfolk has also been mentioned as excellent in this intent. Tull, also, recommends a stone cylinder, three feet long, two and a half in diameter, and of eleven hundred weight, drawn by a simple pair of limbers, held together by two bars, firmly penned in at their ends, instead of the common frame, which is expensive. This is, doubtless, an effective implement for crushing clods, but ought not to be used but in dry weather. The land being sufficiently worked, should be gathered into ridges or beds, of a width proportionate to the condition of the soil for moisture, and to the number of rows intended to be set upon them. Ridge-work seems generally advantageous; it preserves wet land from being flowed, and in shallow land, affords a bed of greater depth, and of course a more ample pasture to the plants.

Can any reasonable complaint be laid against the trouble, the expense, or the risk of such an improvement?—Can experience of value be purchased at a cheaper rate? Most farmers have been accustomed to set their beans in rows, which practice may be exactly followed with other corn; or shallow drill-furrows, equally distant, may be drawn by a common light plough, space being left between them for the hoe-plough, at any width which may be deemed sufficient, not exceeding eighteen inches. The seed, one bushel of which is a fair medium quantity for an experimental acre, may be cast into the drills by a steady hand, and covered (should that care be judged necessary) in the garden-style, by the hoe, the lands afterwards lightly rolled, and finished with the harrows. With respect to quantity of seed, in general, it may, perhaps, be safely laid down as a rule, that seed must be increased in proportion to the poverty of the land, from which cause so many kernels always perish for want of nourishment; whereas, in a rich seed-bed, nearly every individual seed vegetates. These rows, whether of twelve or eighteen inches width, may be hoed with the same plough which drew the drills, and the corn kept, by hand-weeding, in the finest garden style. Should the farmer desire to pursue the method of culture in a more expeditious way, and over a greater breadth of land, the artificers already quoted, will furnish him with all the necessary implements, particularly with drilling-machines, from five to eleven guineas each, and with ample instructions for their management.

A comparative use of the hand and horse-hoe has invariably turned out in favour of the latter, from its superiour power of loosening the soil to a greater depth, and thereby sending a greater quantity of moisture, and of atmospheric manure, to the roots of plants. Hence the vast importance of the operation of horse-hoeing, during continued drowth, in the spring or summer: and to this cause, in great part, at least, it may probably be owing, that lucern, usually rowed and horse-hoed, is said to endure drought so much better than natural grasses, and to appear green and flourishing, whilst these are withered and burned up. The almost instantaneous benefit conferred by this operation, upon cabbages which are root-bound, from a baked soil; or upon wheat which appears yellow and sickly in the spring, are its best recommendation. I have seen these crops, after being worked in the rows, from a withered, sickly hue, and flagging condition, turn erect, and change their colour to a deep and flourishing green, within twenty-four hours. Nay, of such importance is the operation of deep and effectual hoeing held, by experienced people, that I have known a Kentish farmer, in a time of great drought, send his men, with their spades, into the alleys of pease, being afraid of damage from horse-work. He inclined very much to Tull's opinion, that "English hand-hoes were fit for little else but to scrape chimneys." I had, myself, an idea of them not very dissimilar, long before I had read Tull: they are yet admirable implements, where the more powerful, among which is the spade, are not within command.

If the hand and breast-hoe could be sufficiently efficacious upon any, they must be the lightest soils, but even on such, from the idea of economy both of time and expense, horse labour would be entitled to a preference. The experiment, so often decided in favour of horse-hoeing, may be easily repeated between narrow rows, and a larger allowance of seed, and economy of seed, with alleys of sufficient extent to admit the full advantage of the hoe-plough; also, between the expeditious method of hoeing, at once, a number of rows, and the more forcible application of the simple hoe-plough, making but one furrow.

The old method of very wide intervals for the horse-hoe, whilst the seven-inch rows upon the ridges, were trusted entirely to the operation of the hand-hoe, seems now to be exploded, and to have given way to the improvement of horse-hoeing the rows, a considerable number at one time. From the best inquiries in my power to make, Mr. Ducket was the first who used this expeditious process. There can be no doubt of the superiority of the practice over hand-labour; but, practised upon strong and rough soils, I am inclined to question both its efficacy and correctness, and to prefer the superiour steadiness and force of the single operation of the hoe-plough. I ought, however, to observe, that on stating this objection to the Rev. Mr. Cooke, he assigned reasons for holding a different opinion, which he supported, by quoting the practice of several cultivators of strong soils, particularly Mr. Boote, of Atherstone, near Stratford-upon-Avon; Mr. Jones, of Chailey, near Lewes, Sussex; and Mr. Thorn, of Ealing, Middlesex. With all possible deference, however, to superiour experience, I remain still unconvinced. There is nothing of greater consequence upon clays, than deep and effective tillage; and upon such soils it is, that the farmer is so commonly injured by the dishonest indolence of ploughmen, whose constant aim is, as light a surface skimming as possible, in defence of which they have a fund of the most plausible reasons; and really it is wonderful how sophistry oftentimes abounds, in proportion to the want of real knowledge. I have observed, very frequently, upon strong lands, a fine and apparently mellow and well-pulverized surface; but, taking the spade, to be convinced, this fine tilth has proved to be only half-spit deep, all beneath, turning up in clods, which would submit to no tool of inferiour force to the mattock. Now the part of such a soil left untilled, is nearly useless for the purpose of vegetation, and if labour will at all repay its expense, the more effective it is, the more certain, and in the greater proportion, will be the repayment. For reasons like these, I have doubted the advantages of scuffling in seed; unless, indeed, upon soils which have had the previous advantage of deep and thorough pulverization from the hoe-culture: and such reasons operate in my mind, equally in favour of the superiority of the single hoe-plough, and sufficiently capacious rows. A machine will drill four or five rows at once, at the requisite distance.

Respecting the depths in the ground, at which corn ought to be planted, the matter must vary in different soils and circumstances, and the depths must be greatest in sands and dry seasons. Wheat and rye will require to be placed near three inches deep in some soils, in others barely two; oats and barley, two inches; beans and peas, three inches; and all small seeds from half an inch to an inch.

The number of hoeings required by this culture may, perhaps, be generally stated at four, although five may be required, by extraordinary circumstances. The chief rule in course, is the presence of weeds, which are never to be permitted, whatever may be the number of hoeings required.

The first hoeing of wheat, (of such, I mean, as has been sowed sufficiently early to admit that operation in autumn,) must never be performed until the plant shall have more than one blade; and it may be deferred until it hath four or five leaves, provided no urgency appear, and that the operation be completed before the setting in of winter. Tull directs to hoe from the rows, up and down, the first time, which leaves a ridge in the midst, and a furrow or channel on each side, between that ridge of the plants, to catch the rains and snows of winter; and doubtless, by that method, the greatest possible superficies of the soil are exposed to the influence of the atmosphere. He asserts, on experience, that you can scarcely plough too deep the first time, nor approach too near the rows, provided you do not cut the plants, or absolutely root them up; and that by thus laying the roots almost bare, and exposing them to the severity of the frosts, you do them no manner of injury, a practice, about the rationality of which I am at present uncertain, having always entertained the idea, however erroneous, that the roots of all plants were comforted and strengthened, during the rigours of winter, by being earthed-up; and I believe Miller held the same opinion. Tull, however, acknowledges that in very light lands a greater caution is necessary, in approaching the rows. He remarks it as a common errour of servants, in the use of the hoe-plough, that they merely skim up and down the midst of the alley, neither going sufficiently near the rows, nor sufficiently deep; and recommends, as an amendment of this errour, to trench, or draw a second furrow to a proper depth, immediately, if practicable; otherwise, before the ridge be turned back in the spring. The plants will thus stand, as it were, on the brink of a trench, by which they will be drained, and kept constantly dry; they will also be sheltered by the ridge which has been thrown up. It will occur to those who drill upon strong soils, that there is danger in deferring too late their first horse-hoeing, lest the land become too wet to work.

The spring-hoeing may be given, as soon as the frosts are out of the ground, and the surface is sufficiently firm and dry to carry the cattle: the ridges between the rows are then to be split, and the mould finely pulverized and manured by the frosts and snows, thrown to the roots of the plants, the fibres of which expanding to the general warmth of the season, are now ready to attract every particle of nourishment within their reach. Nor is there the smallest damage done to roots, by the breaking or disturbing with the hoe those numerous filaments or threads, which branch out on every side, since nature (as may be observed in all vegetables) in a very few hours not only remedies the defect, but ever provides mouths or suckers, in proportion to the nourishment offered; nor is it possible, the nourishment being simple earth, or manure not too gross to overfeed or glut a plant; which, nevertheless, may be effected, according to my observation, by excessive and superfluous quantities or rank dung, poisonous to the vegetable juices, whence atrophy or consumption will ensue, and the plant become stunted or even wither away. The cultivator will judge of the necessity of lightly harrowing and rolling, previously to the spring-hoeing the rows.

The succeeding hoeings, the number and periods of which must of course be at the farmer's discretion, have two objects; to turn in the weeds the instant they are ready, and to move the surface, before it become baked, and impervious to the dews; this last object must be watched with the utmost attention in a thirsty season, as the weight of the crop absolutely depends upon it; and here the superiority of the row-system will clearly manifest itself. There may subsist a farther reason for an additional stirring, in exhausted and impoverished soils, the plants on which, having extracted all the food of their last pasture, may require an earthing-up, of fresh moulds, at the critical time of their coming to perfection. Shallow ploughing can never do any injury, at whatever season; but deep ploughing must never be admitted, near the rows, in spring or summer. The middle of wide alleys may be ploughed deep, and in this case, at the last hoeing, the plants are left well earthed-up.

I shall subjoin the opinion of the Rev. Mr. Cooke, on certain implements, and their use in preparing the land for drilling: the agricultural reader will have it in his power to form a judgment thereon, from actual experiment. I particularly recommend to the farmer's notice, Mr. Cooke's method of using the harrow.

The mechanical power, called *The inclined Plane*, constitutes the true principle of the *common Plough*.

"From the imperfections which I observed in the work of common ploughs, some furrows being set too much on the edge, others laid quite flat, (both extremes equally wrong,) I concluded that their medium could not be far from being right; I therefore fixed on the angle of five and forty degrees, for the form of the fore and hind parts of the plough, with a mould-board uniformly twisted, as best adapted for taking up, or raising the furrow, with the greatest ease, and delivering it with the greatest regularity.

"Being satisfied with the principles of this plough, and that the exact form might be preserved, I had it cast in iron, with the land and furrow sides growing together, which renders it not only strong and durable, but unalterable by workmen. It is made without wheels; but I prefer wheels, two before and one behind, a deal of friction being thereby obviated, and consequently less draught required.

"The strongest proof of accuracy in the construction of any plough, consists in every part of the mould-board bearing an equal resistance to the approaching furrow, which is ascertained by every part of the mould-board receiving an equal polish from the friction of the furrow.

"*The Cultivator* may be considered as an appendage to the drill, being applied to the drill axes when at work. It is particularly useful in making clean fallows of all descriptions, at half the expense of ploughing, &c. It consists of a diagonal beam, with from three to seven shares of different sizes, for various uses, applied to two handles, by which it is guided laterally, and may also be forced into the ground, to any given depth, at pleasure. It is used as a substitute for ploughing and harrowing, by tearing or lacerating the soil internally without tearing a furrow. The narrow shares or scarifiers, are, in some cases, used for obtaining a tilth in light soils without ploughing at all, and the broad shares for cutting up a fleece of weeds, and afterwards leaving them to perish at the surface of the land.

"In strong compact soils, if land is ploughed once before winter, or early in the spring, the remainder of the business, in making a clean fallow, may be performed without repeated ploughings, better than with them, and at half the expense. By the action of *the Plough*, some weeds are turned down and buried, others are transplanted; by the action of *the Cultivator*, they are all brought up to the surface, and left there exposed.

"In preparing land for barley, &c. after turnips, I cannot consider the plough and harrow of any other use than to attain a proper tilth or pulverization of the soil, all which may be obtained by a proper and seasonable use of the cultivator, in half the time and at half the expense, with the richest and clearest portion of the soil left on the surface, for the reception of the seed; instead, as in the first instance, of its being turned down by the plough, out of the reach of the fibres of plants; and a raw and less fertile soil brought up, for the reception of the seed.

"I never see common *harrows* at work, but I am presented with ideas of awkwardness respecting the process and danger, both to men and horses; both which are obviated in my practice, by *applying a proper harrow to the under side of the coulter beam of the drill.* The harrow, in that case, supplies the place of the coulters, and may be lifted up at pleasure, to discharge the accumulated weeds, or forced down, so as to overcome the resistance of compact soils; and by being lifted up at the ends of land, it clears off the ground, and all danger, while the horses are turning round, is thereby done away." *Foot's Survey of Middlesex.*

Dr. Darwin's Phytologia did not come abroad until after publication of the first edition of this work, but I have since perused it with the utmost pleasure, and I hope with profit, which indeed every attentive reader may reap, in full measure, from the writings of that profound and indefatigable investigator of nature's secrets. There is something, in my ideas, exceedingly conciliating and inviting, in the manner of this celebrated Doctor; his perpetual quotation of authorities is at once highly useful, and a signal proof of a noble and ingenuous mind, fully confident of its own great original powers. In a former work, if I took the liberty to question certain principles maintained in *Zoonomia*, I also was beholden to that great work for instruction on many points, which I failed not to acknowledge. Neither had I seen the two quarto volumes of Communications to the Board of Agriculture, from which so much various and inportant information may be derived.

The best advice I can give to the scientific cultivator, is to provide himself with Dr. Darwin's book; but to those who have not seen it, I shall occasionally present a few quotations, which may lead to useful purposes.

I had omitted to quote the practice of the illustrious Norfolk husbandman, T. W. Coke, Esq. of Holkham, but can now remedy the inadvertence from Dr. Darwin's book.

"Mr. Coke, of Holkham, in Norfolk, assured me that in thirteen years experience on a farm of 3000 acres, he had found the drill-husbandry in that country, greatly superiour to sowing seeds of all sorts by the hand, in what is termed the broad-cast method, but differs in the number and arrangement of his rows from the method of Mr. Tull, in the following circumstances.

"Mr. Tull drilled two rows of seed a few inches from each other, and then left a space of two or three feet, and then drilled two more rows near each other, for the purpose of passing a hoe between each double row, drawn by a horse, which was therefore termed a horse-hoe; but Mr. Coke drills all his rows of wheat and peas nine inches from each other; this is performed by a drill-plough made by the Rev. Mr. Cooke, which drills six rows at a time and thus sows an acre of land in an hour, and is drawn by a single horse; and the quantity of seed consumed is about six or seven pecks to an acre, which is about half what is used in the sowing by the hand, in the broad-cast method.

"Early in March Mr. Cooke uses the hand-hoe, which for hoeing the rows of wheat and peas is about six inches wide, and for hoeing those of barley, about four inches wide. By this hoe the surface is not only turned over, and the weeds between the rows rooted up, but it is also accumulated about the roots of the growing corn, and covers and consequently destroys the low growth of poppies amongst them, which are a very frequent weed in that part of the country. A second hoeing is performed about the middle of May, and the soil is again not only cleared from weeds, but accumulated against the rising corn, each of which hoeings costs about twenty pence an acre." Pa. 438.

"Nevertheless I am informed that some attentive agricultors use the horse-hoe, belonging to Mr. Cooke's drill-machine, though the rows of corn are but nine inches from each other; and assert that this occasional trampling of the horse, on the young plants, is of no very ill consequence, a circumstance well worth observing, as it removes the principal disadvantages of the horse-hoe, which consists in the too great distance of the alternate rows of the corn-plants.

"By the earth being thus accumulated against the roots of the corn, it is said to tiller, or tellure much, that is, to throw out four or six stems or more, around the original stem, and thus to increase the number of ears, like transplanting the roots; insomuch that Mr. Coke obtains by this method, between four and five quarters of wheat on every acre, which in the broad-cast method, did not yield more than three quarters an acre, besides saving a strike and a half of the seed-corn, unnecessarily consumed in the broad-cast method of sowing. To this should be added another advantage, that as the land is thus kept clear from weeds, and has its surface twice turned over, and thus exposed to the air, it is found to save one ploughing for the purpose of a succeeding crop of turnips."

Here we have another most respectable and irrefragable proof of the immense superiority of the drill, over the broad-cast husbandry. I have before observed, that I always feel the propriety of bringing forward the experiments of eminent and well-known cultivators, in preference to any memorandums of my own, not always for want of such; I have seen Cooke's drill very successfully used in a shallow calcareous soil, where, according to the opinion and practice of Mr. Coke, the hand-hoe was preferred. In very light soils, where the hand-hoeing can be given as deep as the soil will admit, it may be doubted whether hand-labour be not really preferable, and whether it be worth while in narrow intervals, to incur the unavoidable (if small) damage, of the treading of cattle; I say this without at present giving up my opinion, as to the preference due to wider intervals, and to the horse-hoe.

I had attributed to Mr. Ducket, the invention of the multiplied shares for the purpose of hoeing a number of rows at once, without at the instant recollecting, that Ellis had used and recommended them long before; and I have since read in the Board Communications, that such practice has been long known in some parts of India. On those soils, where hand labour is preferred, the improved hand-hoe, already mentioned, will be found of material consequence.

Dr. Darwin observes—"By the earth being thus accumulated against the roots of the corn, it is said to tiller, or tellure much, that is, to throw out four or six stems or more, around the original stem, and thus to increase the number of ears, like transplanting the roots." It has however been observed, that drilled corn is apt rather to over tellure, by which the original root becomes exhausted and less productive of seed-bearing stems; an effect which I have not witnessed; but I am inclined to believe, that the superiority of drilled corn arises rather from the weight, than the greater number of ears.

The Doctor quotes Mr. Kirwan, for the opinion that clay, in its usual state of dryness, can absorb two and a half times its weight of water, without suffering any to drop out, and retains it in the open air, more pertinaciously than other earths; but that in a freezing cold, clay contracts more than other earths, squeezing out its water, and thus parting with more of it than other earths. Every practical man will agree with Mr. Kirwan in this observation, but the conclusion drawn from the premises, namely, that clay, either from the drying effects of frosts or sun, 'becomes less adapted to the purposes of agriculture,' I will venture to assert is not equally fortunate or just. Whoever has attended to the working of clays, after a frosty winter or a wet one, or after a dry summer and a wet one, will not be at a moment's loss to form an opinion. The retention of moisture is the grand disadvantage of clayey earth, for however dry it may have been rendered by the weather, a very few showers will make it fit to work. Clay is unsusceptible of tillage in either extreme. but that of moisture is of infinitely the worst consequence. Without having recourse to the existence of nitre in the air, I conceive the old practical idea to be perfectly correct, that the winter's frost ameliorates the soil in various ways, and most particularly that which is argillaceous.

LETTER RESPECTING THE DANVERS PRIZE COW.

BY E. HERSY DERBY, ESQ.

[To the Recording Secretary.]

[*See Plate.*]

Salem, December 25, 1816.

DEAR SIR,

I FORWARD you, agreeable to the request of the Trustees, the information I have obtained respecting Mr. Caleb Oakes' Prize Cow.

The Cow is of a dark red, and rather under size. She was first purchased out of a drove. Mr. Oakes bought her, in April, 1813, of his brother-in-law, at which time she was five years old. He made from her, the first year, without any extra feeding, 180 lbs. of butter. In 1814, he gave her about 10 or 12 bushels of meal, and made 300 lbs. of butter. In 1815, he allowed her 30 or 35 bushels of meal, and the quantity of butter made was over 400 lbs.

Last spring I called on Mr. Oakes and requested him to keep a particular account this year of the product, in milk and butter, which he has been so obliging as to furnish me. She calved the 5th of April. The calf was killed the 8th of May; being remarkably fine and fat veal. Through the season she has had good pasturage, and has been allowed one bushel of meal per week, and *all her skim milk*. Some time in June or July, Mr. Oakes weighed the milk—at which time she gave, at night, 10 quarts, weight 26½ lbs.—7 do. in the morning, weight 18 lbs.—making 44½ lbs. of milk per day.

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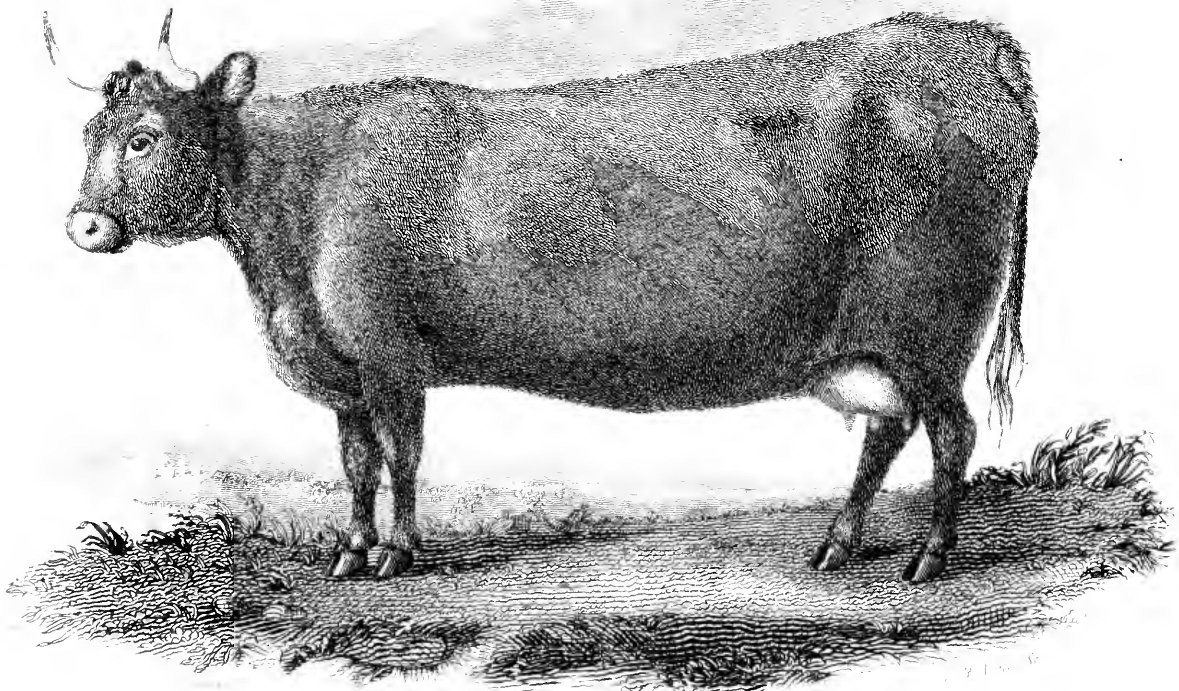

Oakes's Prize Cow

Statement of the Butter made this season.

Before the calf was killed, 17 lbs.	July 17—16	October 2—16¾
May 15—14½	24—16	15—15
22—16	31—16	21—16
28—17½	August 7—15	29—16
June 5—19	14—15	Nov. 7—16
12—18½	21—16	18—18
19—17	28—15	23—10
26—18	Sept. 4—15	30—13
July 3—18	11—16	Dec. 10—14
10—17	18—12	20—10
	25—15	
		Total, 484¼ lbs.

Since Mr. Oakes has had the cow, she has suckled four calves, over four weeks each, and furnished about one quart of milk per day, for the use of the family. I purchased of Mr. Oakes some of this year's butter, I think I never saw finer.

I am, &c.

E. HERSY DERBY.

Note.—December 23th, 1816; eight quarts of milk per day.

Successful Culture of Turnips, on land broken up after haying. Use of Plaister of Paris.—Swedish Turnips.

BY JOHN PRINCE, ESQ.

[To the Corresponding Secretary.]

DEAR SIR,

FINDING at the commencement of the last hay season, that there would be a small crop, and not knowing any better means (at that late season) of providing additional food for my stock of sheep, &c. I thought it would be advisable immediately after taking the hay from the field first cut, to plough the ground (which I intended to break up in the fall) and prepare it for turnips; this was the first week in July. Not having any rain till the 20th, I then harrowed in, on about 1½ acres, eight loads of compost manure, and on the 23d sowed the seed, one half of the common flat, and the other English Norfolk turnips. They had one good hoeing and thinning out, and at pulling I had near five hundred bushels. I do not consider this a large crop. but as I had already taken a tolerable crop of hay, feel myself compensated: more especially as the land is in better order for corn and potatoes the next season. Having succeeded so well, I shall be induced to adopt the same method in future. This land had not been ploughed for eighteen years, and had considerable couch grass, or I should probably have had a greater yield.

Adjoining this piece, I sowed at the same time, some Swedish yellow turnips, which had not time to come to perfection, and I now think should be sowed in the spring to ensure a full growth, when I am confident they will prove a valuable crop. I raised since in corn hills, sowed at the same time with the corn, (which turned out well,) one or two only in each hill. The turnip seed was steeped in *train oil and sulphur*, it in consequence was longer coming up; but when up, grew rapidly, and was not attacked by any insect.

On one of my grass fields, of about three acres, I sowed in April two bushels of plaister of Paris per acre. At mowing my people acknowledged we had quite as much grass, as on the same field the last year. This was the only one, which produced two thirds of what the same fields gave the last season; I therefore feel convinced the plaister had a great effect, and intend the next year to put three or four bushels per acre on most of my grass fields, notwithstanding the prevailing opinion, that so near the salt water it would have no effect. I have used it occasionally on my pastures for three or four years past, and am fully convinced they are much benefited, as they now produce largely of white clover.

Yours respectfully,

JOHN PRINCE.

Jamaica Plain, Dec. 28th 1816.

ON NEAT CATTLE.

[Communicated by the President of the Society.]

[The following, on Neat Cattle, is extracted from a Treatise on Domestic Animals, by Mr. John Lawrence, dedicated to the Right Honourable John Lord Somerville. It contains many useful observations respecting the selection of the best breed of Cattle, in several counties in England, and the marks for the best milkers, and for beef. Also, some account of the advantages of crossing, and a fine description of the male, whose qualities he thinks of much more importance, for improving the breed, than those of the female. I have made this selection under an impression that it may be highly useful to the farmers in this country, who wish to pay attention to this highly valuable species of stock.]

AARON DEXTER.

All those animals which we style domestic, must have been, originally, wild. Some of them are, even at this day, in a state of nature, in various countries. The reason and the art of man, to which nature has submitted all things, constantly subduing the beasts of the field, select such as appear most profitable, and best adapted to the domestic state. In point of utility and profit, no animal can stand in competition with the Cow; a sentiment which has been universal from the primitive ages, and which, to this moment, has lost nothing of its force or truth. Her milk, so indispensable to civilized man, is her most precious product, of which, the value in various forms, is universally understood. Of this real liquor of life, more valuable than the richest wines, the cow will give the amount of many times her weight in the course of a year, and every year she continues in a constant state of reproduction, unto the end of life, when her last gift to man is food of the most substantial kind, and so many articles of various use, that no part of her carcase need be wasted or lost. The worth of these replaces, probably doubles, her original cost.

The age of neat cattle is determined by the teeth and horns. They, as well as sheep, are destitute of teeth in the upper jaw. But the mark of age, as in the horse, is to be found in the corner incisory teeth of the lower jaw. The first front teeth, or calves-teeth, remarkable for their whiteness, are shed at two years of age, and replaced by others not so white. Every succeeding year, two other calves-teeth, next to the front, are also replaced, and at five years old, the incisory or cutting teeth being all removed, are of good length, whitish and even, and the beast is full mouthed. From this period, the teeth are gradually filling up, until six years, when the mark is complete. The teeth afterwards become discoloured by age, and sometimes long and irregular. The indications of age from the horns are as follows. In the fourth year of the bullock's age, a kind of button or ring appears near the head, as the bud or basis of the horn. In the course of the year this ring moves, being pushed forward by another which succeeds it; a process which goes on to the end of the animal's life—its years being determinable by the number of those rings upon the horns, reckoning three years for the first ring. It is common with dealers to obliterate these rings, by shaving the horns, in order to conceal the age of the beast. The aggregate of our live stock is also much improved in bulk and substance, and blended into more numerous varieties from perpetual crossing.

Polled cattle are said to have been originally introduced from Poland; which, doubtless, may have been the case with a considerable number: but as defect of horns is one of the primitive characters of the genus, it is not improbable that there existed ori. inally a mixture of hornless cattle, although they are now so blended with other varieties, with which they seem to hold affinity in form and qualities, that it is impossible to discover the real prototype. When it is asserted that this or that were the original race, it can only mean in a restricted sense; since there can be no doubt but there existed a considerable number of breeds or varieties in the earliest times, of which the breed quoted may have been one.

THE FORM OF CATTLE.

General symmetry and harmony of parts, that is to say, an equal and proportional union of length, depth, and substance; the head not large or long, but neatly shaped, eyes full and clear; neck not long, but inclining to thinness, decreasing, or tapering towards the head; chest full and wide; legs by no means long, fore ones straight, the shanks clean and fine; feet even and sound, the toes turned neither in or out, girth deep; back and loins straight and broad; belly capacious, without swagging; quarters deep and capacious, the flesh reaching down to the hocks; from which, the legs forming an angle, the feet will stand sufficiently under the loins; distance as great, at least, between the hinder as fore feet.

MR. CULLEY'S DESCRIPTION OF A BULL.

The head of the Bull should be rather long, and the muzzle fine; his eyes lively and prominent; his ears long and thin, his horns white, his neck rising with a gentle curve from the shoulders, and small and fine where it joins the head; his shoulders moderately broad at the top, joining full to his chine and chest backwards, and to the neck vein forwards; his bosom open, breast broad, and projecting well before his legs; his arms, or fore thighs, muscular, and tapering to his knee; his legs straight, clean, and very fine boned; his chine and chest so full as to leave no hollows between the shoulders; the plates strong, to keep his belly from sink. g below the level of his breast; his back, or loin, broad, straight, and flat; his ribs rising one above another, in such manner that the last rib shall be rather the highest, leaving only a small space to the hips, or hooks; the whole forming a round or barrel like carcase; his hips should be wide-placed, round or globular, and a little higher than the back; the quarters, from the hip to the rump, long, and instead of being square, as recommended by some, they should taper gradually from the hips backwards, and the turls or pot bones not in the least protuberant; rumps close to the tail; the tail broad, well haired, and set on so high as to be on the same horizontal line with his back. Hago, the Carthagenian, has transmitted to us his opinion, that such oxen are to be purchased as are young, square, with huge members, lofty horns, and somewhat blackish and robust, with a broad and curled forehead, hairy, rough ears, black eyes and lips, wide nostrils, turned up nose, a long and brawny neck, large dewlaps, and almost hanging down to their knees, a great breast, vast shoulders, a capacious belly, and, as it were, great with young; extended sides, broad loins, a straight and even back, or somewhat subsiding, round buttocks, with compact, well set, and straight legs, but rather shorter than longer, and not with big and ill shaped knees; with great hoofs, and exceeding long, bristly tails, and the hair of their whole body thick and short, of a red or dark colour, and exceeding soft to the touch.

By improvement of the breed of animals, is meant the gradual change of form and properties in their progeny, until they shall arrive, as nearly as possible, to a certain standard of presumed perfection. This is to be effected on the principle of like producing like by a conjunction of male and female, of the desired species, form and properties, some steps or points being gained by procreation. The male of course being able to multiply likeness to such an extent, must be the prime instrument in the business. It is, therefore of the utmost consequence, that he be thorough-bred or thorough-shaped, and the female ought to be selected with the strictest care, since although her qualities cannot be considered of so great consequence as those of the male, her likeness being restricted to an individual or two, yet it must not be forgotten, that perfection is not to be attained but by perfection on both sides. In this particular the common breeders are very liable to err.

Nothing can be more groundless than the notion that all breed goes in at the mouth, inferring that all excellence depends on keep. It would be equally rational to say, that size and form depend on food. No fact can be better established than the reality of specific properties, and the superiority of one breed over another. The formation of an entire new breed, or the establishment of a permanent variety, it will immediately occur, is a matter requiring the most diligent attention, through a long course. For that reason it is infinitely the shortest and safest course to part entirely with an inferiour stock, or such as requires much amendment, and to replace with a species, the nearest to perfection, at whatever price. This will account rationally, for the high price of certain well-bred individuals, which may be strictly their due.

Long experience has proved the old notion of the necessity of crossing or interchanging the species of animals and seeds, in order to prevent degeneration, totally groundless. You may breed forever, in and in, or from the nearest affinities of blood, with the utmost success, provided you select with judgment the best shaped individuals; and the finest animals in this country have been bred in this mode. In truth, since like produces like, the best shaped, however allied in blood, must be the most proper for conjunction. A cross for the improvement of forms is a very different, and may be a very necessary measure; yet crossing is said, and probably with truth, to produce in the first instance larger size, and improved temperament. All animals will fatten early and quick in proportion to the smallness of their bones, with the disadvantage, however, of running too much to fat, and falling short in the quantity of solid flesh, of course in weight. Hence the private advantage is not so great as generally supposed, and the public disadvantage sufficiently apparent. Large bone, and a well shaped capacious frame, are necessary to the growth of flesh; and fat in plenty, both externally and internally, will follow, granting sufficient time be allowed. Tallow or internal fat, which denotes the ripeness of the animal, results from mature age, length of keep, and probably, from size of bone and depth of carcase.

It has been observed, that the northern short-horned species is the largest breed in Britain, the Hereford standing in the second place in that respect. The short-horns are an original species, but whether those of our northern countries are so or not, cannot now be ascertained; that is to say, whether they are aboriginal, or were imported in very early times, as we know they have continually been found during several centuries. The northern short-horns led to the introduction of Norman or Alderney bulls, at some period of the eighteenth century, with the precise date of which we are unacquainted. This improvement commenced in Holderness, Yorkshire. Never was there a more fortunate cross. In no other country does exist so excellent a breed of cattle as those of Holderness, including all the useful properties. In one, perhaps the most important respect (great milking) they are superiour and even without rivals. Their beef is finer than that of the old short-horned breed, and they fatten much earlier and quicker, carrying still a vast depth of natural flesh, and tallowing within, in the first degree. They have both speed and strength enough for labour, and their shoulders are well formed and well placed for draught.

The northern half long-horns are the immediate produce of a conjunction of the long and short horns, which must of necessity frequently happen upon, and in the vicinity of, these mountains, which separate the native district of the two species, to wit, Lancashire and Yorkshire. The horns of this variety are pretty straight and even: unlike those which are called middle or wide horns. The half long-horns are a large and long breed of cattle, partaking equally, as may be supposed, of the qualities of each species, and thence ought to be good dairy cattle, as uniting quality and quantity of milk and size. In fact, I have been assured by an intelligent Essex dairyman, that they have the best title to such character; and many years since, when cow stock was at a low rate, he preferred going to the price of sixteen or seventeen guineas a piece for this description.

The northern, or Yorkshire polled cattle, have the same qualities as the short-horned cattle, carrying vast substance, and some I have seen lately are of great size, although in that particular, they are most conveniently various: in my opinion, they are a most excellent breed, and well merit improvement, as working cattle, by a selection of the finest boned and most active individuals.

The Alderney and Norman cattle on the French coast, are, I believe, collectively known by the name of Alderney; these are a variety of, and smaller than the Norman, light red, yellow, dun and fawn coloured, short wild-horned, deer-necked, with a general resemblance to that animal; thin, hard and small boned, irregularly, often very awkwardly shaped. This description refers chiefly to the cows; they are among the best milkers in the world, as to quality, and in that respect are either before or immediately next to the long-horns; but in weight of butter (for their inches) they are far superiour to all. I have been assured by a respectable friend, that an Alderney strayed cow, during the three weeks she was kept by the finder, afforded nineteen pounds of butter each week, and the fact was held so extraordinary, as to be worth a memorandum in the parish books.

The Norman and island cattle make fat very quick, and for their bulk, arrive at considerable weight. The beef is of the first class, very fine grained, in colour yellow, or of that high colour with a blueish cast, and elastic feel, which denotes the closest grained, most savoury and finest meat.

Cheshire is not numbered among our breeding counties, nor is any species of stock thence denominated, unless we adduce their justly celebrated breed of cheese. They nevertheless breed a great number of cow cattle for their own dairy use, and perhaps no where are to be found such a medley and jumble of different races. Lancashire long-horned, Holderness, Shropshire, Welch, Irish, Scotch, Stafford, Derby, New-Leicester, have all been periodically introduced into the Cheshire dairies, and their present home breeds are a mixture of all these. Should these become known as a settled variety, no term could be more appropriate to them than the *omnium gatherum* cows. Milking seems to be the sole object in rearing here; their favourite points are "large thin skinned udder, and full milk veins, hide not material, shallow and light fore quarters, capacious behind, wide loin, thin thigh, white horns, long thin head, brisk and lively eye, fine, clean chops and throat—general symmetry and beauty no objects."

With respect to purchased stock, they prefer on experience the broad-horns, by which I suppose they mean the half long-horns, or the produce of the Lancashire long and Yorkshire short-horns, forming an union of quality and quantity of milk: these for their richest pastures. For their poor soils, they have a short-legged breed, hardy and of inferiour size, resulting from a Welch cross.

They prefer their home breed for their dairy, experiencing that purchased cows do not reach their full milking until their second year, if they come from poor land. They hold cows to be in their prime, from four to ten years old, and keep them as long as they milk well, indeed until they are fit for nothing else. I mean to make the exception of capital milking, which I should be tempted to keep even to twenty years of age. But I yet think generally, cows are not at their best until five years, and on their decline at eight; when I apprehend it must be the interest of a dairyman to sell or put them to keep. I think few can suffer such an exhaustion as constant milking to the eighth year, without deterioration. The farmer himself attends the milking, assists in carrying the milk, and observes particularly, that the cows are well dripped, or the udder well cleared of milk, for should any be left it would not only be the richest of the milk, ("each succeeding drop which a cow gives at a meal, excelling the preceding one in richness") but such negligence has the effect of causing a cow to become gradually dry.

For the milk-house a northern aspect is preferred, and it is desirable that it should be so sheltered by buildings or trees, as to divert the sun's rays through the whole day. An uniform temperature of the air within ought to be preserved the year round. In winter a stove would effect this, in summer the end would be effected by pouring spring water on the floor; and water should ever be at hand in a dairy; the expeditious cooling of the milk in summer has considerable effect in retarding its acidity.

The quantity of cheese made from one cow, in the season of twenty-two weeks, from April or May, about 300 or 500 pounds and upwards, the former quantity accounted a good average, for dairy accidents included. One gallon of milk makes one pound of cheese, and the dairymen are better satisfied with a cow that gives only eight quarts per day, through the season, than with that which gives a greater flow; in which case, it is proved, the milk is generally thinner, and less productive of good, and the cow liable to go earlier dry.

The object in the choice of cows, is to obtain such as will produce the largest quantity of butter or cheese, and beef. The various uses of the cow, are breeding, the manufacture of butter and cheese from the milk, feeding the swine from the skimmed milk or whey, suckling or fattening calves for veal, and sale of the milk, which is chiefly carried on in large towns. By the last, obviously, the cow renders the largest profit, amounting indeed in a good milker, to a great number of pounds annually. The butter and cheese dairy, aided by the profit of pig feeding, may be considered next in emolument to the sale of milk, and suckling in the last place; this is however managed, at the least trouble and expense. Local circumstances and inclination will determine the proprietor's choice in the application of his cows. But the nature and produce of the soil ought to be the farmer's guide, as to the extent of his dairy, since a dry upland situation adapted to sheep stock, is by no means calculated for milch cows, which require the succulent grass, and full bite of meads, or of rich and luxuriant pastures, with easy access to good and plentiful water, without the necessity of harassing the cows, by driving them any distance to obtain it. For the first purpose, or milking for the sale of milk, as quantity is plainly the chief object, and not consistence, or great produce of cream, the deepest milkers must be in request. These are to be found in the Holderness variety of short-horns, or proportionally, in any variety, to the degree of short-horn blood. The general professed object of the considerable dairyman in the choice of his cows, is the union of deep milking with large size, which last he reckons an advantage in the sale of cows, either for immediate disposal, when exhausted by milking, or after having grazed and fattened her.

The food of milch cows is well known to consist of grass in summer, and hay and straw in winter. Many actual experiments have convinced me that to keep any lactiferous animal with poor or ordinary food, under the idea of economy, is purely deceptive. Nor can any food be too rich, with the exception that tending too much to the production of fat, although it may increase the consistence and richness of the milk, it may yet contribute to retard the secretion of that fluid, and reduce, in too great a degree, its quantity. Nevertheless, in cases of great and excessive milking, or under the usual exhaustion from straw feeding and poor winter keep, many will fail. I am well convinced a good cow would return the cost of a certain quantity of corn continued for a time. The effects of such generous keep will appear in the dairy, and the grazing ground, or fatting stall; and the value of twenty shillings, thus expended, will often render more than a five fold return. Cows may be summer fed with the artificial grasses, lucern, sainfoin, clover, or with tares or green corn, cut and carried to them in the home-stall, or to any shaded and watered ground; and this method gives a facility to cow keeping in upland situations. It is affirmed by theoretical writers, that to feed cows in this way, increases their quantity of milk; a fact which various experiments compel me to disprove. With me it has ever had the effect of adding to the substance of the animals, and of diminishing the quantity of milk; probably from defect of the exercise they were wont to take, in collecting their food.

The milk product of a cow is extremely uncertain. The great expense to keep her well is equally certain. Hence the importance of a judicious choice. Inadequate keep pretty nearly levels all distinctions of good and bad, or rather most degrades the former. Some have entertained an opinion, that it is the food exclusively which confers a superiority of milk product upon the cow; a mere supposition, which may be converted into a certainty, by the experiment of two cows of equal size and age, one of a milky breed, the other of different repute, or a common mongrel kept at full allowance of the best food. Mongrels are kept in some districts; a jumble and medley, bred from the refuse of all sorts, which devour the best produce, at least in the summer season, without producing more than half the quantity of milk which might be drawn from a good milch cow.

It has been said, that on an average, three gallons of milk will make a pound of butter, or three pounds of new-milk cheese. A thorough dairy woman, at my elbow, says the latter is far nearer the truth; that the former is very uncertain, depending on the nature of the cow, the quality of the food, the season, and the age of the milk, which in course loses much of its consistence, as it is distant from the period of calving. Certain capital individuals of the long horned breed, have, in the prime of their milking, and in the summer season, produced twenty and even twenty-two pounds of butter per week. A fact however so uncommon as to have few witnesses; such an one I suppose will afford, on an average, twelve or fourteen pounds per week through the summer season, and afterwards, until she become dry, eight or ten. I would travel some hundreds of miles to purchase so rare, and, on many accounts, valuable an animal. A good, fair dairy cow will produce, from her calving in May until the approach of winter, an average of seven pounds of butter per week, from the quantity of three to five gallons of milk daily. Winter weekly average of butter, four pounds. From an inferiour cow, the winter product is scarcely worth the trouble of calculation, and never worth charge of her keep.

Cattle ought not to be turned to pasture in the spring, until the herbage shall have attained sufficient maturity and luxuriance; in the usual phrase, until there is a good bite. And if it consist of the artificial grasses, great precaution is necessary at their first meal, least they gorge themselves to excess and become hoven, or in danger of bursting: to which they are still more liable than oxen.

FIELD CULTURE OF WHEAT, RYE, CORN, &c.

BY GORHAM PARSONS, ESQ.

[To the Corresponding Secretary.]

Brighton, January 4, 1817.

DEAR SIR,

The following particulars of the manner of cultivating, and the produce of my wheat, rye, corn, &c. are taken from my interleaved Almanac. If, considering the extraordinary season last year, the facts are thought worth communicating, they are at your disposal.

The ground on which I sowed my wheat and rye was well ploughed (as was all my tillage land) the fall previous; and in the spring, as early as the plough would pass through it, before the frost was entirely out, crossing the furrows of the former ploughing; it was then ploughed again, after which it was harrowed, and thirteen ox-cart loads of manure put on each piece, and ploughed in quite deep. The manure was green from the barn cellar, and had not gone through a fermentation. The ground was then harrowed and the lumps thoroughly broken, after which the wheat and rye were sown, being previously soaked in weak lie twenty-four hours, and when drained off, covered with plaister of Paris, rather more than would adhere to the kernels. When sown, the ground appeared quite white. The grain was then ploughed in with a small seed plough, covering it about four inches. Herds grass and clover were then sown, lightly harrowed with a small iron tooth harrow, then passed over with the brush harrow, and made smooth with the land roller, pressing all the small stones below the surface.

Both wheat and rye came up well and grew rapidly, and did not appear to be affected by the repeated frosts, after it was out of ground several inches.

The rye (two bushels) was sown the 15th of April, on *one acre, one quarter and four rods*, and yielded *fifty-two bushels and an half* of clean, sound grain, weighing fifty-six pounds to the bushel.

The wheat (two bushels and an half) was sown the 20th of April, on *one acre and sixteen rods*, and yielded *thirty-eight bushels and an half* of well cleaned grain, weighing fifty-eight pounds and an half per bushel. The kernel I thought not so large and full, as that which you raised the same season: it however makes good flour and very sweet bread, and when well washed before grinding and bolting, is as white as the average of Baltimore fine flour.

The soil on which the wheat was sown was a yellow loam, rather shallow; that of the rye, a part rich and deep, the other part shallow and light, with a mixture of gravel; on the poorest ground the rye was decidedly the best. At one time I feared that neither wheat or rye would produce any kernel, and attributed it to the green manure, which had forced it too rapidly; the result however was different from my expectation, but the stalks of the rye in particular, were very high, more than five feet on the best of the ground.

No other attempt was made in this town the last year to raise spring rye, and but one other to raise wheat; that was by one of my neighbours, who sowed about half an acre, but did not get the seed in till the middle of May; to that cause I impute its being blighted, as it began to fill out in July, when we had a short spell of sultry damp weather; he mowed it and used it for fodder without thrashing.

I am fully satisfied that to raise spring grain, particularly wheat, in this neighbourhood, it must be sown very early, and for that purpose, fall ploughing aids very much. I sowed Persian Barley on three quarters of an acre of ground, it was considerably lodged, but entirely free from any rust or blight; it yielded twenty-seven bushels of very handsome sound grain, which weighed sixty-one pounds and an half to the bushel. A greater quantity of the common barley is raised, but I doubt if it yields so much weight of grain to the acre. Some of the best common barley raised in my neighbourhood, weighed only fifty pounds. My farm is generally laid down to grass; and as I renew that which is most run out or exhausted, I prefer planting potatoes to bring it into heart, and the last season I planted but a small piece of corn; it was estimated at one acre and an half, was well ploughed in the fall, and twice in the spring, the soil a rich yellow loam, manured with ten large loads of green manure, planted the 13th May, the seed soaked in weak lie, and covered with plaister of Paris. This ground was high and sheltered by trees on the north and west, and from the N. E. winds by a hill. The frosts of the 9th, 10th and 11th June, affectde the leaves of the young corn considerably. The mercury of Fahrenheit (before sun-rise.) 39, 38, 37, falling one degree each night. (We had ice in the tub at the pump on the morning of each of those days.) After the parts injured by frost began to dry, I took pains to have them cut off with shears and scissors, but consider it labour lost, as a few hills not clipped did quite as well. After weeding, I put five bushels of unleached ashes around the corn—perhaps half a pint to a hill, and the same quantity at half-hilling. It was very little affected by the frosts, until that of the 28th September, which was very severe, (the mercury at sunrise being at 29)—a part was considerably injured: but near half the corn was so forward as to receive but little injury. It was of that species, of which the husks, when it begins to harden, fall from the ear; which accelerates its ripening. Many persons not acquainted with it, have supposed the ears stripped by hand, as it is left as free from husks as if that operation had been performed. Before gathering the corn, I selected those ears that were well filled out quite to the top of the cob, and where two grew on a stalk; taking the best of the two for seed. It appears well, and would pass for good seed corn in any season. I gathered from the piece, one hundred forty-seven bushels, (in the ear.) We calculate that two heaped bushels in the ear will make one when shelled. Sixty-three bushels of it were very good, sound corn,—eighty-six bushels injured by the frost, and about one quarter very much injured, and appeared to have lost its nutritive quality. From the same ground I gathered eighteen hundred and twenty-seven pumpkins, a large proportion well grown, of a good size, and fully ripe.

I took a piece of ground in my neighbourhood to cultivate for a share of the produce; it had been under cultivation five or six years previous; the soil a rich, deep, heavy, black loam, and low ground. It was not ploughed in the fall, and the frost was not out until late. It was treated, in other respects, in the same manner as my own ground—the same kind and quantity of manure and unleached ashes. It was planted May 15th, with corn, and the long, red, River Plate potatoes, the seed corn the same as that used on the other piece. The frosts in June affected it very much, turning yellow a large proportion of the young corn quite to the ground. It appeared to recover before the last hilling, and promised better than the other: the stalks were larger and taller—the foliage more abundant—the ears larger and longer, but it was not so forward as the first by a fortnight. The frost of the 28th of September injured it so much, that I did not gather a single bushel of sound corn from the piece. Although pumpkin seeds were sown as abundantly as on the other piece, I gathered only four hundred thirty-four, and but few of those were well grown and ripe. The potatoes, round the edges, measuring one quarter of an acre, yielded sixty-seven bushels, which was better than the average in my own ground. In this town the crop of Indian corn was generally cut off, and very little sound corn, fit for bread, raised.

I weighed, this day, a bushel of my corn of last year and a bushel of that of the year before. That of 1815 weighed sixty-four pounds, and that of 1816, fifty-eight pounds. Respecting our crop of hay in this town, there has been some difference of opinion, but it is generally agreed that on new fields, in good heart, and but a few years down to grass, the crop was equal to that the year previous. If the hay was not as bulky, it was as heavy, and of a better quality. On old fields it was short one third, but the quality very good. Potatoes gave a good crop, and the common barley more than usual.

Yours, &c,
GORHAM PARSONS.

LETTER FROM JUSTIN ELY, ESQ. TO THE PRESIDENT OF THE SOCIETY.

West-Springfield, January 8, 1817.

DEAR SIR,

Your favour of November 20th was duly received, for which I thank you.

The Persian Rye you sent me almost wholly failed: about a pint of poor blasted seed is all that has been saved from it.

I congratulate you on the success in raising summer wheat in your vicinity the past summer.

The largest crop of winter wheat was raised in Springfield, the past summer, that is known ever to have been raised in this vicinity, and perhaps larger than was ever before raised in New-England.

Four acres of land, (one of the house lots in Springfield-Street, belonging to the distillery company,) three years ago last spring, were English mowing. It was manured and ploughed up and planted with Indian corn, and dung put in the hills. The crop was abundant. The next spring it was covered with very rich manure from the distillery, and hemp seed sowed thereon. The crop was large and heavy. The land was then ploughed twice and sowed with the bald wheat, one bushel and four quarts to the acre. The produce was *two hundred bushels* of good, clean, heavy wheat, from the four acres.

About half an acre of the hemp was not pulled with the other hemp, but was suffered to stand till the hemp seed was ripe, whereby the sowing of the wheat, on that part, was delayed too late in the season, which diminished the crop of wheat on that part, six or eight bushels, as supposed.

It is the opinion of many people, that the unprecedented cold and drought of the last summer checked and retarded vegetation so far as to prevent the destruction of the crop by blasts and other causes, and that if the last summer had been as warm and wet as usual, the whole crop would have been blasted and lodged, so as to have been wholly ruined.

I am, &c,

JUSTIN ELY.

ON WHEAT CULTURE, AND THE USE OF PLAISTER OF PARIS AS MANURE.

BY J. LOWELL, ESQ.

[To the Recording Secretary.]

DEAR SIR, *Roxbury, Nov. 21st,* 1816.

I SEND you this account of my experiment on wheat, neither for its magnitude as to the quantity of ground employed, or any thing peculiar in its management or product, but because it was, and was designed to be, a fair exhibit of ordinary means and ordinary success. You know how fallacious experiments, as to general utility, are, when gentlemen apply to them a degree of labour or a proportion of manure exceeding the capacity of common persons, or indeed any persons, to follow on a large scale. I selected a piece of land, measuring nearly three quarters of an acre; its quality is but indifferent, a light thin soil on a gravelly base. It had been leased to different tenants for six years, and was very much exhausted, having been constantly in tillage, and never surcharged with manure.

I sowed only one bushel of wheat, at least one half less than I should have sown; it was steeped in brine for three days, limed, and sown with one bushel of plaister of Paris. The crop was 16 bushels of very fair, full and heavy wheat; that is about 22 bushels to the acre. The whole labour was about ten days of one man, including sowing, reaping and thrashing. What crop of indian corn, even of 50 bushels to the acre, would produce as much profit? Two acres of wheat would supply almost any family with its bread stuff, and of much better quality than what is generally eaten by our farmers. Yet we go on paying ten per cent freight, and eight per cent commission and profits, for the first necessary of life.

I tried gypsum, or plaister, on many parts of my land last year, and I think with success. The most signal instance was that of a field, which had been laid down to grass more than seven years, and was very much sward-bound. I began on the worst part of the ground, and the person employed to sow it with plaister, instead of three bushels on an acre, as I directed, put the three bushels on a fourth of an acre. The effect was so surprising, that when the trustees of the Society were at my house, I asked them separately to say where the plaister began, and where it ended, and no one failed to point out the precise limits. The crop was double that of the rest of the same piece of ground, and quadruple that of the preceding year.

I am apprehensive, that we have been too impatient, too careless, and too penurious in our experiments with plaister. It is now rendered certain by the experience of many, that the neighbourhood of the salt water forms no obstacle to its use.

JOHN LOWELL.

EXTRACTS FROM TULL'S ESSAY, ON THE PRINCIPLES OF VEGETATION AND TILLAGE.

Horizontal roots, (except those of trees) have seldom any of their branches deeper than the plough or spade has penetrated into the staple of the earth. These roots sometimes extend themselves several yards from the tap-root.

The horizontal roots of plants, being observed to taper very much near their commencement, have been supposed to diminish in the same proportion throughout ; and of course, to terminate at a short distance. The fact is, however, that these roots do not discernably taper more than a few inches ; after which they hold, to the end, nearly the same bigness.

I have found an extensive small fibre on the side of the carrot, much less than a hair, which, through a microscope, appeared a large root, not tapering, but broken off short at the end, which, it is probable, might (before being broken off) have extended six feet from the plant. It had many fibres growing out of it. I have observed that a carrot will draw nourishment from a distance, by means of roots almost invisible where they come out of the carrot itself.

Roots by being broken off near the ends, increase their number, and send out several where one is broken off. Roots increase their fibres every time the earth is stirred about them. Stirring the earth causes a more rapid growth.

I call the inner superficies, made from dividing the soil by art, the *artificial pasture* of plants. This artificial pasture for the roots of plants may be enlarged without the addition of more land, in proportion to the division of the parts of earth, and this division may be carried on without end.

Suppose a solid cube of earth of one foot, too hard to be penetrated by the smaller fibrous roots of plants, it is obvious enough, that by its entire pulverization, it will afford to these roots, which have penetrated it in all directions, a surface more than a thousand times greater.

Every time the earth is broken by any sort of tillage, there must arise some new superficies of the broken parts, which never have been open before.

Great clods are of no use to plants except by the dust they let fall: when pulverized the particles are exposed to be impregnated throughout their whole substance, with the riches carried in by the dews.

As soon as the farmer has done ploughing and harrowing, in the usual mode of culture, the particles of the soil will tend to unite again by their specific gravity, and by little and little close up, and become impervious to the finer roots of plants. This will take place, in a greater or less degree to the depth the plough had penetrated. This tendency cannot, it is well known, be effectually counteracted, by the use of the hand-hoe.

Hand-hoeing is only scratch-hoeing. The horse-hoe, or small plough, keeps the magazines of the earth open, and replenishes them with the dews, which fall most in dry weather, and those dews seem to be the richest present the atmosphere gives to the earth, having, when putrified in a vessel, a black sediment at the bottom. This seems to cause the dark colour of the upper part of the ground.

To demonstrate that dews moisten the land when fine, dig a hole in the hard dry ground, in the driest weather, as deep as the plough ought to reach, beat the earth very fine, and fill the hole therewith, and after a few nights dews, you will find this fine earth become moist at the bottom, and the hard ground all round will continue dry. Of two fields—make one very fine by frequent deep ploughings, and let the other be rough by insufficient tillage; then plough the two fields cross-ways in the driest weather, (when of long continuance,) and you will find the fine ploughed land, on its being turned up, moist, the other dry as powder, from top to bottom.

Although hard land, when thoroughly soaked with rain, will continue wet longer than fine tilled land adjoining it; yet this water serves rather to chill than nourish the plants standing therein, and to intercept the good to be derived from the atmosphere, leaving the ground still harder when it is thence exhaled; and being at last become dry, it can admit no more moisture, unless from a long continued deluge of rain.

As fine ploughed ground is not so long soaked by rain, so the dews never suffer it to become perfectly dry: this appears by the plants which flourish and grow fast in this, whilst those in the hard ground are starved. except such of them as stand near enough to fine pulverized earth, to draw moisture and nourishment from it.

Good ploughing procures moisture to roots; though the ignorant and incurious fancy it lets in the drought, and therefore are afraid to plough or hoe their plants in time of drought, when, unless they water them. they are spoiled for want of it.

There is yet one more benefit from ploughing frequently and thoroughly. All that can be done in feeding an animal is to give it sufficient food, meat and drink, at the times it has occasion for them. If you give an animal any more, it is to no purpose, unless you could give it more mouths, which is impossible; but in ploughing or horse-hoeing deep, near and round a plant, the additional nourishment thereby given, enables it to send out additional, innumerable additional fibres and roots. which fully demonstrates, that a plant increases its mouths in some proportion to the increase of food given to it.

Ploughing or horse-hoeing can be employed only in the *row-culture*, and as a *preparation* of the land for grass seed, when it is to be sown *broad-cast*. The distances of the *rows* in the *row-culture*, will be found to be one of the leading objections to this kind of husbandry; the interval not being *planted*, much of the benefit of that ground will, it is supposed, be lost, and therefore the crop must be less, than if it was planted all over. I answer:—It might be so if not horse-hoed, but if well horse-hoed, the roots can run through the intervals, and having more nourishment, make a greater crop. This has been proved by repeated experiments.

A too great number of plants, placed all over the ground, in common sowing, have, whilst it is open, an opportunity of *wasting*, when they are very young, the stock of provisions; for want of which, the greatest part of them are afterwards starved. Their irregular standing prevents their being relieved with fresh supplies from the hoe. Hence it is that this method, exhausting the earth to no purpose, produces a less crop, and yet leaves less food behind for the succeeding one, contrary to the hoeing husbandry. In a large field of wheat it was proved, that the widest hoed intervals brought the greatest crop of all. Dung without hoeing did not equal hoeing without dung

Another objection is, that so small a part of the land as that wherein the rows stand, cannot contain plants or stalks sufficient for a full crop. But since plants thrive and make their produce in proportion to the nourishment they have within the ground, not to the room they have to stand upon, one very narrow row can contain more plants than a wide interval can nourish, and bring to their full perfection, by all the art that can be used.

In wide intervals there is another advantage of hoeing, I mean horse-hoeing, (the other being more like scratching and scraping than hoeing)—there is room for many hoeings, which must not come very near the bodies of some annual plants, except while they are young; but in narrow intervals this cannot be avoided at every hoeing. It is true that in the last hoeings, even in the middle of a large interval, many of the roots may be broken off by the hoe-plough, at some considerable distance from the bodies; but yet this is no damage, for they send out a greater number of roots than before, as has elsewhere been made to appear.

If it be asked, how many hoeings are necessary? I answer—It is not the number of hoeings that determines the degrees of pulverization. For, one well done is twice done; and the oftener the better, if the expense be not excessive.

Poor land, be it never so light, should have the most hoeings; because plants receiving very little nourishment from what I call the natural pasture of such land, require the more artificial pasture to subsist upon.

Horse-hoeing has in truth every year the effect of a summer fallow; though it every year produces a good crop,

It is said of some plants, that they enrich a soil; of others, that they impoverish it. *But I think it may be observed, that all those plants which are usually hoed, are reckoned among the enrichers; and though it be certain that some species of plants are, by the heat of their constitution, greater devourers than those of another species of equal bulk; yet there is reason to believe, that were the most cormorant plant of them all to be commonly horse-hoed, it would gain the reputation of an enricher, or improver of the soil.*

Observations on Manuring, Planting, Grafting, and Pruning, of Trees. Extracted from Bradley's Treatise on Husbandry and Gardening. Published in Great Britain, 1726.

It may be thought singular, that we should attempt to lay before the public, remarks on a subject which may be considered to be already well understood, and still more so, that we should draw them from so ancient a source. The popularity of the work of Forsyth may seem to render such a measure hazardous; and the opinion, that modern improvements have entirely superseded the practice of the early part of the last century, may confirm this opinion. But chance having thrown in our way this early treatise on the management of trees, we are constrained to express our conviction, that it contains as much solid, good sense, as can be found in any modern work o the same extent, and we think the form in which instruction is conveyed, much more suited to practical men.

ON TREATMENT OF TREES.

Observation 1st. If any branch, in the middle of the tree, rises with too much luxuriance above the rest, in full, sappy, wood, we must cut it off close to the body of the tree, but take care we do not injure the bark of the great wood we take it from; for such a wound would endanger the health of the tree, the wounded part would be a long time recovering, and be subject to canker.

2d. There are many people with their pruning knives constantly in hand. But the continual pruning of a tree makes it shoot into false wood, and miscarry of its buds designed for fruit. The reason why trees shoot more into wood when they have been largely pruned, is because the root had filled itself with juices proportionable to the nourishment its standing branches required; but when many of them are cut away, the same fund goes to the remaining buds that was destined to support many more; and thus a too luxuriant growth will be produced on the limbs which are left.

3d. When a tree is in good order, we must take care not to prune it too close, or take away too much wood inside, as some are too apt to do. We must however take away enough to admit the sun and air into the centre, in order to ripen the fruit. It may be remarked, also, that we must admit more sun and air in a strong or wet soil, than in a dry, sandy one; because the former naturally produces insipid fruit, while the latter generally ripens fruit better.

4th. Winter fruits should have their shoots left wider asunder than summer, the latter not wanting so much sun as the former.

Trees which made weak shoots the year before should be pruned in January, or earlier; but vigorous trees should be pruned late in the year, in April, or even May, in which case they will bring less wood and more fruit.

5th. We must consider the climate in which we live, and direct our practice according to the degree of heat or cold. In hot countries the fruit must be gathered sooner than in colder ones, because the sap has performed its work sooner. Fruit will *keep longer*, the longer it is suffered to remain on the tree. We should gather fruit after a frost, for we are then sure the sap will no longer aid it.

[This last remark or observation is very important. In the interiour parts of our country, the summer is generally more tardy and cooler than on the sea coast. There may be some exceptions, but it is generally true. Do we suffer our winter fruit to hang sufficiently long on our trees? A difference should be made according to the above theory, between hot and cold seasons. We should not fix on a precise day or week of the year for gathering fruit, but should defer it to a later period in such cold seasons as the last. This certainly deserves the attention and inquiry of cultivators of winter fruit.]

6th. In gathering fruits it should be done with care and patience; we should avoid destroying the blossom buds which are near them, or which join them; for the buds are already formed for the next years fruit. Apples are much harder to gather than pears, being more closely fastened to the tree, and with shorter stalks.

7th. In hot, dry years, if it is very hot in August and September, our fruits should be gathered early in October; for such fruit as has had a good share of ripening on the tree, lasts but a short time, and is very subject to rot; but if August and September be very cold, then let the fruit be left on till the last of

October, and it will keep well. I account this one of the most important observations with regard to fruit.

8th. Those who prefer large, fine, fair fruit, should thin the fruit early; and if the tree, in its first or second sap, tends to shoot abundance of wood, it should be pinched off while it is tender and young, but never cut while the sap is flowing, because the tree, by cutting, at that time is apt to run into wood, and the blossom buds are disappointed. N. B. The blossom buds are formed by the first sap, between April and June, and filled by the second, between July and October.

10th. We find some trees more apt to shoot into wood branches than others. Such trees should have their branches left long in pruning: but those shoots which are loaded with blossom buds should be shortened, that the remaining buds may nourish the fruit better.

11th. It is necessary, the first and second year after planting a tree, to prune it very short, to make it shoot into wood; and if, in following years, it does not come into bearing, but keeps shooting unprofitable wood, as is common with the *Bergamotte*, *Rousselet*, and *Virgoulouse pears*, and some others, then leave every shoot very long. Of all the sorts of pears, none will bear pruning so short as the Winter *Bon Crêtien;* for then it will give large wood and larger fruit.

15th. In pruning, we must have regard to soil and climate. If it be wet and cold, we must prune the tree very open; but in light, sandy grounds, where fruit is *always good*, though it is smaller, the pruning should be different. Wounds made by pruning, heal with very great difficulty, in very hot, dry land; and I have known them entirely perish by pruning.

16th. When a tree looks yellow, pluck it up and plant another. It is not worth the trouble of pruning and culture. But if it be a rare sort we may recover it by mud that has been well turned and dried, and hogs' dung laid about the roots.

If we find that pear or quince stocks do not answer a particular soil, take them up and plant those on free stocks; if they fail, plant apples; in short, suit your trees to your soil, otherwise all your labour is lost.

17th. Pear trees, in their soil, should be planted shallow, that the roots may spread; fern or straw is a great protection in summer to the roots, and vastly encourages their growth.—

People fond of raising fruit, should keep free stocks ready to engraft, but never use suckers, they are good for nothing.

22d. When we graft a young or old tree, we should do it as nearly equal on each side as possible, otherwise that which is not engrafted will run away with the nourishment from the grafts. This is of less consequence in budding, as this does not affect the tree so much When trees are transplanted, the holes should be made as large as possible, and the ends of the roots cut away, and *the small fibres* taken off; for they are apt to rot and infect the great roots.

[An exception may be made to this last rule, where considerable earth can be taken up with the tree, and it is instantly replanted; in that case the small fibres are of great value to the tree.]—*Editors.*

24th. When you plant a wild stock for grafting, be as careful as if it was the finest fruit. This is apt to be neglected, though this stock is to be the foundation of all our work.

25th. When we transplant a tree, never fail to plant the same side towards the south which stood so before. We must also defend, as much as possible, the wound made by grafting from the violence of the sun.

[If this be an important rule in Great Britain, it must be more so here. Grafts should be loosely covered till the whole wound is healed.]—*Editors.*

26th. In dry, sandy ground, plant trees in autumn, and in moist, watery places, in spring, otherwise the winter is apt to chill and kill them.

Apples and pears, though more hardy than some others, are still more apt to be hurt by water standing round them.

In moist grounds, it is good to open the holes in the fall, and let them remain open all winter; this enriches and mellows the land thrown out, and fits it better for planting.

Where a soil is light and sandy and not subject to inundation, plant the trees in the beginning of November and they will gain fibres enough to support them before winter, and will shoot well the next spring, and better than those planted in the spring.

[N. B.—In this country we should plant in October.]

27th. I have remarked, in the way of grafting, a curiosity which, it is likely, may be new to many cultivators. If we have a good bearing tree which runs so much to blossom that the shoots and fruit are small; if we take from the bearing shoots of such a tree a few buds and inoculate them upon large vigorous shoots of some other pear tree, such buds will bear the second year and produce very large fruit, having plenty of sap to nourish it; or if we put buds of the less bearing kinds upon good bearers, such buds will be so far overruled by the nature of the bearing tree as to bring abundance of fruit: but on either of these occasions, it is necessary to assort our fruits, and to inoculate only summer pears upon some of the pear trees of the same season. Autumn pears should be inoculated upon autumn pears, &c. &c. but never graft or bud a winter pear on a summer one, for the sap of the summer pear will decline or diminish before the winter fruit is sufficiently grown.

Analysis or Examination of the present state of Agriculture in Massachusetts, so far as the same can be ascertained by the answers of several highly respectable Gentlemen, in various parts of the State.

BY THE CORRESPONDING SECRETARY.

About fifteen years since, the Trustees of the Massachusetts Society for Promoting Agriculture, framed and published a set of queries addressed to the farmers and cultivators of this state, requesting information on almost every interesting subject of agriculture.

Although some gentlemen have treated their application with great respect, and have very faithfully performed the duty requested of them, yet the queries have not been so generally and extensively noticed and answered, as to enable the Trustees to ascertain the general mode of culture throughout the state. Doubtless the principal object of the gentlemen, who then composed the Board of Agriculture, in sending forth these queries, was to enable them to make a correct analysis of the actual progress and state of agricultural science in Massachusetts; to ascertain its defects as well as its advantages; to compare the processes and crops of one part of the Commonwealth, with those of another; and to contrast the whole with the preceedings and products of other countries.

This project of our predecessors was wise, and had it universally met with the encouragement it merited, it would have formed the basis of intelligent remark, and useful discovery.

In the papers of the Society printed in 1807, there was an analysis of the various answers, which had, at that time, been returned. They were those which had been received from Mr. Heath and Col. Gardner, of Brookline; from the Rev. Mr. Packard, of Marlborough; from the Rev. Mr. Mellen, then of Barnstable; from Dr. W. Payne, of Worcester; from Mr. Joseph Kent, of Newbury; from Mr. Thos. Hubbard, of Concord; from Col. Parsons, of New-Gloucester; from Dr. Babbit, of Brookfield, in behalf of the Agricultural Society in Worcester County; and from the Western Society of Middlesex Husbandmen.

This analysis will be found to be interesting, and to furnish a very good view of the then state of agriculture in the counties referred to.

Since that period we have from time to time published some further replies, to wit: From the Hon. Justin Ely, Esq. West Springfield; from the Shrewsbury United Agricultural Society; from the Newbury Agricultural Society; the Agricultural Society in Vassalborough; and the Danvers Agricultural Society.

It is earnestly to be wished, that other intelligent farmers, in other parts of the state, would imitate these praiseworthy examples. We should then be able to ascertain not only the difference of culture in different sections of this Commonwealth, but what has been the progress of this art during the last ten years. It may be both useful and entertaining to exhibit an analysis of the five last mentioned replies, arranged under different heads, to which may be occasionally added a few remarks on the culture of the same articles in Great Britain.

I. SIZE AND DIVISION OF FARMS.

Mr. Ely states the size of farms in the vicinity of West-Springfield, to be from twenty to eighty acres, and to be divided as follows: one sixth pasturage, mowing and tillage one third, and the other half wood and orcharding.

The Shrewsbury Agricultural Society state the size of farms to be about one hundred acres, and to be divided one third into mowing, one third pasturing, one ninth tillage, and two ninths woodland.

The Newbury Agricultural Society state the size of farms to be about seventy-five acres, divided into one seventh orchard and woodland, and the remainder—two fifths mowing and tillage, three fifths pasture.

The Vassalborough Society state the farms to consist of about one hundred acres, one fourth wild, as much growing up to young wood, twenty acres of pasture, twenty of mowing, six of tillage, and two of orcharding.

The Danvers Society state the farms to run from forty to one hundred acres, and to average seventy-five acres. *There are many who follow gardening* who have from *five to twenty acres.* The Danvers farms are divided into mowing, tillage and orcharding about one third, pasturage one half, and woodland one sixth.

In Great Britain, the average size of farms, according to Arthur Young, is about three hundred acres, and they are divided into one half tillage, and the other half grazing, including pasture and mowing.

It is natural here to inquire, why so much larger a portion of the farms in Great Britain is employed in tillage? Is it that the British farmers understand their interest less than ours? Can the spirited and active cultivation of land be more profitable there than with us? As the average size of their farms is three times as great as ours, one would suppose, that the proportion of tillage to other lands would be greater with us than with them. Is it owing to the difference between the two countries in the price of labour, and of cattle? That difference was formerly much greater than at present. The average price of men's labour in Great Britain is now about sixty-seven cents per day, and ours does not exceed, probably, seventy-five cents, taken as an average for the State. To balance this, may be placed the extra price of rents in England. The farmer is seldom, there, the owner of the soil, and he pays a rent of from five to thirty dollars per acre; his taxes also are at least three times as great as those paid by our farmers.

Both these items are to be deducted from the profits of the British farmer. The price of the cattle employed in labour, and also of agricultural implements is rather higher in England, than in Massachusetts. How then is this secret explained, that a British farmer can afford to employ half his land in till age, while we employ from a sixth to a sixteenth only? Is the cause to be sought in the higher price of the produce of farms in England? Certainly not; the price of the products of our farms is higher, and has been so for many years (excepting this year of uncommon scarcity in Great Britain) than it is there. The only solutions which we can find for this paradox are the following: the greater capital employed by the British farmer, a superiour spirit of enterprize, and the convenience of more ready markets. But is it clear, that our farmers could not extend their tillage to advantage? How can they ever accumulate capital, if they limit their labour to the raising barely enough to keep their cattle through the year, and to the disposal of a surplus barely sufficient to pay their taxes, and supply them with a few foreign commodities? Are there not some radical defects in our system? Is there not a want of enterprize? We know we speak much of our spirit of adventure, and it may truly be affirmed, that our merchants are the most enterprising on earth; but is this true of our farmers? We suspect the very reverse to be the fact. We believe that until within a few years, little effort has been made to improve our system. If twenty years ago it had been asked, whether we could rival the Gloucester and Cheshire farmers in the article of cheese, we should have been told, that we did not possess the fertile lands of the vale of Gloucester; yet we have lived to see the time in which the cheeses of this State, New Hampshire and Rhode Island, after being ripened by a voyage, would rival in the British market the very choicest products of these most favoured parts of Great Britain.

May not the same change take place in other branches of culture? May we not hope to see indian corn, the most expensive and exhausting as well as uncertain of our crops, less favoured, and the finer grains, and many valuable roots, absolutely unknown as general productions, cultivated with the same success that they are in Europe? When we shall find that we can raise with ease 400 bushels of potatoes, or as many carrots, on an acre, by spirited culture, and that they will support in better condition our cattle and horses, than the ordinary produce of three acres of neglected mowing land—that we can by these means not only increase the stock on our farms, but greatly improve it—we have little doubt, that such a revolution in their husbandry will be favoured by our farmers. Now these things are practicable in our country. How many years did Massachusetts labour under the absurd opinion, that the plaister of Paris, though well suited to Pennsylvania, was utterly useless to her? How long did she contrive to be the Issachar of the middle states, and bear the burden of that valuable fossil manure to enrich their grounds, and to be returned to us in the form of flour, for which we have always been tributary to them? And even after our more intelligent farmers on Connecticut river discovered that the fertilizing powers of plaister of Paris were not limited by a geographical line, how long did we continue to believe on the faith of "Nobody knew who," that the vicinity of the sea-coast rendered that manure useless and inert, which spread fertility and plenty every where else. Yet it is now established, beyond all reasonable doubt, that the gypsum or plaister is highly useful, if not as universally so, on the seaboard, as in the interiour.

As to wheat, the matter is placed beyond a doubt, that with the same care as is bestowed in England and in the middle states, we can raise the first and noblest of grains on the very margin of the ocean, as well, nay we can produce better crops, than are ordinarily gathered in the favoured states. We are aware that we have been drawn rather aside of our subject, by the interesting nature of these questions, and we shall now resume our analysis.

II. PREPARATION, TREATMENT AND AMOUNT OF GRAIN CROPS.

Here we find considerable variety of treatment, and success, stated in the replies under consideration. Mr. Ely, of West-Springfield, says the land for indian corn is ploughed but once—does not state whether it is hoed twice or three times—crop from fifteen to forty bushels. Rye on high lands is ploughed or hoed in after indian corn—crop from five to fifteen bushels. Common wheat is raised, either on new lands—crop from twelve to twenty bushels—or else Virginia wheat (which is we suppose a spring wheat) is raised on old manured lands, or on new turned sward land, ploughed and harrowed twice, and yields from fifteen to thirty bushels. It would seem from this statement, that the wheat culture was much the most profitable, the labour not exceeding half that of corn; and the produce of corn, putting indian corn at half the price of wheat, not equalling that of wheat.

The Shrewsbury Agricultural Society state, that old rye fields are ploughed twice, harrowed across the furrows, sown, and then harrowed again. Oats, barley and spring wheat are usually sown on lands where corn was grown the year before. The land is not ploughed the year before, after the corn is off, only once ploughed in April, harrowed, the grain sown, and ploughed in with an horse plough, and if grass seed is sown, it is smoothed again with a brush harrow. They remark, that spring wheat should be got in as early as possible, say in March. No manure is applied with the smaller grains. For indian corn the ground is ploughed in June, or in August for the next year, and in the spring cross ploughed and sometimes harrowed. A horse plough is then used, to mark out the rows, and then it is dunged, seeded and covered as usual. The quantity of rye on an acre, they state to average fifteen bushels, oats thirty-five, barley eighteen, wheat twelve, and corn thirty-five.

We remark here, that the cultivation of corn in this part of the state, seems to be much the most spirited, and to exceed that of their neighbours on Connecticut river. They plough the year before, they cross plough, and sometimes even harrow for indian corn. This is doing well; but they are less attentive to the finer grains. Let them try their three ploughings or two ploughings and harrowing for spring wheat, and they will soon find their average rise to sixteen or twenty bushels, and the value of the crop exceed that of their indian corn.

In Newbury (say their society) we plough twice, manure for planting with from ten to thirty loads per acre. They sow two bushels of wheat, three of barley, and one of rye to the acre. An average crop of corn is *forty* bushels, potatoes two hundred, barley thirty, rye fifteen, wheat sixteen to twenty.

This looks well; it shews the advantages of frequent ploughing and ample manure. If others say they cannot get the manure, we answer, farmers can always get manure, if they will get the crops; and they will get the crops if they will plough twice, or as in England, three, four and five times. This will supply the place of dung till they get large crops, and these crops will enable them to obtain manure. We see they adopt the practice of pretty liberal seeding in Newbury; yet in the

English and French husbandry, they sow more. Three bushels of wheat on land no better prepared and no richer than ours, they would think full little seed to an acre. Spring wheat should be sown thicker than fall wheat: it has not so much time to spread, and of course requires more seed.

The Vassalborough statement on this point is too general to enable us to give their processes. In planting indian corn they plough in the fall; they put on gypsum or plaister after it is up, usually hoe twice, sometimes once only on new land, crop from thirty to forty bushels.

The Danvers Society state, for corn they plough once and harrow thoroughly, crop from twenty-five to forty bushels. For barley, land is twice ploughed and harrowed once. Two bushels of seed are used, and crop of barley twenty bushels.

Such is the view given of our treatment, and the produce of grain crops in some of the best districts of Massachusetts. It is apparent from even this short sketch, that nothing but more labour and manure is necessary to secure us good crops, as good or better than those of other countries. It is apparent that indian corn is the favourite production; for that alone the ground is sometimes ploughed twice, for that, we submit to the labour of dunging and planting in holes, for that, we go through the labour of three hoeings and ploughings while it is growing. As to the expense of the culture of indian corn, there is an unaccountable difference in the opinions of our correspondents. Mr. Ely estimates the labour of an acre of indian corn at from six to nine days labour of one man, and shelling its produce two days and an half. The Shrewsbury Society estimates the same labour at eighteen days, &c. The Newbury Society, at from twenty-seven to thirty-two days. The Vassalborough Society, at nineteen days. The Danvers Society, at from eighteen to twenty-one.

Between the two extremes, that of Mr. Ely eleven days, and the Newbury Society thirty-two, the difference is so great as to lead one to apprehend, either that the process was much more thoroughly performed by the latter, or that the former had found some mode of shortening labour unknown to the latter. But be this as it may, we must take eighteen days labour of a man at least, as the average amount bestowed on an acre of indian corn. It would not be deemed extravagant to say, that this is double the labour required for an acre of wheat. Why then does it happen, that indian corn continues to be so great a favourite to the exclusion of wheat? If it be said that it is more profitable, why do the farmers of the wheat raising states so much surpass ours in opulence? Will it be said that corn is more natural to our country? Corn requires the best of land, the richest culture, the most favourable seasons. The climate of Virginia, of Maryland and Pennsylvania is better calculated for corn than ours; yet they raise wheat in preference. We failed formerly it is true; the wheat crop was uncertain; it was subject to blight. But this is equally the case at times in Great Britain, in Canada and in France.

"The climate of Great Britain," says a great practical farmer of that nation, "has of late years been very unfavourable to the growth of wheat. The distempers to which wheat has for *many* seasons past been subject, are called blight and mildew." He says this is owing to the kind of wheat they use, and recommends a spring or summer wheat, which is seldom or never subject to these diseases. He says the average crops of wheat in Devonshire (a county from which a great proportion of our ancestors came) is about fifteen bushels, and the produce of this new summer wheat from twenty-five to thirty bushels.

If our farmers will only give themselves the trouble to look over the accounts of late experiments on spring wheat, even on the sea-board in Massachusetts, where it is supposed to be the most subject to blight, they will find the average produce to exceed twenty bushels. In this present number of the Repository, they will see the experiments of Mr. Parsons, of Brighton, who raised about thirty-seven bushels of excellent wheat on an acre, and Mr. Lowell, who on very indifferent light land, raised twenty-two bushels to the acre of wheat of a superiour quality.

Is it not unaccountable then, that our farmers should persevere in raising an expensive, exhausting plant, in preference to another of more easy cultivation, of as certain a produce, and more profitable? The true secret of blight or mildew in wheat, in this state, in former days, was slovenly cultivation. Let the land be well prepared the fall before by two ploughings, let it have a ploughing and cross ploughing in the spring, let it be in good heart before the wheat is attempted to be raised, let the seed be properly washed and limed, let it be well plaistered after it is up, and we believe there will be less frequently a failure of the wheat crop than of indian corn. In place of some further remarks, which we had proposed to make on this subject, we insert the following letter, just received from Gen. Dearborn, to the Corresponding Secretary, which is extremely apposite and very forcible on this point.

Brinley Place, January 25, 1817.

DEAR SIR,

I HEREWITH send you a copy of the letter required.

As I know you take great interest in our domestic improvements, I send you a paper containing a letter from De Caritat, to the President of the New-York Society for the Encouragement of Manufactures, presuming you may not have seen it. I do this, because the fact which I stated in my letter to you, that *woad was indispensably necessary for making a permanent blue dye, is confirmed* by an experienced dyer from Switzerland.

The indigenous substitute which he says he has discovered in this country, cannot be so easily or abundantly raised as the woad, for milk-weed requires a peculiar soil.

Perhaps it may be well to put an extract of that communication into your agricultural publication, by way of a note, confirmatory of the statement contained in my letter, as to the importance of woad to ferment the indigo vat. It is so difficult to induce our agriculturists and mechanics to make experiments, that nothing should be omitted which may tend to convince them of the truth of whatever may be of private or public benefit.

It is a lamentable and notorious fact, that a too general belief prevails, that nothing useful can be learned from *books*, in relation to agriculture or manufactures. This prejudice being once removed, we shall soon equal those nations who now so much excel us.

England has made most rapid improvements in agriculture since the establishment of the numerous agricultural societies, which are now scattered over that kingdom. We must do the same. It is up-hill work; but I trust the spirit of our best citizens will clear the way and pursue the object with patriotic zeal.

Our farmers have not advanced in any degree in proportion, either to their natural intelligence or the progress of the arts in other countries. They plant indian corn to their ruin; their orchards are as neglected as their woodlands; and after you get at a distance from considerable towns, *horticulture* is scarcely known. New-England can furnish bread stuff for the whole of the United States, and is still dependant on the southern states for flour.

The states of Pennsylvania, Maryland, and Virginia do not yield, on an average, more than eight bushels of wheat to the acre; and no part of New-England yields much less than twenty, and from that to forty.

I rode over a part of the District of Maine, New-Hampshire, Vermont. and this State, last summer, and I presume there was twice as much wheat raised as in any other year. Notwithstanding the season, the crops were never better, while the *corn* was generally destroyed. Our farmers never will grow rich until they abandon planting *Indian corn;* it is ruinous to their prosperity. Wheat, rye, and barley are raised with more ease, are more certain, and nearly twice as valuable. Our ancestors found the *natives living on Indian corn*, and we do the same. I cannot discover any other reason why such a practice should prevail. The northern nations of Europe never raise *Indian corn.* Wheat is an article of export even from the Baltic and Black sea, and still we cannot shake off this fatal predilection for *corn.*

I have about two bushels of woad seed which I shall be glad to give to any person who may wish to make an experiment. Should application be made to your society for seed, please to require it of me.

With great respect,

Your obedient servant,

H. A. S. DEARBORN.

JOHN LOWELL, Esq.

Pastel, or Woad, important to our Farmers as a product, and to our Manufacturers as a substitute for Indigo.

THE public are indebted to General H. A. S. Dearborn, of Roxbury, not only for the translation of an admirable treatise of C. P. De Lasteyrie, on the culture, preparation, history, and analysis of Woad, but amidst his numerous public avocations, for his spirited and judicious experiments upon its culture, and the process of obtaining a pigment from it.

The Trustees of the Massachusetts Society for Promoting Agriculture, in submitting his letter to the public, tender him their respectful acknowledgments for his interesting communication. They assure the public that they have a specimen of the pigment obtained by General Dearborn, very nearly resembling, in colour and all its sensible properties, the most perfect Indigo. General Dearborn, in the true spirit of a patriotic citizen, also authorizes them to assure the public, that he has two bushels of Woad seed ready to be given to any person who may be disposed to cultivate it. The work translated by General Dearborn may be had gratis by the Agricultural Societies throughout this state, by applying to J. Lowell, Corresponding Secretary of the Massachusetts Agricultural Society; General Dearborn having presented certain copies for this end.

Before we insert General Dearborn's letter, we would observe that a French gentleman of science, Monsieur De Caritat, has recently, in a letter to the New-York society for the encouragement of manufactures, thus noticed and confirmed the opinions of General Dearborn. Speaking of a Mr. Treytorrens, a dier of Switzerland, he says:

"Through the kindness and zeal of Dr. Mitchell and Mr. James Robertson, with whom I have made him (Mr. Treytorrens) acquainted, he had knowledge of a work just published in Boston, and sent by the translator, Mr. H. A. S. Dearborn, to the former gentleman. When he had ran it over and examined it, he came again to me, wishing I should state to you his observations and discoveries, either relative to the subject, or some other branches of his profession, tending to shew his devotedness to his adopted country, and particularly its manufactures.

"The following are nearly his words:—'Pastel or Woad, on which a treatise has just been published in Boston, is well known and familiar to Mr. Treytorrens, not as having cultivated it himself, which however he often saw and observed in the soil, nor manufactured, though acquainted with the process; but as having employed its product for dyeing. Its quality, and its *indispensible use* with indigo to obtain a deep, rich and superfine blue colour will be the sole end of his remarks now. Without Pastel or Woad, or a substitute perfectly analogous, according to him, there is no possibility of dyeing in deep unchangeable blue, (let the materials be what they will,) of a superiour quality. As this plant is not indigenous to the United States, and has been in Europe considered by the learned among many of a similar nature, *as deserving the preference*, the treatise concerning it, and especially the success of the experiments made here, for cultivating the same, must of course be regarded *as most precious and valuable acquisitions.*'" Mr. Treytorrens then goes on to speak of a substitute for Pastel, but which he does not pretend to say is better, and which he calls Milk-weed, or Silk-grass. What this plant is, or what part of it is used, does not appear. It will not, we are persuaded, supersede the valuable plant described in the following letter.

Brinley-Place, (near Boston) Oct. 28, 1816.

SIR,

As a citizen of Massachusetts, I feel great solicitude in every thing which may contribute to render the products of her soil of importance to the nation, and render the labours of the Agriculturist profitable.

As the society of this Commonwealth for the encouragement of those objects, have recommended experiments and invited communications on all subjects interesting to the farmer, I herewith transmit a number of copies of a work, which I have translated from the French, on the culture of Woad or Pastel, and the use of its blue pigment in dyeing.

Desirous of testing the correctness of the experiments which are therein detailed, of the best methods of cultivating Pastel, and extracting the indigo from the matured leaves of the plant, I sowed a piece of ground early in May, in drills, three feet apart, and at the first weeding thinned out the plants, so as to leave them six inches apart.

On the 15th of August, I cut a part of the leaves, which covered $\frac{1}{60}$ part of an acre, and pursued the process contained in the *Information upon the Art of extracting Indigo from the leaves of Pastel*, published by order of His Excellency Montalivet, Count of the empire and Minister of the interiour; contained in the treatises transmitted. The experiment succeeded to admiration, and I herewith send you a sample of the Indigo obtained.

The fermentation was perfect at the expiration of 48 hours. The liquor being drawn off from the vats, one bucket of lime water, prepared agreeably to the directions contained in the treatise, was added to two of the liquor, and then agitated with a small wooden rake, for fifteen minutes, when a most copious white froth arose to the surface, which soon assumed a bright blue colour. This froth was carefully skimmed off and put into earthen bowls to dry, and gave me a quantity of "*fleuree*," as mentioned at page 138; a part of which I send you.

The green flocculi were deposited in two hours. The supercumbent yellow liquor being drawn off, an ounce of sulphuric acid, diluted with water, to every bucket of the liquor, was poured into the green precipitate, which instantly changed it to a most beautiful cerulean blue: cold water was then poured into this admixture and violently agitated for ten minutes.

Twelve hours after, the liquor was drawn off, and the blue deposition put into cloth filters to drain. In twenty-four hours, the indigo was perfectly drained, taken out, and put into a box with a linen bottom, which was placed in an airy situation, under cover. At the expiration of seventeen days, it had become a tenacious paste: was then taken out with a wooden knife, and pressed into small boxes to dry. In two weeks the indigo was perfectly dry.

At the expiration of twenty days, the plants which had been cut, were grown sufficiently large to cut again; which would give, of course, three cuttings a year, in this northern climate; but if sown in September, there might be four, if not five cuttings, a year. As the plants are not injured by the frosts of winter, they would, in this way, be fit to cut in June.

From this experiment, I am satisfied the following quantity of indigo could be made from an acre of ground. One cutting from $\frac{1}{60}$ of an acre gave, of indigo, half a pound. One cutting from one acre, therefore, would have given thirty pounds—four cuttings one hundred and twenty pounds. The present price of indigo is two dollars per pound; therefore, one acre of land, cultivated with Pastel, would produce to the farmer, two hundred and forty dollars.

I wish you to distribute some of the books I have sent, among the different agricultural societies in this state, and the remainder in such manner as will best tend to diffuse a knowledge of the advantages which the agriculturists and diers of this state may derive from the cultivation and use of Pastel.

If the present pacific state of the world is adverse to the extension of the cultivation and use of Pastel, as a dying material, it is nevertheless important, that the advantages which the different sections of our country may reap, at some future period, from this plant, should be known, when less favourable circumstances shall combine, to deprive us of the colouring ingredients, now so easily obtained, from every part of the globe.

During the war, indigo was four dollars a pound in New-England and New-York.

It is of the first consequence to a nation, that it can, at all times, be able to rely on the resources of its soil and industry, for, not only the necessaries, but the luxuries of life.

The resources of the United States are as yet, very imperfectly developed, but the rapid advances, which are now making in chemistry, mineralogy, botany, agriculture, and the mechanic and fine arts, warrant the most favourable anticipations of the future glory, prosperity, happiness and real independence of the republic.

Besides the advantages resulting from the cultivation of woad, as a pigment for dying, it is indispensably necessary for fermenting the *indigo vat.* For this purpose, the green leaves are used, or they are made into cakes, balls or *pelotes,* as described in the treatise.

It is a notorious fact, among well taught, scientific and experienced diers, that a deep, permanent, and brilliant blue cannot be produced, unless the *indigo vat* is fermented with woad. It has long been used in France, Germany and Holland, in preparing the *indigo vats* in the best manufactories of those countries, and is now used in England: for it is found impossible to imitate the justly celebrated NAVAL BLUES of France without it. A more perfect fermentation is thereby produced, and the particles of indigo consequently more uniformly held in solution. The colouring pigment, prepared in this manner, attaches itself so firmly to the fabrics, that cloths thus died appear of a deep uniform and beautiful blue; the colour does not rub off, and never fades by exposure to wet, heat or the air, but remains permanent and unchanged.

There is no art less perfectly understood in this country, than dying: and it has been owing exclusively to the exertions of the first chemists of Europe, that it has been reduced to a perfect system, and the whole process conducted on known established principles.

Formerly there was a mysteriousness in the process, which for a long time excluded all attempts at investigation. Those who practised the art, made it a point to keep, as important secrets, whatever they knew, and, like the manufacturers of glass, suffered no inspection of their labours, lest they should be robbed of an imaginary treasure. There were no means within their power of detecting the causes of failure in the preparation of their vats, for they were ignorant of the chemical effects of the different ingredients used. They merely knew from practice, or tradition, that a certain combination of materials made a red, blue, yellow or green die, and if from an injudicious admixture the anticipated result did not take place, they merely said *they had "bad luck."*

Long custom had created prejudices, which forbade instruction, and, like many individuals of every mechanic art, the diers laid it down as an axiom, that nothing useful could be learned from books, or instruction communicated by individuals, who had not served an apprenticeship, and laboured in the same vocation.

The vast strides which have been made in knowledge during the last fifty years, have not been confined to the schools of the literati, or only known to the secluded philosopher.

Useful discoveries in the arts, instead of merely giving eclat to the laborious investigator and patient experimentalist, have been extensively disseminated.

The perfection of European manufactories is attributed to chemical investigation.

The superiour manufactories of painters' colours, earthen ware, and porcelain, soap, medicinal preparations, the working of metals, the art of dying and distilling, and the astonishing improvements in agriculture, are some of the important effects, which have resulted from the chemical pursuits of the learned individuals, societies and academies of the last half century.

Although the United States have progressed in civilization and the arts, in a manner unparalleled in the annals of nations, still much remains for inquiry; and it is the duty of every citizen to contribute, by every means within his power, whatever may tend to advance the best interests of all classes of society, and render our nation industrious, learned, independent and happy.

With great respect,
Your obedient servant,
H. A. S. DEARBORN.

LETTER FROM E. W. WOODWARD, ESQ.

[To the President of the Society.]

Haverhill, (N. H.) Dec. 11*th*, 1816.

DEAR SIR,

When you were in this part of the country, five or six years since, you left with Stephen P. Webster, Esq. a sample of rye of the growth of France, with a view to experiments in this part of the country.

Mr. Webster made a distribution of it among some of his friends, with directions to have it put in the ground in the fall of the year, agreeably to instructions, which, he said, you gave him.

It fell to my lot to receive three kernels of this grain, but it wholly escaped my mind until the ensuing winter, when, on inquiry, I found others had followed the directions, and put their seed in the ground.

On the opening of the spring, I concluded to plant it, with but little expectation that it would come to maturity, and accordingly selected the first bare spot, and put in the seed.

At the time I made my garden in the month of May, finding each kernel had sprouted, I transplanted it to a more favourable spot, and was gratified in noticing its rapid growth, and finally becoming perfectly ripe, yielding that season about a table spoonful.

The season was unpropitious to all others who made the experiment, which led me to the conclusion that it was a spring grain. I accordingly so treated it the succeeding years, though by an unfortunate circumstance, (a horse getting into my garden) I lost nearly all of my second years growth; I however was enabled to save about as much as I put into the ground, thereby losing about one years growth.

In May 1815, I was enabled to plant about half a pint of seed, which I drilled in my garden, but soon found it stood too thick; it however gave me ten quarts of fair full berried rye.

Concluding this spring to give a fair experiment, and also being desirous of making as much as possible of my seed, I prepared half an acre of ground with hoes and rakes, and again drilled it in rows about twelve or fourteen inches apart, with the kernels from two to three inches apart in the rows, and cleared it twice from weeds. It has been very productive this season, having yielded, from eight quarts (the exact quantity put in the ground,) thirteen bushels and twelve quarts—one bushel of which weighs fifty-seven pounds. I have now a desire to do something with it that may benefit my country, as I am well convinced it will prove a valuable article, and one that is well adapted to our climate.

I was informed that a quantity of the same kind of seed was sent to Northampton, (Mass.) but that it was all lost by sowing in the fall; and am led to believe it has, in no other instance, been preserved.

Many applications have been made for small quantities; and there would be no difficulty in getting off the whole, to receive half the next years crop in exchange.

Your obedient servant,

E. W. WOODWARD.

FARMER'S PROFITS.

[Middleton's Middlesex.—London, 1798.]

The accounts of particular families, produced to me, have demonstrated a profit of 32 per cent. per annum. on the sum employed, for thirty-five years in succession. Indeed it seems to be evident, that a man who employs only 500*l.* and with it brings up a large family, and places them in a situation equal to his own, while he himself retires with an easy fortune, could not have done it with a less return.

MANURE, AS APPLIED TO DIFFERENT SOILS.

[From Marshall's Minutes of Agriculture.]

During the drought of summer, *clayey soils* are divided by innumerable fissures: and if the manure be laid on while the soil is in this state, the first shower of rain carries down the dissoluble particles into the vegetative stratum. But, in winter, a retentive soil resembles a spunge filled with water; and the manure laid on, while it remains in this state, must either be washed away by heavy rains, or be lodged near the surface; and cannot possibly penetrate the soil until it be made porous by the ensuing summer's drought. On the contrary, an *absorbent* soil is always open to superficial moisture: it resembles a dry spunge, which greedily absorbs the moisture it can reach: and as fast as the manure laid on such a soil is liquefied, it is received by the mould. The danger here, perhaps, lies in its being hurried *through* the vegetative stratum. Is not winter then the fittest time for feeding such a soil, when the current of absorption is gentlest, rather than summer, when its rapidity may hurry down the vegetative food, and prevent its being incorporated with the plant-feeding mould? And is it not obviously eligible, on such a soil, to lay the manure on the *surface*, at the greatest distance from that depth at which it becomes useless, rather than to bury it in the soil, where it may more readily escape below the sphere of vegetation?

The writer is, *at present*, so fully satisfied with the former part, at least, of this theory, that he is determined not to manure in future the surface of a retentive soil, when its pores are full: he will either embrace the opportunity when dry weather has rendered it absorbent, or bury the manure in the soil; in which situation it may meliorate, not only, *perhaps*, as a food, but also as a provocative.

FROM BANNISTER'S CURSORY OBSERVATIONS ON HUSBANDRY.

Every farmer should bend his thoughts towards the improvement of his *low meadows*, and not suffer them to languish for want of a little care as beneath his attention, whilst no expense is spared in the management of tillage of his arable land, though incapable of producing so ample a profit.

The natural situation of these grounds, and their tendency to humidity, point out the first method to be pursued for their improvement, which is draining. For t is purpose a principal ditch is to be made on the lowest ground, and a number of smaller ones are to intersect the meadow, pointing to the principal drain. But if, as frequently happens, the meadow should lie lower than a neighbouring river, so that the water cannot be conveyed directly to that reservoir: or if it lies at some distance from the river, still the method of cutting drains should not be omitted. These drains may point to a ditch that ought to surround every piece of land of this description, or to a pond, which may be sunk in the lowest part of the field, to receive the contents of the drains, which should always be kept clear, for the water to flow away.

The meadows being thus drained, will by degrees produce grass of a finer texture, and abate of their tendency to send forth rushes and flag grass. But to improve these meadows still farther and to rid them of these inconveniencies, it will be necessary to cover the surface yearly with a good dressing of town mud, road grit, ashes, or soot, thinly spread; and on the lowest parts, gravel may be thrown with great advantage. These will be found to destroy the rushes, &c. and contribute to bring the meadows into a good state.

Various are the benefits to a farmer who unites much of this low ground with his ploughed land. When properly managed, the hay cut from meadows will be found equal in quality, and more abundant than that from uplands; and every sort of stock (sheep excepted) will be provided with a pasture much more salubrious and congenial to them.

ACCOUNT OF THE CATTLE SHOW AT BRIGHTON.

IN OCTOBER, 1816.

This exhibition was attended by a most numerous body of respectable farmers and distinguished citizens. In one point, that of *fat* cattle, it was rather meagre; in all other respects we should have been well satisfied to have placed it down at Smithfield or Lewes, at Bath, or at Mr. Coke's sheep shearing, at Holkham. It would not have disgraced our country in the estimation of any foreign farmers.

Three causes operated against the production of a greater number of fat cattle. The unexpected season which almost threatened famine, the novelty of the exhibition, not yet extensively known, and a general but unhappy opinion that the great Springfield Oxen would both be sent, and would of course distance all competition, carrying the only two prizes for that description of cattle.

Nineteen different competitors offered for exhibition: (we do not mean this for the number of animals, for there were nearly an hundred; but the number of claimants.)

The Merino Sheep were uncommonly fine, whether regard be had to the purity of blood, the form and condition of the animal, or the fineness and quantity of fleece. The adjudication must have been embarrassing to the Judges. We presume that the size and quantity of fleece turned the scale in favour of Mr. Ingersoll of Brookline, for the first premium, and of Mr. Jaques for the second; Mr. Bussey's were also very fine sheep, as were the selections from the excellent and extensive flocks of Mr. Parsons and Mr. Prince, which were not in competition. (These gentlemen declined to stand for the premium, on account of their offices in the Society.)

The three year old bull owned by Mr. Thomas Gardner of Groton, which carried the first premium, was a noble animal of most perfect proportions.

The bull of Hon. Judge Dana of Groton, which obtained the second premium, was a wonderful animal for his age, being only nineteen months old; his size exceeded that of most two and of many three year old bulls, and his figure was very fine.

The milch cow which carried the first premium, was owned by Mr. Caleb Oakes of Danvers; and if this article should reach all parts of the United States and Great Britain, we think we may challenge the whole to furnish her superiour. Her calf was weaned last May. During the last twenty weeks she has furnished milk from which 320 pounds of butter have been made!

She was milked on the field in presence of the Judges, and gave at a single mess, at the end of six months after calving, nine quarts of milk, as near as we could judge by the size of the vessel.

She is below the middle size and of beautiful proportions. The owner was offered for her on the ground one hundred dollars. At an English exhibition, such a cow would bring one hundred guineas for her wonderful properties.

The cow to which the second premium was awarded, was owned by Rev. Dr. Foster of Brighton. In quantity of milk, she equalled the other, but it did not appear that its quality was so unusually rich, though very fine. She had one property very uncommon, that of continuing to give milk the whole year, having for several years given six quarts per day before calving, without having ever given less.

The first prize for working cattle, was awarded to John Parkman, Esq. of Brighton; and the second for the same to Mr. John Warren of Brookline.

We extremely regret that the pressure of time prevented the trial of an ingenious newly invented plough. The Trustees of the Agricultural Society will certainly attend to it, but it was impossible to do it on this occasion, as there was barely time to get through the examination of the cattle.

CATTLE SHOW AND EXHIBITION OF MANUFACTURES, AT BRIGHTON,

ON THE SECOND TUESDAY OF OCTOBER, 1817.

The Trustees of the Massachusetts Society for the promotion of Agriculture, encouraged by the renewed patronage o. the Legislature of this state, intend to bestow in premiums, not only the sum granted by the government for this purpose, but also the whole amount of the income of their own funds. They therefore announce to the public their wish to have a Cattle Show, and Exhibition of Manufactures, at Brighton, on the second Tuesday of October, 1817; and they offer the following Premiums.

FOR STOCK.

For the best Bull raised in Massachusetts, of any age,	$ 40
For the next best do. do. - - - -	25
For the best milch Cow, not exceeding eight years old,	40
For the next best do. do. - - - -	30
For the next best do. do. - - - -	20
For the best Ox, fitted for slaughter, and weighing not less than 1800 wt. - - - - -	50
For the next best do. do. not less than 1500 wt. -	40
For the next best do. do. not less than 1300 wt. -	30
For the best pair of working Cattle, not exceeding eight years old, - - - - - -	40
For the next best do. not exceeding eight years old, -	30
For the next best do. of any age, - - -	20
For the best Merino Wethers, not less than six in number,	20
For the next best do. - - do. -	10
For the best native Wethers, - - do. -	15
For the next best, - - - - - - -	10
For the best Merino Ram, not less than three years old,	20
For the next best do. of any age, - - -	10
For the best Merino Ewes, not less than five in number, and two years old, - - - - - -	30
For the next best do. do - - -	15

For the best Boar, not exceeding two years old, -	10
For the next best do. - - - - -	5
For the best Sows, not more than four years old, and not less than two, and two in number, - - -	10
For the best Store Pigs, not less than two in number, and not more than two years old, - - -	10
For the next best do. do. do. - - - - -	5
For the best Bull hereafter imported by a citizen of Massachusetts, having regard to the adaptation of the breed for meat as well as dairy, - - - -	100
For the next best imported do. - - -	75
For the best milch Cow, imported, - - -	75
For the next best do. - - - -	50

Any of the above stock, when raised, and still owned, at the time of exhibition, by the person who raised them, will entitle the claimant to an allowance of ten per cent. in addition.

FOR AGRICULTURAL EXPERIMENTS.

To the person who shall raise the greatest quantity of wheat on an acre, on a tract not less than one acre, specifying the nature of the soil and culture, - - - -	40
To the person who shall raise the greatest quantity of carrots, potatoes, or turnips, having regard to the quantity of land and mode of culture, - - -	40
To the person who shall introduce any new vegetable or grass, and prove, by cultivation, its superiority to those now in use, or its being a good substitute for them,	30

INVENTIONS.

To the person who shall invent the best, simplest and least expensive machine for thrashing wheat or any small grains,	75
To the person who shall invent the best and simplest, and least expensive machine for sowing small seeds on an extensive scale, - - - - - - - - -	30
To the person who shall invent the best plough for common purposes, - - - - - - - - -	20
To the person who shall introduce the drill plough, and apply it successfully to the culture of any small grains or seeds, - - - - - - - - -	20

To the person who shall produce at the show any other agricultural invention, which shall in the opinion of the Trustees, deserve a reward, - - - - - - 20

FOR DOMESTIC MANUFACTURES.

To the person or corporation who shall produce the best specimen of fine broadcloth, not less than six quarters wide, and 100 yards in quantity, from wool grown in Massachusetts, and manufactured within the same, - - 50

To the person who shall produce the best specimen of broadcloth as aforesaid, not less than 100 yards, - - 30

To the person who shall produce the best specimen of broadcloth as aforesaid, manufactured in his family, and not less than twenty yards, - - - - - - - 20

To the person or corporation who shall produce the best specimen of cotton cloth, manufactured in this state, not less than fifty yards, - - - - - - - 20

To the person who shall produce the best specimen of any other fabrics of wool or cotton, or both, manufactured in this state, in public factories, - - - - - - 20

In private families, - - - - - - - - 20

It is understood, that whenever merely from a want of competition, any of the claimants might be considered entitled to the premium, under a literal construction, yet in the opinion of the Judges, the object, so offered, is not deserving of any reward, and is not superiour to many similar ones not offered, the Judges shall have a right to reject such claims.

Persons to whom premiums shall be awarded, may at their option, have an article of plate with suitable inscriptions in lieu of the money. Premiums will be paid within ten days after they shall be awarded. The rules and regulations of the Cattle Show will be made known some weeks before it will take place.

By order of the Trustees,

J. LOWELL, *Chairman of the Committee for Premiums.*

LIST OF MEMBERS OF THE MASSACHUSETTS SOCIETY FOR PROMOTING AGRICULTURE.

Those marked thus, (*) Deceased.

ADAMS JOHN, His Excellency
*Avery John, jr. Esq.
*Ames Fisher, Hon.
*Appleton Nathaniel,
*Appleton Nathaniel W. Dr.
Andrews John, Esq.
Allen Joseph, Esq.
*Ammidon Caleb, Esq.
Adams Jonathan,
*Amory Thomas C. Esq.
Adams Benjamin, Hon.
Ammidon Calvin, Esq.
Andrews William, Maj.
Andrews Asa, Esq.
Appleton Daniel,
Ayer James, Esq.
Abbot John, Esq.
* Breck Samuel, Esq.
* Barrell Joseph, Esq.
* Brimmer Martin, Esq.
Bulfinch Charles, Esq.
* Baldwin Loammi, Esq.
* Brattle Thomas, Esq.
* Bowdoin James, Hon.
Baylies William, Dr.
* Brooks Eleazer, Hon.
Brooks John, Hon.
Bacon John, Hon.
Beals Benjamin, Esq.
* Black Moses,
Bass Samuel, Esq.
Baker Samuel, Hon.
* Bridge Ebenezer, Hon.
* Blodget Samuel, Esq.
Bates Elijah,
Boardman William, Esq.
Billings William, Esq.
* Bigelow Daniel, Esq.
Bannister Seth, Esq.
Beaman Ezra, Esq.
Bromfield Henry, Esq.
* Buckminster Joseph S. Rev.
Bartlett Bailey, Esq.
Bartlett Thomas, Esq.
Brewer Thomas,
Brewer John,
* Babbet Thomas, Dr.
* Brigham Elijah, Hon.
Bussey Benjamin, Esq.
Butler Moses, Esq.
Baldwin Luke, Esq.
Burbanks Timothy, Capt.
Brooks Peter C. Hon.
Bartlett William, Esq.
Barnard David,
Breed John,
Breed Ebenezer.
Bates George, Dr.
Brown Michael,
Bixby Daniel,
Bachelder Joseph,
Bascom Jonathan, Esq.
Bowman Joseph,
Brown Daniel,
Bradley Enoch,
Bailey Jonathan.
Bradley Benjamin,
Bradley Caleb L.
Brown Abner,
Burnham Josiah,

* Cutler Mannasseh, Rev.
* Codman John, Esq.
* Cutts Edward, Esq.
Cabot George, Hon.
Craigie Andrew, Esq.
* Cranch Richard, Hon.
* Cary Samuel, Esq.
* Chandler Samuel,
* Cushing Thomas, Esq.
Coney Daniel, Hon.
Cutler John, Gen.
Carr Francis, Capt.
Coolidge Joseph, Esq.
Cleveland Nehemiah, Esq.
Coolidge Charles,
Coolidge Cornelius, Esq.
Cleveland William,
Corlis Ephraim,
Carlton Aaron, jr.
Carlton Daniel,
* Chadwick Samuel,
Carlton Elijah,
Currier Daniel,
Colt Samuel D.
Choate John, Esq.
Choate John P. Maj.
Choate George, Esq.
Cobb Elijah, Gen.
Crosby Oliver, Hon.
Craigie Benjamin.
Coffin Nathaniel,
Chandler Peleg, Esq.
* Dexter Samuel, Hon.
* Durfee Thomas, Hon.
Dexter Aaron, Dr.
* Dana Francis, Hon.
* Dean Samuel, Rev.
Danforth Samuel, M. D.
Davenport Seth,
* Dexter Samuel, jr.
* Denney Thomas, Col.
Davis John, Hon.
* Davis Thomas, Hon.
* Dix Elijah, Dr.
Dix Joel,
Dwight Thomas, Hon.
Derby John, Esq.
Derby E. Hersy, Esq.
Deering James, Esq.
Dowse Edward, Esq.
Dodge Robert, Capt.
Dane Nathan, Hon.
Dwight Edmund, Esq.
Dillaway Samuel,
Draper Simeon, Esq.
Duncan James, Esq.
Duncan Samuel, Esq.
Day Heman,
Davis Jonathan, Esq.
Dearborn Henry A. S. Esq.
Edwards William, Esq.
Ely Justin, Esq.
Edwards Timothy, Hon.
* Eggleston Azariah, Esq.
* Emerson William, Rev.
English Thomas,
Emery Moses,
Emerson Daniel.
Elwell Paine,
Emerson Oliver,
Emerson Billy,
Eaton David S.
Emery Robert,
* Foster Bossenger,
Foster Dwight, Hon.
* Flagg Samuel, Esq.
Frye Simon, Esq.
Fisher Joshua, Dr.
Fowler Samuel, Esq.
Fessenden Arthur,

Fiske Oliver, Hon.
Fessenden Samuel, Esq.
Freeman James, Esq.
Freeman Samuel, Esq.
Frye James,
Field Alexander,
* Gill Moses, Hon.
Gore Christopher, Hon.
* Guild Benjamin,
* Gorham Nathaniel, Hon.
* Gerry Elbridge, Hon.
Greenough David S. Esq.
Gold Thomas, Esq.
Greene Joshua, Esq.
* Gray John, Capt.
Gray William, Hon.
Gardner Samuel P. Esq.
Gardiner Robert H. Esq.
Goddard Benjamin, Esq.
Gale Moses.
Groves Rufus, Col.
Geddings Joshua, Major
Gardner Stephen P. Esq.
Goodell Asa, Esq.
Gould Elijah, Esq.
Gifford Prince, jr.
Godfry Grovenor,
Greenleaf Moses,
Higginson Stephen, Hon.
* Holten Samuel, Esq.
Hill Henry, Esq.
Hull William, Esq.
Hicks John,
Homer John,
Hunt Ebenezer, Dr.
* Henshaw Samuel, Esq.
* Hancock John, His Ex.
Howard Daniel, Esq.
Hastings Seth, Hon.
Hall Jonathan P.
Hale Thomas, Esq.
Howe Artemas,
* Hosmer Joseph, Esq.
* Henshaw David, Esq.
Hall Ebenezer,
Haskell Joseph,
Hunnewell Jonathan, Esq.
Hall Richard,
Hall Ebenezer, jr.
Hall Andrew,
Hall Nathaniel, jr.
Hancock John,
Hancock Ebenezer, Esq.
Higginson Stephen, jr. Esq.
Hayward Lemuel, Dr.
* Harris Jonathan, Esq.
Hinckley Samuel, Esq.
Hewes Thomas, Esq.
Holman Silas, Hon.
Harding Jabez, Esq.
Hatch Joseph,
Homer Stephen,
Hallet Charles, Capt.
Hoyt Epaphras, Esq.
Hyde Caleb, Hon.
Hubbel Wolcot.
Hall Ambrose.
Howe David,
Hyde Ebenezer,
Howe Joseph,
Hooker John, Esq.
Hill Mark L. Hon.
Henry Samuel,
Hastings Stacy, Esq.
Harrington Joseph, Esq.
Heard John, Esq.
* Jackson Jonathan, Hon.
* Jarvis Charles, Esq.
* Jarvis Leonard, Esq.
Jones John Coffin, Hon.

Jenks John,
Jones Joseph, Col.
Joslyn Benjamin, Esq.
* Ives Thomas, Esq.
Jones Israel. Esq.
Jones Nathan, Esq.
Jones Thomas K. Esq.
Jewett Joshua, Dr.
Ingersoll Nathaniel, Esq.
Inches Henderson, Esq.
Jones Thomas, Esq.
Jenkins Nathaniel, Major
Ives George, Esq.
Jaques Samuel,
Johonnot George S. Esq.
Keyes Danforth, Esq.
Kingsley Martin, Esq.
Kitteridge Thomas, Dr.
* Knox Henry. Gen.
Kirkland John T. Rev.
Kendrick John, Esq.
Keating Oliver. Esq.
Kellog Silas,
Kimball James,
Kimball Moses,
King William, Hon.
Knapp Josiah. Esq.
Knapp Jacob N.
* Lincoln Benjamin, Hon.
* Lowell John, Hon.
Lincoln Levi, Hon.
* Lane George, Capt.
Lee Joseph, Esq.
* Lee Thomas, Esq.
* Lucas John,
* Leonard George, Hon.
Lovell Solomon, Esq.
Lyman Theodore, Esq.
Le Barron Lazarus,
Lowell John, Esq.
* Lyman Samuel, Hon.
Lee William R. Esq.
Leonard Horatio. Esq.
* Lane Ebenezer, Esq.
Little Josiah, Esq.
Low John, Esq.
Lumbard Daniel,
Lincoln Theodore, Esq.
Lamson Josiah, Esq.
Lathrop Samuel, Hon.
Martyn William, Esq.
* Mears John,
Munro Nehemiah,
Mason Jonathan. Hon.
Morgan Abner, Esq.
May Elisha, Esq.
Micall John, Esq.
Merrick Joseph,
* Merrick Pliny, Esq.
Matthews Elisha,
Maxwell Hugh, Col.
Montagu Zebina, Esq.
McKean Joseph, Rev.
* Magee James, Capt.
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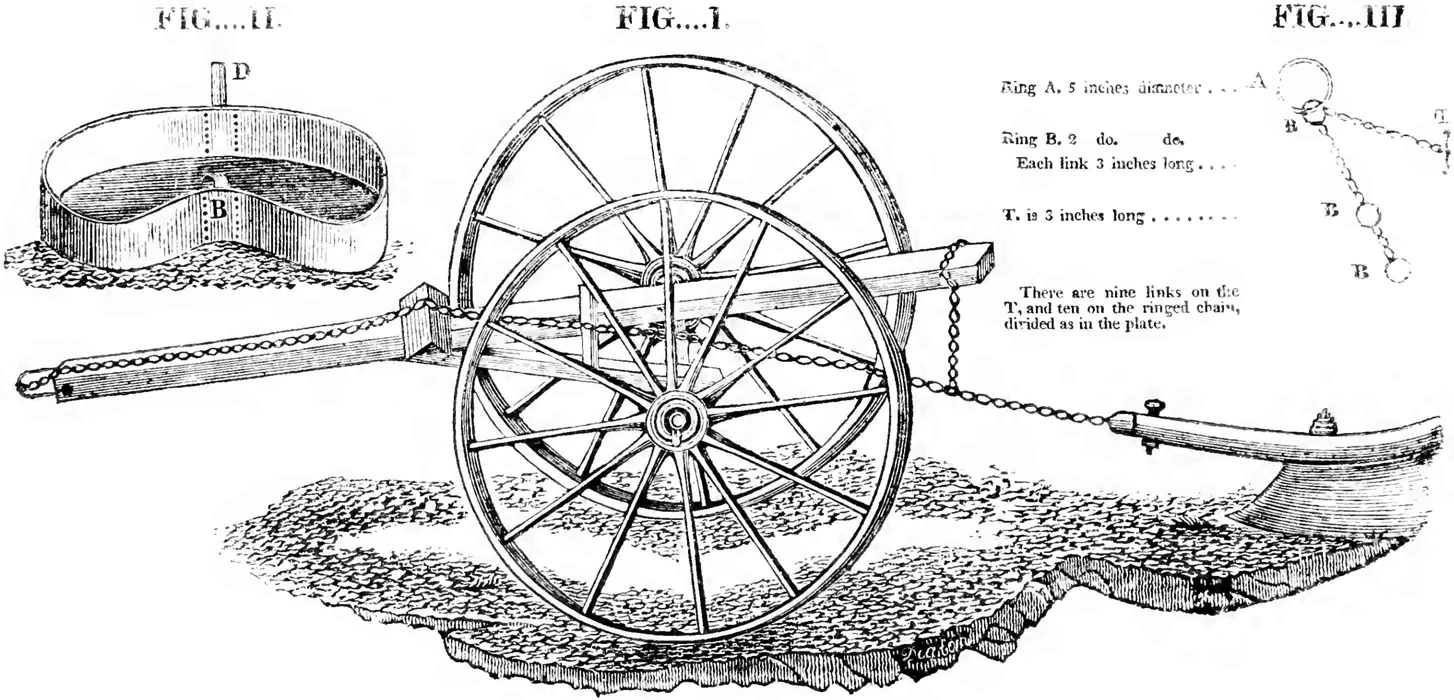

LUKE JOHNSON'S APPARATUS.

Eben Parsons

Esquire

MASSACHUSETTS

AGRICULTURAL JOURNAL.

VOL. IV. JULY, 1817. No. IV.

[If ever agriculture is to become in fact a science, and to have established rules for the guidance of the farmer, there must be, as a preparatory step, less backwardness among intelligent husbandmen in communicating the fruits of their experience for general information. Nothing but experiment, and the comparison of a great many results, with a due consideration of the various circumstances attending them, will give any certainty to our knowledge, and a security against ruinous mistakes. If but a small portion of our active farmers would make one judicious experiment in a year, in some one branch of husbandry, and communicate an accurate account of such experiment for publication in our repository, we may venture to affirm that this work would become in a few years the farmer's *manual*, replete with important facts, and such general inferences fairly deducible from them, as would go far to furnish the necessary data, for calculating the profits on agriculture in all its different branches. In our present number will be found an account of a simple apparatus for facilitating the operation of heavy ploughing, with testimonials of its utility, which will be thought, we think, entirely satisfactory.]

[*See Plate, fig.* 1.]

DESCRIPTION OF MR. LUKE JOHNSON'S APPARATUS, TO FACILITATE PLOUGHING.

THE machine consists of a pair of wheels, which may be from four and a half to five feet in diameter. The axletree, which connects the wheels, is a piece of square timber of sufficient length to pass through the boxes in the hubs of the wheels, and leave three feet and two inches between the inside boxes of the two wheels, and the sides of the axletree from three to four inches wide. On this axletree the beam or tongue, by which the machine is moved, is placed and fastened. This beam or tongue consists of two pieces of square timber, one thirteen feet and six inches long, the other six feet long, and the sides of each from three to four inches wide. The shorter piece is framed into the longer, about eight feet six inches from that end which is next the plough, extending obliquely from the longer piece and forming an angle with it, so that the two pieces, thus framed together, may be placed on the axletree in the following manner, to wit; the longer piece to form a right angle with the axletree, to be placed on it about two inches from the hub of the off or right wheel, and the end extending back three feet and eight inches from the axletree; the shorter piece to be placed on the axletree within two inches of the hub of the near or left wheel, and the end extending back of the axletree three or four inches. These pieces, thus framed together, and thus placed on the axletree, are to be fastened to it by pins driven through them into the axletree. On the beam where the two pieces are framed together, is placed a square block, eight inches long, and the sides eight inches wide, which is fastened to the two pieces of the beam by pins, and another block long enough to reach from one piece of the beam to the other, the sides, two inches wide, is placed on the two pieces across the beam, about five inches forward of the axletree, and fastened to the beam by pins.

The end of the plough to be drawn by the machine, should be a sufficient distance from the axletree of the wheels to give it the proper depth in the ground. A chain or several chains hooked together, and long enough to reach from the end of the plough to the end of the beam above described, is hooked to the end of the plough, and extends from thence over the two blocks aforesaid to the forward end of the beam. The chain thus presses upon the blocks, which causes a pressure upon the wheels. This chain is kept in place by a small chain put round it and the beam, a few inches forward where the two pieces are framed together. This machine may be drawn by a pair of oxen or horses, the end of the chain being hooked into the staple of the yoke, and the end of the beam put into the ring and held by a pin. The plough by this means is drawn with one fourth less power than without it.

and kept more easily and steadily in the furrow. And by putting a short chain round the beam, next the plough and near the end, and extending it round the chain, it will, when the team turns the plough round with it, save the labour of carrying the plough round.

It is not necessary that the pieces, constituting the beam or tongue, should be of the exact length or size above described, but the above proportion should be observed.

JOHN GARDNER,
ABIJAH BIGELOW.

RESULT OF AN EXPERIMENT WITH JOHNSON'S APPARATUS.

Brighton, May 7, 1817.

DOCTOR AARON DEXTER,

DEAR SIR,

Mr. Luke Johnson, of Leominster, the bearer of this, is the gentleman who applied last fall at the Cattle Show, to have his improvement tested for propelling the plough with less power than in the usual method; his plan is to pass the chain over a short axle fitted to two chaise or tight waggon wheels, and over a block of seven inches high, fixed on the tongue which is placed on one side the axis, within two inches of the inner edge of the hub of the wheel on the off side. You will recollect you invited him to be at Brighton on the day the Trustees were to dine with me. He accordingly attended, but the violent rain on that day prevented making any trial, for which he was fully prepared. Last week, on his way through this town, he saw my men engaged in breaking up sward land, and his machinery being here, he wished me to make trial of it. I readily consented, and we used it two days, until we had finished breaking up. I invited some of my most intelligent neighbours to attend, and we were all of opinion that there was a saving of one quarter of the power by his method, and that it was much easier for the man who held the plough, and that there was less difficulty in laying the furrows smooth than with the common plough. In the eastern country, fixing the chain to the axle of a cart, and putting the cattle on the tongue, has been practised for many years, and is usual even for drawing a log that is too heavy for the team, when pulling by the chain leading from the log to the yoke. Mr. Johnson's improvement consists in having a short axle fixed to two tight wheels, the tongue on one side, and a block of seven inches on the tongue over which the chain passes; the block serves to lengthen the lever, and of course increases the power in that ratio, the tongue or beam being on one side, and on the off side directs the off wheel in the furrow, while the other is on the grass. How far his method would answer in rough and rocky ground, or when trees stand irregularly, I do not pretend to judge. Mr. Johnson is very confident that in rough and rocky ground, and when stumps two feet high are left upon it, his method is quite as good as when the ground is level. It is true, we ploughed with less difficulty, and laid the sward much smoother with less application of the foot than in the usual method of hooking the chain to the yoke, which we had tried one day before Mr. Johnson called on us. My neighbours, who have tried it, Mr. Johnson informs me, speak quite as favourably as I have done in this letter, which I have read to him.

With respect and esteem,

Your very humble Servant,

GORHAM PARSONS.

EXPERIMENT

TO ASCERTAIN THE BEST KIND OF INDIAN CORN, AND TO PROCURE THE BEST SEED, BY GATHERING THAT WHICH RIPENS EARLIEST, AND FROM THE MOST PROLIFICK STALKS.

[The ensuing extract, from "the Exeter Watchman," has been thought worthy of republication in this Repository, in as much as it indicates an intelligent and very laudable attention to a subject of great importance in agriculture. There can be no doubt, that if like care in selecting all seeds was more common, a material and beneficial effect would result, both to the productiveness and the earliness of the crop. Much less attention is generally paid to the selection of seeds, than might be expected, since the intimate connexion between the quality of the seed and the quality of the crop, is a fact so necessary and so familiar.

To collect good seeds, (says the celebrated farmer, Mr. Cooper of Pennsylvania,) consists not in procuring new seeds from distant places, as is generally supposed, but in selecting the best of one's own seeds and roots. Though Mr. Cooper continually sowed or planted them in the same soil, every article of his produce was greatly superiour to that of every other person, who supplied the market, and continued to improve. He believed that the continuing to propagate from the same vegetables, or animals, was not attended with any degeneracy, and adopted the plan with vegetables, which Mr. Blakewell pursued with equal success with animals, viz. to raise from the best individuals of the kind.

Mr. Cooper was led to the practice, by observing that vegetables, of all kinds, were very subject to change with respect to their time of coming to maturity, and other properties; but that the best seeds never failed to produce the best plants. Among a great number of experiments, he particularly mentions the following:—

About the year 1746, his father procured seeds of the long watery squash, and though they have been used on the farm ever since that time without any change, they are at this time better than they were at the first.

His early peas were procured from London in the year 1756, and though they were planted on the same place every season, they have been so far from degenerating, that they are preferable to what they were then. The seeds of his asparagus he had from New York in 1752, and though planted in the same manner, the plants were greatly improved.

It is more particularly complained of, that potatoes degenerate when they are planted from the same roots in the same place. At this, Mr. Cooper said he did not wonder, when it was customary with farmers to sell or consume the best, and to plant from the refuse; whereas, having observed, that some of his plants produced potatoes that were larger, better shaped, and in greater abundance than others, he took his roots from them only, and the next season he found that the produce was of a quality superior to any that he had ever had before. This practice he still continued, and found that he was abundantly rewarded for his trouble.

Mr. Cooper was also careful to sow the plants, from which he raised his seed, at a considerable distance from any other. Thus, when his radishes were fit for use, he took ten or twelve that he most approved, and planted them at least one hundred yards from others, that blossomed at the same time. In the same manner he treated all his other plants, varying the circumstances according to their nature.

About the year 1772, a friend of his lent him a few grains of a small kind of Indian corn, not larger than goose shot, which produced from eight to ten ears on a stalk. They were also small, and he found that few of them ripened before the frost. Some of the largest and earliest he saved, and planted them between rows of a larger and earlier kind, and the produce was much improved. He then planted from those that had produced the greatest number of the earliest ears, and that were the first ripe, and the next season the produce, with respect to quality and quantity, was preferable to any that he had ever planted before.

The method of saving seed-corn, by taking seed from the heap, is attended with two disadvantages; one is the taking the largest ears, of which, in general, only one grows on a stalk, which lessens the produce; and the other is taking ears, that ripen at different times. Many years ago, Mr. Cooper renewed all the seed of his winter grain from a single plant, which he had observed to be more productive, and of a better quality than the rest, which he is satisfied has been of great use. And he is of opinion, that all kinds of garden vegetables may be improved by the methods described above, particular care being taken, that different kinds of the same vegetables do not bloom at the same time near together, since, by this means, they injure one another.]

Communications from the Board of Agriculture, vol. 1. Letter from Dr. Priestley

[To the Editor of the Exeter Watchman.]

SIR,

I send you the following mode of procuring a good kind of Indian corn for seed, which you may publish if you think proper.

Yours, &c.

A. L.

About ten years ago, I procured all the different kinds of Indian corn, approved of by any body in this part of the country for seed. These different sorts I planted on a piece of ground, particularly appropriated to that purpose, planting two rows of each kind. The ground was all equally good and early, manured in the same way, planted at the same time, and all cultivated alike.

These different kinds of corn were in a situation, that I saw them at all stages of their growth, from the time of planting until they were fit to gather. I found there was, through the season, a very great preference to some sorts over others, in the quantity of corn and of fodder, as also in the time of their ripening, and also in the size and shape of the ears, and in the quantity of shelled corn, which could be obtained from the same ground.

From all the kinds planted (which I think was more than twenty) I selected three which I considered preferable to the rest, but not all for the same qualities. The one kind was a large twelve rowed corn, ears long, well shaped, and well filled, both between the rows, and at the end of the ear, very productive, in proportion to the ears, in shelled corn, with large and high stalks, called the Sandwich corn. Another kind, called the Pigwackett corn, twelve rowed or more, the ear well covered at the ends, and no spaces between the rows, ears rather short, stalks low, but a large number of ears to the hill. A third kind, was ten and twelve rowed, ears well covered as either of the others, stalks about the common size, and ears larger than usual. The two last kinds of corn were earlier than the common corn, about eight or ten days; the other kind, a little later than our common corn, planted in this part of the country.

These three kinds of seed I mixed together, and planted in the same field, at a distance from any other, and in the fall selected the earliest ripe ears in the field, from stalks (when it could be done) on which there were more than one ear, having regard to the size, shape, and perfection of the ear in every particular. I have continued this practice ever since, and have never failed having a good crop. The corn has become so mixed, that there has not been, for several years, a single ear, in a field of three or four acres, which does not distinctly shew each of the three kinds of corn originally planted, by the colour, shape, and size of the kernels. The last year but little of the common corn in my neighbourhood ripened, but mine was about as large a proportion of it ripe, as usual, although I had not so large a crop.

I think by gathering my seed in the field, from the first ripe ears, the corn is ten days earlier than when first planted.

You will observe that I gather my seed from stalks, that have more than one ear, when that can be done. My reason for pursuing that course, at first, was from a general belief, in this vicinity, that some trees and plants, as well as animals, were more prolific than others, and that the descendants of those animals and seeds of plants, would partake of the nature of the parent. Whether this be true or not, I leave to philosophers to determine. My corn, since I adopted this method, has been more productive than formerly; but whether, in any part, owing to this course, I cannot say with certainty.

Chester, March 30th, 1817.

DEAR SIR,

For several years last past, I have adopted the following method of raising Indian corn, and have found it successful. I communicate it to you, requesting your remarks, and the result of your experiments.

No soil, but a warm, dry, and good one, ought ever to be planted with Indian corn, for, although wet and cold soils, in particular seasons, may produce good crops, yet the chance is so much against getting pay for so expensive a kind of cultivation, as this crop requires on such land, in a common season, as to make it prudent always to avoid planting such land with Indian corn, and to prefer any other crop to pulverize and enrich it.

A very important thing in raising a good crop of Indian corn, is the preparation and application of the manure. I have found this a good one. Cover the bottom of your barn yard, in the fall, with mud, or any substance composed of rotten vegetable matter, from meadow land or pond holes, or with tanner's bark, and if these cannot be procured, with rich soil, turf, and wash. In one year from the time of so covering your barn yard, after the manure from the barn, droppings of the cattle, straw, &c. have been thrown upon it, and well mixed during the summer, by ploughing or digging it several times over, take out eight cart loads for every acre you intend to plant, lay it in a square and flat heap. In the spring, hale from your hovel, or stable, five cart loads of unfermented manure, and place it upon the top of the heap you haled out in the fall. As early as the middle of April, dig over and mix the heap as composed together; if frozen, cut it up with an ax, or punch it to pieces with an iron bar, so as to mix the old and new dung together; let it lie light, and if rain does not fall so as to make it ferment, throw on water. Let your ground be well ploughed, and as soon as the dung heap becomes hot, which, in common seasons, in this part of the country, will be between the first and tenth of May, put the dung in the holes, and immediately drop and cover your corn, keeping all parts of the work as even with each other as possible. The distance I have found best, from hill to hill and row to row, is three feet nine inches. I have usually put eight or ten kernels in each hill, but allow not more than three to remain.

This method of raising corn I have practised, for seven or eight years, with little alteration. I find the heat in the manure brings the corn up early, of a good colour and vigorous growth; that the old, rotten dung affords food to the plant, in the early part of the season; at the time of earing, the new dung is reduced to a proper state to afford sufficient nourishment to the corn, to make it ear well, and the ears to be of a good size, well proportioned, and well filled out at the ends. This mode of raising corn, in description, appears much more expensive and laborious than the common way, but, in practice, it will be found to add very little, if any thing, to the common mode practised.

In hoeing corn no general rule can be given. Hoe it as often as there are weeds, and always before they seed, make hills large or small, high or low, according to the ground and season. In dry ground, and a warm season, the corn requires large and high hills. In wet ground, and a cold season, small and low hills.

Please to communicate to me your thoughts on this subject, and likewise your remarks and experiments, if you think it worth your while to try this mode of raising this very valuable crop.

I send you a small quantity of seed corn, and will, at some future time, communicate to you the mode of mixing and preparing it.

I am, with sentiments of respect and esteem,

your humble servant,

AMOS KENT.

E. H. Derby, Esq.

Mr. Knight, an English horticulturist, has given a curious experiment in impregnating the blossoms of one variety of pea, with the farina of another. He says, treatise of apple and pear, p. 42, "Blossoms of a small white garden pea, in which the males had previously been destroyed, were impregnated with the farina of a large clay coloured kind, with purple blossoms. The produce of the seeds, thus obtained, were of a dark gray colour, but these, having no fixed habits, were soon changed by cultivation into a numerous variety of very large and extremely luxuriant white ones, which were not only much larger and more productive than the original white ones, but the number of seeds in each pod was increased from seven or eight, to eight or nine, and not unfrequently to ten. The newly made gray kinds, I found were easily made white again, by impregnating their blossoms with the farina of another white kind.

The fifth volume of the Bath papers, contains a similar experiment with beans. It is related, that a Mr. Whimpy planted a field with garden beans, in rows about three feet asunder, in the following order—mazagan, white blossom, long podded, Sandwich-token, and Windsor beans. The mazagan and white blossom were threshed first, when, to his great surprise, he found many new species of beans. Those from the mazagan were mottled black and white; the white blossoms were brown and yellow, instead of their natural black; and they were both much larger than usual.

Darwin's Phytologia, page 105.

SOFT SOAP, UNDILUTED, AN EXCELLENT CLEANSER OF FRUIT TREES, AND DESTROYER OF INSECTS.

[To the Corresponding Secretary.]

Easton, (in Talbot County, Md.) 13*th April*, 1817.

SIR,

AMONG the papers published in the third number of the third volume of the Agricultural Journal of the Massachusetts Society, there appears a letter written by Richard Peters, Esq. upon the subject of Peach Trees, mentioning their decline for some years past, and the various remedies employed by him for relieving their diseases and preventing their decay. It does not appear that the Peach Trees in the neighbourhood of Boston are subject to the same disorders; but as the Society have thought proper to publish this paper for the benefit of their members and other readers in their districts, it must be presumed that the subject of it was considered worthy of their attention, and that probably the Peach Trees there are also more or less affected by casualties or distempers which it was their desire to remove or prevent. Under this impression I shall proceed to state an expedient which has been applied to the improvement of Fruit Trees in this county, and which may be equally serviceable in other portions of the country.

The Peach Trees here appear to be liable to the same disasters and diseases which are described by Mr. Peters, and they often wither and decay in the same manner. Pear Trees and other fruit trees are also frequently affected, and sometimes suddenly decay, without discovering the causes of their decline. A gentleman of this neighbourhood some years ago, observing the situation of his trees, and having unsuccessfully used many applications, at length directed their trunks or bodies to be washed and well rubbed with *Soft Soap;* and it is not easy to imagine the early change which appeared in their bark and foliage: the bark became smooth and glossy, and seemed sound and beautiful; and he thought the tree was greatly improved in every respect. I have tried the same experiment, and with equal advantage to Apple Trees, Pear Trees and Peach Trees; and am persuaded they have been greatly benefited by this process: it is used in the Spring, and may be repeated in following years as frequently as the trees appear to require it.

Mr. Peters declares that he used *soap suds* without any beneficial effects: but it is probable that the *Soft Soap* in substance is more powerful; and that having more strength and virtue than the suds as commonly made, it may more effectually destroy the worms, bugs, and other insects which so materially injure the trees; and it is believed to be in consequence of their destruction that the bark and branches are enabled to derive so much improvement from the application of this substance.

I am about to suggest this expedient to Mr. Peters; and if you think it may merit the consideration of your Society, you are at liberty to place this communication before them.

I am, Sir,
With much respect,
Your obedient Servant,
N. HAMMOND.

EXPERIMENT TO ASCERTAIN WHETHER PLUCKING THE BLOSSOMS FROM POTATOE VINES INCREASES THE CROP.——SOME ACCOUNT OF THE SWEDISH TURNIP.

West Springfield, April, 1817.

DOCTOR AARON DEXTER,

DEAR SIR,

I HAD full confidence in the account of increasing the crop of potatoes by plucking off the blossoms, as recommended in No. 1, of the 4th volume. I got the account published in the Springfield newspaper, and sent it to General Simon Perkins, of Warren, in the state of Ohio, who informed me he got it published in the newspapers printed at Warren. I found, after picking off all the flowers, that new sets came on, mine were picked over three times, and some of them four or five times, except two rows of twenty rods long each; where bushes were set up to distinguish them, which were left untouched, and no blossoms taken from them.

I saw them gathered and measured. I could perceive no difference in the quantity or size of the potatoes produced on the rows where the blossoms were plucked off, or wholly left on. I had a number of bushel baskets filled from the plucked and the unplucked rows, and I am certain the unplucked rows produced as much by measure as the plucked rows. All the information I could obtain from others, was similar to my own experience. I never have heard of any increased crop by plucking off the blossoms in any one instance, though many tried it. The last season was rather unfavourable, and produced about two thirds or three quarters of a common crop of potatoes; but I think that could not make any difference in the produce of the plucked rows. Experience must determine the fact.

In the close of the communication from East Andover, volume 3d, page 68, mention is made of a species of the Apricot, found on Kennebeck river, which produces a plentiful crop of delicious fruit. If you have any of the stones on hand, I will thank you for some of them.

I intend sending you by Mr. Leonard a bag of the Swedish Turnip Seed, which is thought preferable to our common turnip for use. It must be planted or sowed sooner than the other kinds for winter sauce, viz. from the 1st to the 15th or 20th of July. They answer very well to plant after green peas; the hills should be ten or twelve inches apart, and three or four seeds put in a hill, and should be hoed two or three times. They are a much richer sauce than common turnips, their flavour is preferred before other turnips, and they will keep good a year, and never grow pithy any more than a parsnip. Willich's Domestic Encyclopedia describes them as follows:—

"The Ruta Baga, or Swedish Turnip, is one of the most valuable roots of the kind. Its inside is either white or yellow; which colour, however, does not affect its quality. It is more hard than other kinds, and suffers no injury from the most intense cold, (meaning in England.) When it seeds near other turnips, it produces numerous varieties, &c. &c." The size and shape is about the same as the common beet. I raised five or six quarts of the seed in my garden. I wish it distributed among all the members of the Society, and others that are willing to try it. A table spoonful will be sufficient for a trial.

With respect and esteem,

I remain your humble Servant,

JUSTIN ELY.

DESCRIPTION OF A BRUSH FOR DESTROYING CATERPILLARS' NESTS.

Wenham, May 26, 1817.

[To the Corresponding Secretary.]

DEAR SIR,

FOR the last three or four years, we have here had very few caterpillars. Last week I observed an increased number, though not many, on my young apple trees. How to destroy them *most easily*, was a question which occurred as often as I had seen orchards infested with them: while I always considered it disgraceful to a farmer to suffer his trees to be stripped of their leaves, and their fruit, for that season at least, to be destroyed; seeing it was very practicable to get rid of them, and without much trouble, by crushing them, when small, with the fingers. This was my father's mode, when I was a boy. The same long, light ladders, which served in autumn in gathering his winter fruit by hand, enabled one to come at most of the caterpillars nests in the spring. On this effectual example I have myself practised, since I became a farmer. Some over delicate persons might object to this mode: but it is really far less offensive than the bare sight of large and numerous nests with which apple trees are sometimes filled. And if the operation be performed early, when the caterpillars are only from a quarter to half an inch long, the operator (man or boy) will feel no repugnance to the process. But in full grown trees, some nests, towards the extremities of their small limbs would escape, because not accessible by ladders. A narrow brush, formed with small bunches of bristles in a single row, I once thought might reach and destroy them; but it was not found effectual nor convenient. Last Saturday morning the idea of the proper kind of brush occurred to me, and, in the forenoon I tried it with complete success.

I presume every farmer has observed, that the clusters of eggs producing caterpillars, are laid round the slender twigs of the apple tree and wild cherry, and effectually guarded by a gummy covering, until vegetation commences in the ensuing spring. When first hatched, the worms appear about the eighth of an inch long. The same warmth in the air which opens the buds, hatches the caterpillars to feed on the embryo leaves. Their first object is to provide for themselves a tent for shelter, in their new state, against the inclemencies of the weather. For this purpose, they crawl to a small fork of a limb, where the branches form a sharp angle; and there spin and weave a web with which they surround it, and where they are secure against undue cold and heat and rain. By this small white web they are discovered, and are then most easily destroyed. But the clusters of eggs are not all hatched at the same time. According to their situation for warmth or coolness, they are hatched some days earlier or later. At the distance, therefore, of a week or ten days after the first visit, an orchard should be again inspected, and all the latter broods destroyed. If neglected in this first state, they soon, by their growth, become straitened for room; and having also consumed the nearest forage, they march and take a new station, and there form a new, but more ample tent. By such neglect the mischief of their ravages is increased, and they are with more difficulty destroyed.

The efficient and convenient instrument above mentioned, for this work, is nothing more than a common bottle brush fastened on the end of a pole. Having an old one in my house, I was enabled to make the experiment on the day when the idea of so applying it occurred to me. This brush is made of hogs bristles, introduced between two stiff wires closely twisted: and being convenient in cleaning the insides of bottles, is probably familiarly known whenever liquors are bottled. For the information of others, I will mention, that a piece of wire full one tenth of an inch in diameter, about three feet long, doubled, and leaving a small loop in the middle, is closely twisted for the length of about eight or ten inches from the loop; and then the bristles, being introduced between the remainder of the two branches of the wire, and these closely twisted upon them, the bristles are immovably fixed; and thus form (after being uniformly sheared) a cylindrical brush about six inches long and two inches and a half in diameter. To fasten this conveniently to a pole, with a small gouge I made a groove about seven or eight inches long at the small end of the pole, in which nearly all the handle (the naked portion of the twisted wire) of the brush was laid, and bound on with three strings.

In using the brush, press it on the small nest, and turning the pole in the hand, the web is entangled with the bristles, and removed: otherwise, you rub the fork of the limb, inside and outside, with the brush, when nest and worms are surely killed or brought down. That the experimenter may see its mode of operation, he may apply the brush with his hand to a nest within his reach. Spruce poles are eligible, because that wood is light and stiff. For my small trees, I found a common bean pole (used for running beans to climb on) six or seven feet long, sufficient: and for them a longer pole would be inconvenient. For taller trees, poles proportionably long must be provided.

If you are satisfied, by my account, of the utility of this simple instrument for destroying caterpillars, you may think it proper immediately to make it publickly known. Should the description be more minute than is requisite for communicating a clear idea of it, and of its application, you will abridge it.

With very great respect and esteem,

I am, dear Sir, truly yours,

TIMOTHY PICKERING.

ON UNFERMENTED MANURES.

[Extract of a Letter from the Hon. Richard Peters, of Pennsylvania, to Josiah Quincy, Esq.]

In No. 1, Vol. IV. of the Massachusetts Agricultural Repository, you have commenced with extracts from Sir H. Davy's Elements of Agricultural Chemistry, in which there are, for the most part, subjects of high importance to those who investigate principles. But, in many of his positions, I cannot agree with him. Not from the vanity of opposing his opinions as a chemist or philosopher, but in the humility of a practical farmer. In no article do I differ with him more than in his ideas of unfermented, or very slightly fermented dung. It is not because I have long cherished and frequently promulgated the contrary doctrine, but because I have had experience during a period of fifty years, which has fixed my convictions. Some of our hot muck farmers have assailed me in the less tenable points.—In one, in which I insist that *all* the hot muck ferments over violently in the earth. They say (and so does Sir H. I believe) that the earth checks fermentation. And so it may, to a certain degree. But strawy muck cannot be regularly spread. The animal matter is not mixed with the straw, but lies in masses per se; this over ferments, and throws up your crop, in bunches, or spots, over luxuriantly; and it lays, smuts, or mildews. The earth prevents fermentation in the straw; and this dry rots and becomes a *caput mortuum.* I have experienced this effect over and over again. I do not believe in the alleged economy of the hot muck practice. I think reasonably fermented dung goes further. All the straw and additional matter is impregnated, and, being decomposed, spreads with the animal ejections more equally, and to infinitely better advantage, assisting your crop in more points, and operating equally and more efficiently on the whole.*

LETTER FROM MR. JEFFERSON TO T. DALTON, ESQ.

Monticello, May 2d, 1817.

DEAR SIR,

I AM indebted for your favour of April 22d, and for the copy of the Agricultural Magazine it covered, which is, indeed, a very useful work. While I was an amateur in agricultural science (for practical knowledge my course of life never permitted me,) I was very partial to the drilled husbandry of Tull, and thought still better of it when reformed by Young, to twelve inch rows; but I had not time to try it when young, and now, grown old, I have not the requisite activity either of body or mind.

With respect to the field culture of vegetables for cattle, instead of the carrot and potatoe, recommended by yourself and the magazine, and the beet by others, we find the Jerusalem artichokes best for winter, and the succory for summer use.

* It is an indisputable fact, that hot or fresh dung is ruinous to tap rooted plants. Beets, carrots, parsnips, grow hairy, tough, and often forked, in contact with hot or fresh dung.

This last was brought over from France to England, by Arthur Young, as you will see in his travels through France, and some of the seed sent by him to General Washington, who spared me a part of it It is as productive as the lucern, without its laborious culture, and, indeed, without any culture, except keeping it clean the first year. The Jerusalem artichoke far exceeds the potatoe in produce, and remains in the ground through the winter to be dug as wanted.

A method of ploughing our hill sides horizontally, introduced into this most hilly part of our country, by Col. J. M. Randolph, my son-in-law, may be worth mentioning to you; he has practised it a dozen or fifteen years, and its advantages were so immediately observed, that it has already become very general, and has entirely changed and renovated the face of our country. Every rain, before that, while it gave temporary refreshment did permanent evil, by carrying off our soil, and fields were no sooner cleared than wasted. At present we may say, that we lose none of our soil, the rain not absorbed in the moment of its fall, being retained in the hollows between the beds until it can be absorbed.

Our practice is, when we first enter on this process with a rafter level of ten feet span, to lay off guide lines conducted horizontally around the hill, or valley, from one end to the other of the field, and about thirty yards apart. The steps of the level, on the ground, are marked by a stroke of the hoe, and immediately followed by a plough to preserve the trace. A man, or a lad, with the level, and two small boys will do an acre of this in an hour, and, when done, it remains forever. We generally level a field the year it is put into Indian corn, laying it in beds of six feet wide, with a large water furrow between the beds, until all the fields have been once levelled. The intermediate furrows are run by the eye of the ploughman. Governed by these guide lines, the inequalities of the declivity in the hill will vary in places the distance of the guide lines, and occasion gores which are thrown into short beds. As in ploughing very steep hills horizontally, the common plough can scarcely throw the furrows up hill, Col. Randolph has contrived a very simple alteration of the share which throws the furrow down hill, both going and coming. It is as if two *shares* were welded together at their straight side, and at a right angle with each other. This turns on its bar as on a pivot, so as to lay either share horizontally; then the other, becoming vertical, acts as a mould board. This is done by the ploughman, in an instant, by a single motion of the hand at the end of every furrow. I inclose a bit of paper, cut into the form of the double share, which, being opened at the fold to a right angle, will give an idea of its general principle. Horizontal and deep ploughing, with the use of plaster and clover, which are but beginning to be used here, will, as we believe, restore this part of our country to its original fertility, which was exceeded by no upland in this state. Believing that some of these things might be acceptable, I have hazarded them as testimonies of my great esteem and respect.

TH. JEFFERSON.

Tristram Dalton, Esq.

ACCOUNT OF PRODUCE OF MILK AND BUTTER FROM A COW, IN ENGLAND, FOR FIVE YEARS—ALSO, MODE OF FEEDING.

[From the communications to the Board of Agriculture.]

An account of the produce of milk and butter from a cow, the property of Mr. William Cramp, of Lewes, in the county of Sussex, for one season, commencing the first day of May, 1805, (that being the day she calved) up to the second day of April, 1806, a space of forty-eight weeks and one day.

BUTTER.	Number of Weeks.	Pounds per Week.	Quantity of Butter.	Sold at per pound. s.	d.	Total Value. l	s.	d.
From the 1st of May to the 7th of May kept no account; sold the calf	1					1	7	0
From 8th of May to the 25th of June	7	15	105	1	6	7	17	6
From 26th of June to the 10th of Sept.	11	14	151	1	6	11	8	0
From 11th of Sept. to the 29th of Oct.	7	12	84	1	6	6	6	0
From 30th of Oct. to the 3d Feb. 1806	14	10	140	1	6	10	10	0
From 4th of Feb. to the 10th of March	5	8	40	1	6	3	0	0
From 11th of March to the 24th of March	2	7	14	1	6	1	1	0
From 25th of March to the 2d of April, left off milking	1	3	3	1	6	0	4	6
	48	—	540	—		41	14	0
Deduct for butter sold in the month of August, 1*s* 4*d* per lb. only for 3 weeks						0	7	0
						41	7	0

Milk.

	Quarts per Day.	Quarts.
From the 8th of May to the 25th June	20	980
From the 26th June to 10th Sept.	18 1-2	1424
From the 11th Sept. to 29th Oct.	16	785
From the 30th Oct. to 3d Feb. 1806	12	1176
From the 4th Feb. to 10th March	11	385
From the 11th March to 24th March	9	126
From the 25th of March to the 2d April	5	45
		4921
The milk, being measured when milked from the cow, there must be deducted for cream		540
		4381

	l.	s.	d.
Four thousand three hundred and eighty-one quarts of skim milk, at one penny per quart	18	5	1
Made in the course of the season, four large waggon loads of manure, worth fifteen shillings per load, thoroughly rotten - - - - -	3	0	0
	62	12	1
Total expense - - - - -	21	6	2
Profit - - - - - - -	l. 41	5	11

Grains consumed the summer, twenty-six weeks, three and an half bushels per week, at 4*d* per bushel - - - - - -	l. 1	10	4
Bran, one and an half bushel per week, at 8*d* per bushel - - - - - - -	1	6	0
Winter, twenty-six weeks, grains consumed, eight bushels per week, at 6*d* per bushel - -	5	4	0
Bran, four bushels per week, at 8*d* per bushel	3	9	4
Half a hundred weight of hay per week, at 5*s*6 per cwt.	3	11	6
Rent of the land whereon were raised the lucern, clover, carrots, &c. - - - - -		15	0
	l. 15	16	2

Brought forward - - - - -	15	16	2
To the wages of a man, at the rate of fifty-two pounds per annum, supposing him to attend ten cows, the tenth part of which is - - - -	5	4	0
To the farrier for three drinks at the time of calving		6	0
	l. 21	6	2

The cow was fed with artificial grasses, sown on the following plats of ground within the walls of the prison, containing by measurement, as follows :—

	Rod.	Perch.
No. 1. A plat sown with red clover and rye grass, containing - - - - -	0	19
No. 2. A plat sown with lucern - - -	0	2
No. 3. do. sown with cow grass and white clover	0	17
No. 4. do. sown with red and white clover -		18
No. 5. do. sown with lucern - - -	0	10 1-2
No. 6. do. sown with carrots - - -	0	2 1-2
	1	29

The above crops of lucern were cut four times, and the clover three times, during the season, producing, each time, good crops. The cow not allowed to feed on the grass ground, but cut and given her in a rack in her hovel, where she has a plat of about eighteen square perches to range in. I kept but this cow, nor have I had any other since I had her. She is seven years old, and has had five calves; has been in my possession two years.

Consumed much less food this year than the year before.

Food and Treatment.

Summer season fed on clover, lucern, rye grass, and carrots, three or four times a day, and at noon time about four gallons of grains, and two of bran, mixed together; always observing to give her no more food than she eats up clean.

Winter season fed with hay, grains, and bran, mixed as before stated, feeding her often, viz. five or six times a day, as I see proper, giving her food when milking; keeping the manger clean where she is fed with grains; not to let it get sour; wash her udder at milking three times with cold water, winter and summer;

never tie her up; lies in or out as she likes; particularly careful to milk her regularly and clean. Milch cows are often spoiled for want of patience at the latter end of milking them.

One man would attend ten cows through the year, with the exception of an assistant at milking times. Feeding milch cows as above stated, they will, at all times, be in good condition for the butcher, if an accident should happen.

There will be no ground trampled and food spoiled by cattle running over a vast tract of land. I think cattle may be fattened by the same method of feeding, with much advantage; one fourth part of the land will feed them; a great quantity of manure be made, and the beast fattened much sooner. Cattle so fed have nothing to do, but fill themselves, and lie down to rest.

No labouring for their food. I fattened the two cows I had before this, and made them very good meat in seven weeks. I found it to answer, although I bought the food at a dear rate, giving them a little ground barley or oats, mixed with the grains or bran. I think that cows would nearly double in the course of the season their quantity of milk and butter, by following the above plan. It is unnecessary for a cow to go dry long before she calves. The thing will tell for itself; when the milk changes brackish, she should be dried off; that may be in three, four, or five weeks before she calves. Milch cows seldom go dry before, unless it is from neglect, poverty, sickness, or bad milking. Let the milk stand two days in summer, and three in winter before it is skimmed. I have stated only one penny per quart for skim milk; but I am informed, that it sells in the town of Lewes, for three half pence, it being worth one penny to put in the hog tub. I fattened two hogs in the summer, with no other food than skim milk and grains, making them very good meat, weighing sixteen or eighteen stone each, at eight pounds per stone. Where cows are kept in this way, hogs should be kept, as the milk will be in summer thick and sour, and fit for nothing else but hogs, the people of this country making no use of it as food.

The following is the pedigree of the cow in question, which I received from Mr. Holman, a respectable farmer at Bentley, in the county of Sussex.

The cow belonging to Mr. Cramp was bred by John Holman, (my father) at Bentley, in Framfield, in the county of Sussex, from a Sussex bred cow, also bred by John Holman on the same farm. She was got by a bull bred by Mr. Colgate, at Hamstead farm, in Framfield aforesaid, the father of which bull was also bred by Mr. Colgate, for which he received a prize cup at Petworth, on the 20th day of November, 1726. She was calved in March, 1799.

N. B. Mr. Cramp's cow calved on the 19th day of April; the calf in very fine condition; the cow having been dry for seventeen days only was taken bad with the yellows, at the very time of calving, but is now recovered and going on very well. The calf sold at twelve days old for *l.* 1 10*s.*

The following is the second years account of the produce of milk and butter from a cow, the property of William Cramp of Lewes, in the county of Sussex, for this season, commencing the 19th day of April, 1806, that being the day on which she calved, up to the 27th day of February, 1807, a space of time of forty-five weeks.

BUTTER.	Number of Weeks.	Pounds per Week.	Quantity of Butter.	Sold at per Pound.	Total Value.
From the 19th of April to the 2d of May, gave no milk, but what the calf sucked	2			*s. d.*	*l. s. d.*
From the 3d of May to the 23d of May	3	10	30	1 4	2 0 0
From the 24th of May to the 6th of June	2	10 1-2	21	1 4	1 8 0
From the 7th of June to the 3d of Oct.	17	12	204	1 5	14 9 0
From the 4th of Oct. to the 12th of Dec.	10	10 1-2	105	1 6	7 17 6
From the 13th of Dec. to the 6th of Feb. 1807	8	9	72	1 6	5 8 0
From the 7th of Feb. to the 27th of Feb. left off milking	3	6	18	1 6	1 7 0
	45	——	450	——	32 9 6

Milk.

	Quarts per day.	Quarts.
From the 3d May to 23d May	12	252
From the 24th May to the 6th June	14	196
From the 7th June to the 3d Oct.	16	1904
From the 4th Oct. to the 12th Dec.	14	980
From the 13th Dec. to the 6th Feb.	11	616
From the 7th Feb. to the 27th Feb.	9	189
		4137
The milk being measured, when milked from the cow, there must be deducted for cream		450
		3687

		l.	*s.*	*d.*
3687 quarts of skim milk at 1*d.* per quart	-	15	7	3
Sold the calf for	- - - -	1	10	0
Value of manure, four large waggon loads	-	3	0	0
Value of butter	- • - -	32	9	6
		52	6	9
	Total expense	21	10	8
	Profit	*l.* 30	16	1

Expense.

The same as in my last years return	-	21	6	2
An additional expense for farriery	- -	0	4	6
		l. 21	10	8

Having been taken ill with the yellows, at the time of her calving, she required the assistance of a farrier for three weeks. The complaint fell into the udder, and was, no doubt, the cause of her not giving so great a quantity of milk as she did the season before.

This complaint was very general among milch cows that spring, in this neighbourhood; many cows totally lost their milk, and some died of the disease.

I have stated this, because many persons have asserted, that I ruined my cow's constitution by milking her too long; and that she would never be the same again. The produce of milk was not so great as last season; but I have no doubt that was in consequence of the complaint, and from no other cause whatever. The produce of butter this season proves the milk to have been equally as rich as it was the former season; the quantity of butter being in proportion to the quantity of milk.

It will be observed, that the first fortnight she gave no more milk than what the calf sucked; and that she was not milked so long, by three weeks and one day, as she was the former season.

The third years account of the produce of milk and butter, from a cow the property of William Cramp, of Lewes, in the county of Sussex, for the season, commencing the 6th of April, 1807, that being the day she calved, up to the 4th of April, 1808, a space of time of fifty-one weeks and four days.

BUTTER.	No. of Weeks.	Pounds per Week.	Quantity of Butter.	Sold at per Pound	Total Value.
				s. d.	l. s. d.
From the 6th April to 20th April	2	6	12	1 6	0 18 0
From the 21st April to 1st June	6	18	108	1 6	8 2 0
From the 2d June to 5th Oct.	18	16	288	1 6	21 12 0
From the 6th Oct. to 30th Nov.	8	13	104	1 6	7 16 0
From the 1st Dec. to 8th Feb. 1803	10	11	110	1 6	8 5 0
From the 9th Feb. to 14th March	5	8	40	1 6	3 0 0
From the 15th March to 4th April, left off milking	2 1/2	5	13	1 6	0 19 6
	51 1/2		675		50 12 6
Deduct for 280 pounds of butter, sold at 1*s*. 4*d*. per pound only -					1 3 4
					49 9 2

Milk.

From 6th April to 20th April,	8	quarts	per day -	112
From 21st April to 1st June	22	do.	do. -	924
From 2d June to 5th Oct.	20	do.	do. -	2520
From 6th Oct. to 30th Nov.	15	do.	do. -	840
From 1st Dec. to 8th Feb.	13	do.	do. -	910
From 9th Feb. to 14th March	10	do.	do. -	350
From 15th March to 4th April	7	do.	do. -	126
				5782
The milk being measured, when milked from the cow, there must be deducted for cream -				675
				5107

Produce from butter - - -	*l.* 49 9 2
5107 quarts skim milk, at 1*d*. per quart -	21 5 7
Value of dung made this season - -	3 0 0
Sold the calf at 14 days old, for - - -	2 12 6
	l. 76 7 3
Total expense	24 14 2
Profit	*l.* 51 13 1

Expense.

Expense as in my last year's return - -	*l.* 21 6 2
An additional expense in consequence of the rise in price of grains and pollard - -	1 10 6
Ditto for ten sacks of malt dust, at 2*s*. 6*d*. per sack	1 5 0
To the farrier for five drinks at the time of calving	0 12 6
	l. 24 14 2

On trial, I found malt dust to be serviceable to the cow, giving her about a double handful at a time, mixed with the grains and pollard. I would not recommend a greater quantity. It may be complained by some, that they cannot get grains to feed their milch cows with: that difficulty may be removed by potatoes as a substitute, grinding them in a common apple mill, or pounding them in a trough. Then mix the pollard with them as recommended in my first report: potatoes are a very fine food for milch cows.

The cow calved the 23d of April; has a very fine calf, is in good condition, and going on as well as usual.

The fourth year's account of milk and butter, from acow, the property of William Cramp, for the last season, commencing the 23d April, 1808, that being the day she calved, up to the 13th of February, 1809, a space of forty-two weeks and three days.

BUTTER.	No. of Weeks.	Pounds per Week.	Quantity of Butter.	Sold at per Pound.	Total Value.
				s. d.	*l. s. d.*
From 23d April to 9th May	2 1-2	2	5	1 6	0 7 6
From 10th May to 6th June	4	15	60	1 6	4 10 0
From 7th June to 5th Sept.	13	14	132	1 6	13 13 0
From 6th Sept. to 7th Nov.	9	12	108	1 6	8 2 0
From 8th Nov. to 2d Jan. 1809	8	10	80	1 6	6 0 0
From 3d Jan. to 16th Jan.	2	7	14	1 6	1 1 0
From 17th Jan. to 23d Jan.	1	6	6	1 6	0 9 0
From 24th Jan. to 30th Jan.	1	5	5	1 6	0 7 6
From 31st Jan. to 6th Feb.	1	4	4	1 6	0 6 0
From 7th to 13th Feb. left off milking	8	2	2	1 6	0 3 0
	42 1-2		466		34 19 0
Deduct for 80 pounds butter, sold at 1*s.* 4*d.* per pound only -					0 14 0
					34 5 0

Milk.

From 23d April to 9th May,	3	quarts per day		-	51
From 10th May to 6th June	20	do.	do.	-	560
From 7th June to 5th Sept.	18	do.	do.	-	1638
From 6th Sept. to 7th Nov.	16	do.	do.	-	1008
From 8th Nov. to 2d Jan. 1809	12	do.	do.	-	672
From 3d Jan. to 16th Jan.	9	do.	do.	-	126
From 17th Jan. to 23d Jan.	8	do.	do.	-	56
From 24th Jan. to 30th Jan.	7	do.	do.	-	49
From 31st Jan. to 6th Feb.	6	do.	do.	-	42
From 7th Feb. to 13th Feb. left off milking,	2 1-2	do.	do.		17
					4219

Brought forward - - -		4219
The milk being measured when milked, there must be deducted for cream - - -		466
		3753
Produce from buttter - -	*l.* 34 5 0	
3753 quarts of skim milk at 1*d.* per quart	15 12 9	
Value of dung made this season -	3 0 0	
Sold the calf at 17 days old for - -	1 16 0	
	l. 54 13 9	
Expense as before	24 14 9	
Profit	*l.* 29 19 7	

N. B. There has been a doubt in the minds of some people, that I have overrated my skim milk at one penny per quart. According to the price of food in this part of the country, where I reside, I am still of the same opinion, that skim milk, at one penny per quart, is cheaper than any other food I can buy to feed my pigs; ground corn not being sold for some years past at less than 4*s.* 6*d.* or 5*s.* per bushel, weighing about 36 pounds. When I oppose 60 quarts of milk to a bushel of such food, I am fully convinced it would do more good than the bushel of corn.

No doubt in that part of the country, where corn may be bought for 2*s.* or 2*s.* 6*d.* per bushel, skim milk would there be of less value; but I have stated my price suitable to that part of the country where I am resident.

Gentlemen who live in Ireland, Scotland, Wales, and in the cheaper parts of England, will, no doubt, think skim milk very dear, at one penny per quart. I have seen it sold four quarts for a penny in Ireland.

The cow calved the 3d of April, has two very fine calves, is in good condition, and promising to do equal to any former season. She has been in my possession five years, and was ten years old last March.

The fifth year's account of milk and butter, from a cow, the property of William Cramp, for the last season, commencing April 3d, 1809, that being the day she calved, up to May 8th, 1810, a space of 57 weeks.

BUTTER.	Number of Weeks.	Pounds per Week.	Quantity of Butter.	Total Value. l.	s.	d.
Twin calves at nine weeks old, at 6 guineas	9			12	12	0
From 6th June to 3d July	4	17	68	5	2	0
From 4th July to 18th September	11	16	176	13	4	0
From 19th September to 13th November	8	14	112	8	8	0
From 14th November to 25th December	6	12	72	5	8	0
From 26th December to 26th February, 1810	9	10	90	6	15	0
From 27th February to 23d April	8	8	64	4	16	0
From 24th April to 30th April	1	7	7	0	10	6
From 31st May to 7th May left off milking	1	5	5	0	7	6
Note. Sold all the butter at 1*s*6 per pound.	57		594	57	3	0

Milk.

	Quarts per day	Quarts.
From 6th June to 3d July - -	24	672
To 18th September - - - -	22	1694
To 13th November - - -	18	1008
To 25th December - - - -	14	588
To 26th February, 1810 - - -	12	756
To 23d April - - - - -	10	560
To 30th April - - - -	8	56
To 7th May - - - - -	5	35
		5369
The milk being measured when milked from the cow, there must be deducted for cream - -		594
		4775

Four thousand seven hundred and seventy-five quarts skim milk, at 1*d* per quart - - *l.* 19 17 11

Value of new milk, exclusive of what the calves sucked from 3d of April to 9th of April, ten quarts per day, seventy quarts, at 5*d* per quart - - - *l.* 0 17 6

						l.	s.	d.
To 23d April,	8	quarts per day,		112	quarts -	1	8	0
To 7th May	6	do.	do.	84	do. -	1	1	0
To 21st May	4	do.	do.	56	do. -	0	14	0
To 4th June	3	do.	do.	42	do. -	0	10	6
						4	11	0

Amount brought forward - - - -		4	11	0
Value of dung made this season - - -		3	0	0
		84	11	11
Expense deducted as before - - -		24	14	2
Profit - - - - - -	*l.*	59	17	9

In my statement this season, I have given no account of milk farther than to 7th of May, although she was milked up to the day before she calved, she would not go dry; but the milk being brackish was fit for no use but the hogs. I do not perceive the least injury she has sustained by it; her milk came with the calves, and as soon and as plentiful as if she had been dry for two months, and her calves in good and lusty condition. She is now in as great perfection for the dairy as in any former season. It will be observed, that the cow produced a greater quantity of milk this season, but not a greater quantity of butter. This I cannot account for. It may be the having twins; nature ordered it so, that they might be sufficiently supplied.

It will be also observed, she produced a great quantity of milk besides what the calves sucked, and why not make butter? The trial was made, but in vain. The cream produced was small in quantity, and poor; and every trial to make it into butter, for many hours, was to no purpose. This strange circumstance I am quite at a loss to account for, as I always milked her myself, sometimes before the calves, and at other times after; but the milk I got, produced no cream sufficient in quality to make butter. *Query*, could the cow have a power of withholding the cream part of her milk from me, or could the calves have an art of sucking it.

In managing milch cows, after the manner I have described, difficulties may arise in the opinion of many people, but I think there are few difficulties, but what might be remedied. If grains cannot be had, there is no land but will produce potatoes: and they are an excellent substitute for grains, pounded in a trough, or ground in a common apple-mill, and then mixed with bran. Bran, also, would be a good substitute for grains, wetting it to the same state as grains, and then mix a little ground oats, or malt dust to separate it. Milch cows may be fed with turnips and cabbages, provided proper attention be paid in doing it. One meal a day of turnips or cabbages will not affect the milk, provided care be taken, and not give them any rotten or withered leaves. One rotten turnip or cabbage would do more injury to milk or butter, than a cart load of sweet sound food. I have often given my cow cabbage, without any ill effects whatever. I have sown rye and tares, which I find to answer; they will come rather sooner than lucern, if sown the first week in September. One gallon of rye is sufficient to mix with a bushel of tares. If the rye be sown too thick, it will overpower the tares, and injure them; but sown moderately thin, it will support the tares, and keep them from the ground. I have sown oats and red clover, and cut the oats before they came out in ear: the oats will shoot up again (if cut before they are in full ear) and the clover grow up with them, and produce a good second crop; the clover will be in full perfection the spring following. After the crop of rye and tares come off, lucern may be sown; and it will be fit to cut once the same summer, but not later than the middle of October. The lucern will be in full cultivation next summer, and will produce four cuttings the season. Lucern should be cut before it grows hard and sticky, or it admits waste, and loses much of its goodness.

Dairies of any size could be managed after the manner which I have laid down, in most of its rules; a dairy of ten cows would require a plat of ground of about a quarter of an acre to range in; twenty cows, half or three quarters of an acre; and so in proportion to the number. No land, but will grow artificial grasses and vegetables; and, no doubt, it would answer even to cut the natural grass and feed them. The object is the great saving; for less than half the land would maintain them. The cattle produce (in general) nearly double the quantity of milk and butter, and a great quantity of manure made. Where cattle are kept in this manner, the dung should be gathered up every day, and thrown into a heap. The land to be cut should be that which lies nearest to the yard where the cattle are confined, in order to save carriage. Where milch cows are allowed to range abroad for their food, they will never produce that quantity of milk, that they will when confined, let their food be ever so plenty; when they are not hungry, they will be searching after the sweetest spots of herbage, and thereby deprive themselves of rest. Cattle, when hand fed, will seldom refuse any sort of food, if properly attended; and no part of this country need be at a loss for provisions to feed them. Where grains and pollard cannot be had, milch cows should have a little nice hay (not heated) once a day, to keep them in a proper state, otherwise all green food would make them too loose. Often changing food is good for milch cows. I seldom give my cow two sorts of food following. I cannot be at a loss where there is so great a variety to be had, viz. rye and tares, lucern, cinquefoil, trefoil, cow-grass, clovers, natural grass, green oats, carrots, cabbage, turnips, grains, bran, pollard, hay, &c. &c. Thirty acres of land would be sufficient to produce food enough for forty dairy cows (if properly managed) including for hay; whereas, in the common mode of feeding, twice that number of acres would not do, and they would not produce above half the quantity of milk and butter. I think salting hay, when made into a stack for milch cows, would answer a good purpose. If salt could be had reasonably, about twenty pounds to a ton of hay, shaken regularly over every layer, by the makers of the reek or stack, would cause thirst, and thereby increase milk. The quantity of food milch cows will consume, it is not easy to ascertain; they should have sufficient, but not to commit waste. Cattle should not be over fed, so as to be surfeited; little at a time, and they will eat their food clean. I feed my cow six or seven times a day.

LETTER FROM N. HAMMOND, ESQ. TO HON. J. QUINCY.

Easton, (*Maryland*,) *April* 11, 1817.

SIR,

YOUR very polite and obliging letter of the 5th of March was received during a state of indisposition, from which I have lately recovered. In a different situation, the attention which it merits would have been promptly given, and the honour it confers immediately acknowledged.

The publication of my experiments on the culture of Summer Wheat, was intended for no other use than that which is declared. It was thought respectful to account to you for the result of those endeavours which you had enabled me to employ; and if the engagements, which pressed me about the time the narrative was prepared, had not prevented, I should have forwarded it to you in a different form. But as you have been pleased to accept it as it is, and the trustees have expressed a desire to insert it in their next number, I cannot but submit to this flattering compliment, and yield to their discretion

I very sincerely thank you, Sir, for the specimen of Spring Rye which your letter enclosed. The size, brightness, and beauty of the kernels exceedingly surpass every thing of that kind I ever saw before. They have been carefully planted in the garden and shall be attentively cultivated. I anticipate great advantages from the culture of it.

The pamphlet you forwarded also arrived safely, and has been read with satisfaction. The cultivation of plants in drills, and the substitution of other spring crops in the place of Indian corn, are propositions which deserve to be very seriously considered.

It has long been my wish to cultivate my grain crops in drills: but the plans which have been seen of the instruments for this purpose appear to be so complicated and expensive, that, considering the smallness of my farm, it has not been deemed advisable to procure one. Observing, however, that the trustees of your society possess information upon the subject of these machines, which they offer to afford, I am induced to request such a description of the simplest kind as may enable a workman here to make one; if a description with this view may be properly granted.

It is observed that you have used this husbandry with remarkable success in the culture of carrots. There is not indeed a more valuable root; and in general there is none whose growth is more certain even in unfavourable seasons. I have cultivated turnips in the same manner with much advantage; but, if you will permit me to suggest it, there is reason to believe that manures *in the drill* will have a sufficient effect upon the growing crop, without spreading it over the ground; and if this should be true, a great deal of manure may be saved. When the ground is prepared, the drill may be made with the plough drawn forward and backward six, eight, or ten inches deep. This operation will open the trench sufficiently; and the manure may be put in the trench and covered up with the hoe: in due time the seed may be sown upon the drill. It is perhaps advisable to lay the drills three feet apart for the great convenience of dressing the plants with the horse-hoe; and in the cultivation of summer plants this mode of working them probably forms a sufficient ridge without the trouble and delay of forming them originally.

I have the honour, &c.

N. HAMMOND.

EXPERIMENTS UPON SUMMER WHEAT, SUBMITTED TO THE FARMERS OF TALBOT COUNTY, MARYLAND.

The author of this address, in the summer of the year 1815, read in the publick papers some letters and observations upon this article, which were published by the trustees of the Massachusetts Society for promoting Agriculture. The account given of the useful culture of it in the neighbourhood of Boston engaged his attention; and he became desirous of making a trial of it here. It had long been believed that the inclement and changeable weather during our winters and springs had materially injured the common crops of wheat; and it was thought that if the summer wheat could be successfully cultivated among us, it might be used to repair the losses so frequently sustained from them, and therefore allow the farmer with great convenience and advantage to reserve a portion of his fallow field for this object in the spring.* In this case he might sow a smaller parcel of the common wheat in the fall, and at an earlier period; and be sooner prepared to attend to the gathering and securing of his corn: and the ground intended for the summer wheat, by remaining exposed to the action of the frosts and thaws during the winter, might be improved, and better managed for the reception of a crop in the spring.

With these reflections, the author concluded to procure a small quantity for the purpose of making an experiment. Notwith-

* The usual grounds, in which the farmers of this county sow their wheat, are the fields cultivated in Indian corn during the preceding summer; though some prepare a field *in fallow*: but those, who do this, also sow their corn-fields in wheat: so that, for the purposes of fall wheat, their grounds may equally be called "fallow fields."

standing his early efforts to obtain it, the arrival of it was very much delayed: he, however, received a barrel of it on the 2d of March last, with some directions for its culture. It was said that it might be sown during any time in April; but an opinion was expressed in the directions that the sooner it could be sown in the spring, the better. He resolved to sow a part of it as soon as he could in March, and the residue as soon as he could in April. The appearance of the wheat was not agreeable. It was browner than the red wheat, considerably shrivelled, and much mixed with rye and barley; and it came so late that there was not time to separate these grains and clean the mass: it weighed fifty-seven pounds the bushel.

The lot selected for the first crop had been cultivated in Indian corn in the year 1814, in oats in the spring of 1815, and in turnips in the succeeding fall: it was consequently pretty clean, and moreover was lightly manured for this project, and in good order. It consisted of ridge and bottom; the ridge light, but not sandy; the bottom stiff but drainable: it was ploughed up on the 8th of March and once dragged over; but the bottoms being rather too moist, the ground was left exposed to the sun and wind with a design to drag it over again before the seed was sown. In the mean time the wheat was well washed and skimmed, and in the evening was put into the drainings of the dung heap to steep. It became so cold and the earth so frozen, that nothing more could be done till the 11th; when the lot was dragged again, the wheat sown, and harrowed in; but before the work was completed there fell a moderate snow which further embarrassed our labours. The lot contains about an acre and twenty perches of land, and one bushel and three pecks of wheat were sown upon it. It was intended that the roller should be carried over the ground immediately; but such was the wetness or frozen state of the ground, that this operation was not performed till some weeks afterwards, when the wheat had obtained some growth, and was probably much improved by it. It first appeared on the 28th of March; and in a very tender state sustained some severe frosts: the shoots became even yellow; but it is believed they received no injury. From the time it was sown till the 11th of April, the ground received many rains and frosts; but from that period till the night of the 14th June, such a series of dry and cold weather succeeded as will be long remembered. The wheat, however, progressed; and on the 15th July it was cut with a scythe and cradle. The rye over topped the wheat, and had been all cut out: the barley, being low, could not be so easily severed. As the wheat headed, several ears were affected by the smut in the usual way: but many ears were infested by it in a more advanced state, and when the grains were formed; and assumed a very unpleasant appearance; but as these grains dried, they crumbled into powder; so that upon treading and fanning the wheat, all the grains appeared plump and sound. The produce of this lot was twenty-four bushels; which, recollecting the nature of the season, may be considered a very good crop. The dryness of the weather prevented much perceptible difference in the wheat upon the ridge and in the bottom; though, generally, the crops here have succeeded best in the lighter grounds.

The piece of ground selected for the second crop had been cultivated in Indian corn the preceding year, and had lain exposed to the action of the winter: besides the corn-hills, a part of it had been well manured. It was in general a plain, and rather low stiff ground, but capable of being drained. It was ploughed up on the 1st and 2d of April and dragged over: it was dragged again on the 3d, and the wheat sown: it was then harrowed in and the roller carried over it. The ground was in good condition, and all the operations were well performed. The land measured off contained seven eighths of an acre and six perches, and nine gallons of wheat were sown upon it. It was washed and steeped as the other had been, with the addition of soot. A heavy rain fell upon it on the 11th, which was all it had that could be very serviceable till the middle of June: it began to appear on the 14th; but throughout its growth this crop never looked well. The Hessian fly was sometimes suspected, and many searches were made for it; but it was not ascertained that the wheat was affected by it. Some have supposed that the first crop succeeded better, not merely because it was planted sooner, but because, having had many rains, it was better *rooted* before the dry weather began. This crop was gathered on the 29th July, and produced only eight bushels, and inferiour in appearance to the other.

The summer wheat is low, well headed, and bearded: it does not shatter in cutting: the grains are dark; and though they continued plump for some time after being threshed and cleaned, they are now much shrivelled; but appear superiour to the seed which produced them. The straw is soft and tender: as the quantity was not worth the trouble of a rick, it was immediately carried into the loft and delivered to the horses. Though they had been using good hay, they fed upon the straw with apparent satisfaction; and it was continued to them till it was consumed. The bread made of it is not white; but it is sweet and excellent. It weighs sixty pounds the bushel. Whether, being now a native among us, it will answer better on another trial, will probably be decided the ensuing season. It is the belief of many experienced farmers, that *smut* may be prevented by the use of *pickle*; and under this impression the next experiment shall be made with that precaution. It may also be observed, that the ploughing of the ground in the spring for this crop may have the same effect upon the wild garlick, which is experienced from the culture of oats; and it is certain that no garlick appeared in the crops of which this account is given, though the lots are subject to it.

In this detail there is nothing exaggerated: it is published for the sake of calling your attention to a new article of husbandry, and of contributing something to your amusement: and with this motive it is hoped the length of the narrative will be excused.

St. Aubin, February 10, 1817.

ON THE HOOF AIL.

[Communication from Hallowell, District of Maine.]

WHAT is the exciting cause of this malady, does not appear to be known. The immediate occasion of it is a stoppage of the issues between the claws or hoofs, which exist in all ruminating animals; and which are very much like the issues so generally known in the back part of the fore legs of pigs; the stoppage of which produces disease, and eventually death, unless remedied.

The hoof ail indiscriminately attacks thin and fat cattle, and very considerable impressions are entertained that it is contagious; therefore, until the contrary is proved, it is safer so to consider it. From a very careful comparison of cases (from memory only) it appears to affect cattle who are in a feverish state, from various exciting causes; as over work; sudden changes from hard work to rest and higher feeding (a practice very common with farmers after working their cattle hard all winter, as a preparation for their spring's work;) being out in a storm; or being driven much, and kept long in the mud. In cows and young cattle, it seems to take either those that are brought from worse keeping, to better; or the finest and best cattle in the yard. But all these observations may be erroneous; for the disease often appears suddenly, without any apparent cause; affecting individuals of the same stock tied in different parts of the barn, and in entirely different cases as to condition, exposure, &c. &c. It, however, very frequently goes through a whole stock, though it does not appear to follow in regular succession according to proximity in the stable, or in the yoke. This may arise, either from contagion or the same exciting causes, operating on the whole. In short, it is a disease very terrible in its effects at times, and which does not appear to be understood. As very few cases of perfect recovery take place in a violent attack, and, as in all cases, the recovery is very tedious, we should rather *prevent* than *cure;* for which end, we must carefully watch for the symptoms, and without any delay apply the remedies.

Symptoms. When an animal is at all lame, its foot should be very carefully felt. The first indication is usually an uncommon degree of warmth, and a soft and puffed feel of the parts immediately connected with the slit between the hoof, either before or behind the foot, and, generally, just above it. If in the hind foot, and not easily handled, a fulness may generally be perceived, by standing behind the animal and carefully comparing the appearance of the two feet, between the dew claws and the hoofs (for it very rarely commences its attack in more than *one* foot.) In the fore foot, it generally swells forward; and on taking up the foot, the slit between the hoofs will have an appearance of dryness, easily distinguishable to a person used to cattle; and the animal frequently licks the front part of the foot. Instances often occur of sudden and extreme lameness, without any appearance of heat or swelling in the foot; and these are often the worst cases; but one symptom rarely fails to accompany the disease, which is, extreme restlessness and appearance of anguish, attended with loss of appetite and flesh; but without, in the least, affecting the brightness of the eye, and, perhaps, sometimes unnaturally increasing it; but the eye has a peculiar cast. As a general rule, it is safest to attribute all lameness of the foot, which cannot be traced to a sufficient cause, to the hoof ail. Lameness of the foot can generally be distinguished from that of the leg, hip, or shoulder, by making the animal step over a stick or rail, and carefully watching its motions.

Remedies. The foot should be carefully washed and cleaned, and thoroughly examined, to be sure that the lameness does not arise from a nail casually run into the foot, or a prick in shoeing, or from a wound from a stump or other substance between the hoofs (a case frequently occurring.) If no appearance occurs of any break in the skin, while the foot is still wet, apply, as nearly as may be, to the centre of the slit, between the hoofs, from one to three grains of corrosive sublimate (reduced to a fine powder) the dose to be proportioned to the size of the animal and the violence of the attack. Care must be used, that the powder is put completely into this slit, for it is a very strong poison, and the animal, as soon as at liberty, will begin to lick the foot, if a fore one. The moisture left by the washing, makes the powder adhere; and the effect is produced in a very short time. Some prefer mixing the powder with hog's lard, which answers; but it is thought less powerful: it has one advantage, however, as being less dangerous to keep in a house (for no one takes salve inwardly.) Where corrosive sublimate cannot be obtained, any other violent stimulant may be applied. Common salt is often effectual in very slight attacks; but it is of the greatest importance to lose no time. The application is to be repeated once every twenty-four hours, till a cure is effected, or till the foot shews unequivocal signs of a gathering which will break. It is supposed, that the corrosive sublimate, by stimulating the parts, removes the obstruction, and enables nature to resume the natural discharge from the issue, of a matter, which (as soon as pent up in the foot) causes inflammation and suppuration, and, at last, forms an abscess, at all times very difficult to heal, and which, when large, *takes off one or both hoofs, which are never perfectly replaced.* It must, therefore, be considered as an object of the first importance to restore the secretion and discharge, without allowing a suppuration. This done, the cure is effected, and, since this course has been followed, no bad case has occurred in a very considerable stock of cattle, and the men attending them are quite familiar with the cure. If, from want of attention, or the violence of the attack, the gathering is formed and breaks, it must be treated like any other tedious ulcer, and without any violent or harsh measures. The animal should be kept quiet, fed well, and occasionally purged. As soon as the discharge has ceased, a salve of flowers of zinc and hog's lard appears to be the best dressing.

It cannot be too strongly impressed on the minds of those who have the care of cattle, that not a moment is to be lost; and that the corrosive sublimate produces no other inconvenience than pain for a few minutes, even if it should be applied in a case of lameness, which afterwards proves to have arisen from other causes.

An account appeared last season, of the cure being effected by cutting off the point of the hoof with a chissel, till it bled considerably. Of the efficacy of this remedy, no opinion is given, as it has never been tried here; but the impression is not favourable, as it must occasion temporary lameness, and, in unskilful hands, prove something more than temporary.

All such barbarous modes of treatment, as hair ropes drawn backwards and forwards between the hoofs; hot irons; cutting out the part affected, and pouring into the wound so made, hot pitch and other ingredients; scraping out the wound, and applying spirits of turpentine: in short, all remedies of torture, should be at once discarded, and a simple mode of ascertaining the cause, and then removing the evil in the most expeditious and humane manner, be substituted.

No inconvenience is known to occur, from keeping an ox at work, if the lameness is not so great as to impair his condition; and it generally yields to the three or four applications in the foot where it began; but frequently it must be followed round all the feet in succession.

The disease seldom attacks cattle that are *not* worked, till after they have been at grass ten days; and is more frequent towards spring, than at any other time. An ox that has had it badly once, is subject to returns; and the butcher is then the best doctor.

STRAW CUTTER.

Pittsfield, Jan. 29, 1817.

DOCTOR AARON DEXTER,

DEAR SIR,

When I last had the pleasure of seeing you I intended to have asked you to favour me with two or three numbers of the Agricultural Repository, which contain a description of Hotchkiss's Straw Cutter. In No. 4, of Vol. III. you merely allude to this valuable invention. In the next number you state at large your opinion of it, and the premium awarded him. This useful machine is getting into general use. It has employed a large number of mechanicks in erecting them. They are becoming common here, and are erecting all over the state of New York, by enterprising young men. Several valuable improvements have been made. And to day I have examined two new inventions, on the same principle, but differing in form, and cost about half the sum. I think these promise to be more useful, than Hotchkiss's, being more simple and less expensive, and cut faster. I discovered soon some small defects, and suggested them to the inventors. When they are made perfect for work, I will forward you a description of them. They contain double the knives, and must cut rapidly. In one, the knives are secured to a wheel, placed horizontally, and the knives at an oblique angle of about 45 degrees. In the other, the knives are fastened to a wheel like Hotchkiss's balance wheel, only larger and firmer, and turn in a circle, and the knives are inclined to a circle, which makes them work easy and fast. This is, indeed, the age of invention.—There is no limit to the efforts of genius. We have seen with no ordinary satisfaction, your notice for another anniversary meeting at Brighton, and your premiums. They are liberal, and well selected. I hope to have the honour of witnessing your display, if I can get through in season with our meeting here, which precedes yours a few days. Next month we shall publish our notice and premiums. So limited are our funds, that we can offer no pecuniary excitements equal to yours. We must effect our purposes with less means, and stronger appeals to ambition and the love of distinction. Great exertions are making in the state of New York and elsewhere, to arouse our countrymen to a sense of their present condition, and the necessity of eliciting their own native resources, and making their fruits the chief dependence for removing the pressure of the times, and the only safe substitutes for the loss of foreign commerce and navigation. The policy now attempted, is to increase the means of a most extensive and active coasting and inland traffick. This looks well, and I think merits a great and united effort. It must succeed—it is our only safe reliance. The Berkshire Society have been called on to take a lead in this enterprise.

I am Sir, with cordial esteem and respect,

Your humble Servant,

THOMAS GOLD.

ON THE USE OF SEA SAND MIXED WITH OTHER EARTHS. —POTATOES PLANTED LATE, AND WHICH HAVE NOT HAD TIME TO RIPEN, BEST FOR SEED.

Saco, May 23, 1817.

HON. JOSIAH QUINCY,

SIR,

HAVING of late paid some little attention to agriculture, and having to cultivate some low flat land, infested with what is called the wire worm, a small red worm, about an inch long, the bigness of a large needle, which I observe is complained of in many parts of the commonwealth, I am persuaded, from experience, that sea sand, put under corn or potatoes with manure, or spread on the land, will go far, if not wholly to the total destruction of those destructive worms, on which nothing else seems to have any effect. It has a beneficial effect spread on land before ploughing, or even after land is planted with corn or potatoes;

not only to destroy the wire worm and other insects, but to increase the crop. With my neighbours a load of sea sand is considered preferable to a load of their best manure, to mix in with their common barn manure, or to spread on their gardens and low flat land.

One thing more I will mention for your consideration, which is, that late planted potatoes, which are gathered in before ripe are far the best for seed the next year. If kept in a dry warm place in a cellar, they will be much earlier, and likely to produce more abundantly the next year, and will be as good for use the following spring, though they may not be so good in the fall. The last season, I planted a patch of low flat ground with potatoes the seventh day of July, which came up and grew very well, until about the last of September, and endured several severe frosts without injury, until the three very cold nights, the last of September. The first of which they felt but little; the second, they felt more severely; but the third they were cut down. The potatoes were dug the last of October, and produced the largest and most from the hill, of any I raised the last season by far. I have planted some of the same this spring, and find they came up some days sooner than others of a more early kind. Late planted potatoes will endure frost better in the fall, than those planted more early. The above potatoes were put into an arch, under a fireplace, where fire was kept during the winter. They began to sprout by February, and though much sprouted by the first of May, taking off the sprout-end to plant, the remainder was, notwithstanding, perfectly sound and good for use.

If the above information should be deemed by you worthy of consideration or publication, the whole, or any part, I shall feel myself highly compensated for my labour.

While I remain, with due respect,

Your humble Servant,

WM. MOODY.

RESULT OF SOME EXPERIMENTS IN BURNING CLAY FOR MANURE, IN A LETTER TO THE BATH SOCIETY IN ENGLAND, BY THE REV. W. WILKINSON.

[The following narrative of an experiment in burning clay for manure affords a valuable addition to our stock of agricultural knowledge. Wherever clay and fuel abound, a good manure may be had in abundance at a cheap rate. Mr. Wilkinson's letter will be read with the more interest, and his example followed with the greater confidence, as he has manifested a wish not to raise unreasonable expectations, and recommends his practice rather as a means of supplying a deficiency of other manures, than as a substitute for them where they can be had in sufficient quantity at a moderate price. He states, however, that in two instances where he made trial of the burnt clay on one portion of a field, and barn manure on another, the crop from the former was quite equal to that from the latter. We are led to infer from his statement, that where fuel is cheap, or of no value for the market, the profit from the use of burnt clay will be greater than from any other species of manure.]

[Bath Papers, vol. 14th.]

GENTLEMEN,

I have been led to believe that the result of some experiments, I have had in my power to make, in the burning of clay, and in the use of clay ashes as manure, may be acceptable to the Society.

In the year 1815, a tenant threw up a farm belonging to me at Woodbury, in Cambridgeshire; and I was induced by many circumstances to take it into my own occupation. The farm is of very considerable extent, and chiefly under the plough; the soil a cold, stiff, tenacious, clay; it had been over-cropped for a long series of years, without a proportionate return of manure; and it is so situated, that no quantity of manure is to be purchased in the neighbourhood. It became my object then to raise as much manure as possible on the premises; and having by accident seen Mr. Craig's letter on the burning of clay, I conceived mine to be a soil well suited to the practice. I accordingly, after some correspondence with that gentleman, made my first experiment in September, 1815. Having marked out a space of fifteen feet by twelve, I excavated it one foot deep, and with the soil thrown out made a wall around the space. At each corner I made an air pipe, (each pipe made of sods) extending only two feet into the enclosure in a diagonal direction. In the centre of the enclosure I placed upright the but end of a large tree, around which other fuel was placed, covering the bottom of the whole space within the wall. The fuel consisted of straw, bushes, large billets of wood, and dry roots of trees. I then put dry turf over the whole surface, which again was covered with a thin coat of clay, newly dug up, except a small hole by which the fire was introduced. The fuel being dry, the fire spread rapidly, and it required the active exertions of two men to smother the flames as they burst out. They used for this purpose dry turf, which they immediately covered with clay. During the first two or three days the surface of the heat occasionally sunk in places, and apparently grew cold; into these places fresh fuel was put, care being taken to make but small openings; and I may here remark, that this operation should be done as speedily as possible; for external air let into the heap after it was once fairly on fire, seemed to do mischief.

It now burned well and evenly over the whole surface, for several days; each covering of clay crumbling to ashes in an hour or two after it was put on. This heap was on fire twelve days, and was constantly attended in its progress by two men, from four o'clock in the morning till nine at night; when a thicker coat of clay than usual was put on: one of these men was chiefly employed in digging the clay, the other in wheeling it (only a few yards) to the heap and throwing it on, sometimes by hand, and sometimes with a spade. This heap I afterwards found contained thirty-seven cart loads of ashes; and as my farm lies nearly level, and the distance of transportation small, the carts were well filled.

In the spring of this year, 1816, I burned another heap, which was found to contain forty loads of ashes; and during the summer I burned two more heaps, the one contained seventy-two loads of ashes, the other about fifty-five loads.

I never had more than two men and a boy employed at once; and my bailiff having kept an exact account of the expense attending these experiments, I am enabled to state that, on the average, the cost was about 1*s*.6*d*. the cart load. In this calculation nothing is charged for the fuel, having plenty of bushes and offal wood on the premises; a value, however, was put upon it as it was used, and 3*d*. or 4*d*. a load may be added on this account; I may, therefore, say that the whole cost was 1*s*. 9*d*. the cart load.

I will now add a few general remarks, which may be useful to any one who may wish to burn subsoil. The fire appears to spread upwards most readily, and the heap grows first cold at the bottom, and towards the walls; for I seldom remarked that the fire penetrated through the walls. As my experiments were made in different parts of the farm, there was a slight variation in the soil; and I observed that, where the clay had no mixture of gravel or stones in it, it burned the best; and I always thought it crumbled quicker when it was put on newly dug up. Summer is certainly the best season for this operation, chiefly on account of the short nights, which permit the heaps to be watched with more ease. Moderate rain does but little harm to the fire; high winds are infinitely more destructive to it. I do not think the clay loses much in quantity by being exposed to the action of fire; but it certainly decreases in weight. Wood is supposed to be the best kind of fuel, coal requiring too much air to promote combustion.

It now remains for me to give what information I am able, in regard to the beneficial effects of clay ashes as a manure. The heap of ashes I burned in the autumn of 1815 was used early in this year to manure an acre and a half of land, part of a much larger field. A part of the same field had been folded late in the last year with sheep, and the remainder was manured with very good yard dung. The whole field was cropped with barley; and either from the seed being ploughed in too deep, or some other cause, the crop was not a very good one; but I may truly say, that the part manured with ashes was better than that dunged: the part folded was evidently the worst. The same gradation may now be observed in the clover; the seed of which was sown soon after the barley.

The greater part of the heap of ashes I burned this spring was used in the beginning of June to manure an acre and a quarter of land, in the middle of a field of five acres, the remainder of which was manured with the best yard dung. The whole was sown towards the middle of that month with red-rind turnip seed; a Northumberland drill was employed to deposit the seed; the distance between the ridges being two feet and a half so as to admit the horse hoe. The crop is a very good one indeed, many of the turnips being twenty-six inches in circumference; and one which I had taken up and weighed, was twenty-nine inches in circumference, and weighed eleven and a half pounds. I do not perceive that the part manured with clay ashes has at all an inferiour crop on it to the rest of the field; my bailiff, indeed, remarked, that on the plants first coming up, he thought those on the clay field the best.

From this heap of ashes six loads had been reserved, which were thrown, the end of June, over somewhat less than a quarter of an acre of rough grass land; and it is perceptible that the sheep during the summer, have eaten that part of the field more closely than the rest of it.

The two heaps of ashes I burned during the summer containing together one hundred and thirty loads, have been used the last October, to dress six acres of land, which had been got into a good tilth by a naked fallow; the ashes were first spread, the wheat seed was then sown, and they were lightly ploughed in together. The rest of the field, in which these six acres lie, had been folded with sheep on a naked fallow, and was sown with wheat about the same time. I left my farm about ten days ago, when the young wheat was just come up; and it appeared full as thick on that part of the field manured with the ashes as on the remainder of it.

I have thus, in the course of a year, burned upwards of two hundred loads of ashes, and manured nine acres of land, at an expense, fuel included, of about 18*l.*; and I am so well pleased with the result of these experiments, that it is my fixed intention to burn clay, to a much greater extent, during the next year.

Having brought my communication to a close, I may be permitted to say, that the practice of burning subsoil is not altogether novel; Lord Halifax and others practised it in the beginning of the last century; and successful experiments of the same nature have been made from time to time, until Mr. Craig, of late years, has introduced the practice into the southwestern parts of Scotland. It is now to be hoped that being better understood it will become more general. I take the liberty, however, of recommending to those gentlemen, who feel inclined to burn subsoil, to consider, first, the fitness of their soil for the purpose; and whether or not their situation affords a facility of procuring other well known manures; for, as this practice is not unattended with expense, it must always be a matter of calculation, whether other manures cannot be procured cheaper. I would lastly recommend to them, if they do make the trial, not to be content with a single desultory experiment, which from many causes may possibly fail. My own success, in the first instance, I attribute to having a plentiful supply of dry fuel on the spot; but chiefly to the repeated instructions of Mr. Craig.

ON ADAPTING PLANTS TO THE SOIL, AND NOT SOIL TO THE PLANTS.

BY MRS. AGNES IBBETSON.

[Whether a soil be good or not, depends on the character of the plants which are to be placed in it. Some of our most common esculent vegetables, as the carrot and turnip, flourish better in a sandy soil than in a rich garden mould. The soil which, in France, produces the most delicious grapes, and those from which the choicest wines are made, is far from being rich. The finest water melons have been discovered growing in the sandy deserts of the middle latitudes of Asia. That soil, it may be said, is richest which affords the greatest quantity of sustenance to vegetation; but it is to be considered, that those plants which grow best in dry, light soils, are so constituted as to derive a considerable part of their nourishment from the atmosphere, and, of course, do not require much moisture in the soil.

The object of the following communication, extracted from the Bath Society's Papers, is to draw the attention of farmers to the character of the soils which compose their farms, and to a more careful selection of plants best suited to them. The neglect of this leading feature in good husbandry, is stated to be a fault prevalent in England. Is it not quite as prevalent in this country? This is a question well deserving consideration, and it would be highly gratifying to us to learn from the different parts of our state, how far the intelligence of our husbandmen has enabled them to anticipate the information contained in the subjoined article. One of the first and happiest consequences of attention to this subject, would be the introduction of a greater variety of field crops, by the addition of some, which, in Europe, have succeeded well, and are found profitable, from the care taken to give them their proper exposure and appropriate soil.

It still remains to be ascertained, whether some of the diseased appearances on plants, which are sometimes attributed to insects, and respecting which, our knowledge is conjectural, are not ascribable to the injurious effects of improper soil.]

[From the Bath and West of England Society's Papers.]

TO THE SECRETARY,

It has long been my intention to address a letter to that Society, who several years past honoured me with what I considered as the *most flattering* and highest proof of their approbation: but constantly occupied in dissecting and studying *the nature of plants*, I was perpetually prevented fulfilling my wishes; but within the last few years, having endeavoured to draw *results* from the *dissection* of vegetables *applicable* to *agriculture*, and having the use of a pretty large farm to assist theory by practice, I shall, with the greatest pleasure, dedicate my future services where gratitude should lead me to offer them, if any thing I can write can possibly be acceptable to so eminent and learned a Society.

I have been lately much employed in endeavouring to shew that all plants should be divided, disposed, or placed, according to the different soils, congenial to their habits, from which they originally proceed; and that it is to the total inattention to this circumstance, that we probably owe the very strange and contradictory results constantly to be found in all agricultural reports. No person can read with attention the late accounts delivered to the House of Commons, respecting the growth of corn throughout this kingdom, without being struck with the contradictory returns transmitted of the whole; and without being convinced, that there must be some hidden cause for such a strange diversity in the gains of the *farmer:* as there are many instances adduced, in those reports, of the same excellent management, where the same seed has been sown, an equal degree of labour performed, with the same *season, time, and manure* employed, and one farmer has gained three times as much again as was expended for putting in the crop, while *another* has scarcely exonerated and repaid himself for the labour and seed: what then could be the cause of the loss of the latter, and gain of the former? It must, I am convinced, be attributed chiefly to the agreement or disagreement of the plant with the soil in which it is placed, its situation, and aspect; three things, of which the farmer knows but little, or ever takes into his calculations. He has but one way of putting in plants, *loading the earth with manure*. But to adapt the plant to the soil from which it originally came, to *suit* also the *manure to both*, that they may exactly agree, and not injure the vegetable; that the situation of the plant may be consulted, with respect to humidity and dryness; and that, to complete the whole, the *aspect* also may be fitted, so that the plant that *loves* the *sun* may be exposed to it, while that which prefers shade may receive it:—these are attentions truly wanting to our agricultural system, as I hope to shew.

It has been a subject of considerable inquiry among agriculturists, as in what consists the food of plants. Some have attributed it to water, some to earth, and others to air. To all these sources vegetation is indebted; the fertilising principle of all manures is referable to the extractive matter arising from decomposed animal and vegetable recrements, and in this state soluble in water, which is the carrying medium into the vegetable substances. Vegetables will not grow in pure earth, or pure water; some plants are so organized as to require only mechanical support from the soil, abstracting their nourishment from the atmosphere by means of their leaves; whilst others from their roots depend upon the soil for their support. Although many plants will grow in different soils, yet they have all their favourite ground; and it is more easy to accommodate the plant to the soil, than to adapt the soil to the plant. By knowing, therefore, what sort of plant the farmer is going to put in, he may of course be regulated with respect to the quantity and species of manure required, the aspect wanted, and the degree of humidity and dryness requisite for the plant. All plants came originally from a peculiar earth; either from clay, sand, gravel, chalk, or loams formed from a mixture of some of these, or from a very wet or dry soil; and though many plants will grow indifferently in several species of earth, yet they have all their favourite ground, *that* which they *evidently prefer*. Now to make the soil fit for the plant, is certainly a very expensive thing; but to adapt the plant to the soil is not only an easy, expeditious mode, but one which requires infinitely less assistance in dressing, labour, seed, and care of every kind. It is true that all cultivated plants demand some manure, because nature gives not salt and oil *enough*, in *any earth*, to do without *some assistance* of this kind; but the plant that is natural to the soil requires infinitely less than that which is adverse to it, and may therefore be cultivated at a quarter of the expense. Now nature is so bountiful, that there is scarce a plant necessary to the food of man and animals, that, if we choose to seek it with care, has not *one peculiar sort* calculated for *every soil*. Thus in clovers, there is a sand clover, a clay clover, a gravel, and a chalk, clover; one that grows well in rich lands; and one that would be ruined in a good soil, and can grow and do well only in a poor one; one that will not endure moisture, and one that only grows in wet land; one that prefers hills, and one that will grow in valleys alone; one that likes the sun, and one that covets shade. Nature has been equally bountiful in most other plants peculiarly adapted to *agriculture*, and in which there are *quite as many species* fitted for *poor land*, as for *rich ones;* and, if planted in their own soils, give an infinitely *greater return*, and are not subject to those *dreadful disorders* but *too common* to plants placed in improper ground. I have repeatedly traced maladies arising from this source, that afterwards tainted the very means of life in a vegetable: and being constantly accustomed, when I heard of any extraordinary crop, to proceed to the place, and inquire thoroughly into the cause and management made use of by the farmer, I have generally found the success to proceed from accidentally putting the plant into that ground from which it originally issued, and manuring it according to the quantum of juices it received from the earth, and with that matter likely to form a proper compound adapted to its wants; in short, attending to the right rules of vegetable economy, and the common process of nature.

But I am sorry to say, that, in examining innumerable farms, *diversely situated*, I have but too often found this order reversed; the chalk plant put in sand, the sand plant in clay, and so on; and, what is still worse, the watery plant put in dry ground, and the dry vegetable in a wet soil; and in all these cases they cannot fail of making a very bad crop. A plant accustomed to a poor soil, placed in a good one, *rots;* while the one that prefers a *rich loam* is *starved* in *a poor one.* A clayey plant put in sand is blown out of the earth, for want of those *retentive powers* the root is used to; while the sand plant, placed in clay, decays at the root from the under moisture which it cannot bear. The chalk plant, also, placed in gravel, is destroyed by its own *acidity*, which is *no longer subdued:* for most plants (if the farmer do not grudge the making the soil) he may certainly do it, but it can never answer in point of expense. It is a strange mistake, and a most fatal one, that almost all, even *some* of our *best*, *gentlemen farmers* fall into, viz. that they cannot manure *too highly.* Now this is so completely the cause of innumerable failures, that I am most anxious to censure the practice. It always reminds me of the account given by Miller, of what was done in the *West-Indies*, when some botanists were desirous of bringing over some fine plants of the *cactæ species.* They inquired not what the plants *were*, but wholly inattentive to their being *rock plants*, they put them into tubs of the richest soil they could procure; the *plants all died:* but this was looked upon as accident, and the same process again followed, when one of the casks breaking, they concluded the plants must die, as the earth had left them; and flinging on them some dry sand, which happened to be in the way, ordered the cask down to the hold, when to their great astonishment the plants so treated *lived*, while those in the other cases died, as usual. This opened the eyes of the gardeners with respect to rock plants; but to this day sand plants, instead of having a poor soil, generally receive a rich one. There is not a more ruinous effect than that produced on the plant of a poor soil placed in rich ground. Some time since a gentleman brought me some turnip roots that had in the same manner failed for several years; and the potatoes had equally been vitiated the preceding year. It is, I find, a *common disorder*, in *gardens* especially, and all *rich ground.* When I dissected the plant, I found the wood or sap vessels of the root were rotted off, and in their stead a number of large bladders of putrid water remained, as a sort of swelled and distorted root. But almost all nourishment from the earth was suspended, and the leaves alone retained a sort of life, from the nutriment they received from the atmosphere, while the washy and putrid effects, the consequence of nutriment, seemed to poison all the rest. The potatoes were nearly in the same condition, the roots all decayed, nor forming any bulbs: but when *peas* or *vetches* were placed in the same ground, they grew remarkably well. Now this is *certainly* a proof that a plant can be destroyed by a decided aversion to the soil in which it is placed; which will, notwithstanding, admirably agree with many *other vegetables;* and that the plant of a poor soil can be as much hurt in a rich one, as the plant of a rich in a poor soil.

I have also known the same disorder seize trees, on being put into ground too rich for them. A friend of mine having just made a garden, which was not yet walled in, left a row of the *salix caprea* in a hedge to shade a walk. Being desirous of having very good vegetables, he manured the ground to the most excessive degree, *even to the edge of the trees.* In two or three years his trees began to decline, and at last got so bad, he consulted me what he should do with them. I advised the taking one for examination. I found most of the wood of the root decaying, while the side radicles were turned into putrid bulbs. We uncovered all the rest of the trees, and flung dry sand on them, mixing it with the earth that surrounded the roots: we saved all *but three.*

In tracing the various expenses necessary to a plant put out of its peculiar earth, I shall first mention *manure* as the most considerable. In proportion as the ground is adverse to the *plant*, so much more does the farmer load it with the only remedy he is acquainted with, "*dressing*," to enable the plant to shoot. If the manure do not afford the juices it requires, and which its natural earth would *certainly* have *bestowed*, the *crop fails;* then the quantity of seeds must be more than doubled, which creates a second expense. Why are they obliged, in one county, to put in so large a measure, and in the next, half the quantity? Because not one seed in three takes effect, from not having those very juices dispensed to it its seeds seek, and the plant requires to give it vigour and force to grow. The ground is said to be full of seeds: *I believe it;* but the soil can only support such a number of plants; the seeds wait, therefore, till they can possess themselves of that *stimulus* wanted for their increase. Now dung happens to be composed of those ingredients necessary, of that salt and oil required by almost *every vegetable.* If, therefore, the soil be dressed with it, the seeds belonging to each peculiar ground shoot directly; and the sands send up *sand plants*, and the *chalk soil chalk plants*, and so on to the rest: for it is a great mistake to suppose that the embryo plant is concealed in the dung; indeed the vegetable, thus always appertaining to the soil, proves the contrary: but if the manure be not suitable, then that stimulus is still wanting, and the crop is *again said to fail.* How often does this happen; because some bad season makes the want of that peculiar juice doubly missed: then labour is a third expense, which must in excess belong to that plant which is placed in a wrong soil; for it will never be said that the vegetable that can grow spontaneously in that peculiar earth, can want any addition, besides the little manure, to increase its vigour, and render it more productive. All the labour, then, of dibbling, and throwing up the earth, might be saved in that case: indeed, this is a trouble that, I think, (if I might venture to say so,) might be saved in *many soils.* In clays, in chalks, or loams, it must be excellent, where a little motion of the earth round the roots of the plants, and an opening of the ground to admit the air, and dry the interior, must be most wanted, besides breaking the clods of earth; but in sand and gravel, that require no drying, or in a rich loam perfectly pulverized, it only deprives *that earth* of its little *moisture*, and moves the roots, where you would rather wish to render them more fixed and steady in the ground. And if it be on a hill, where the soil falling down renders it thin, I have seen the practice kill many plants, by depriving them of the side thickness and moisture, which would otherwise compensate for the little depth of earth above.

I have now endeavoured to shew, that one of the principal parts of farming should be thoroughly to understand the soil of each field, and its sub-soil, and the *sort of plant* that suits that *peculiar ground*, that the farmer may be able to adapt them to the earth of which his estate consists; especially where, if he wants more variety, they are to be bought or exchanged with ease. The only desire of most cultivators is to make the farm answer in point of expense. This is all I mean by the plan I am suggesting,—"that that plant will yield a vast deal more in its own soil, and will repay for buying or exchanging that which would not grow without too much expense." How few are the plants that can possibly be wanted! ten or twelve at most; how easy, therefore, to suit these to his estate! A couple of different kinds of wheat for each soil; oats that agree well with it; and clovers that are naturalized to it. There are some plants that all farmers grow, but that nature seems to have made *as substitutes* to each other, for feeding of cattle; I mean, turnips, carrots, parsnips and cabbage: they each claim a different soil. The turnips do admirably in sand, the carrots in sand also, the cabbage in clayey ground, and the parsnips in good ground: as to potatoes, though preferring a *drained boggy earth* to all others, yet they are *so necessary*, they must grow where they can. But there is a terrible mistake in this country, in supposing they should be planted in dry ground; as the potatoes (I have proved, after sixteen years experience) will never be mealy, if not grown in tolerable *moist earth*. As to the others, one of them might be chosen as best suiting. It is true, that a plant grows sick of the ground in which it is placed too frequently; because the peculiar juices are *exhausted*, which sustained and supported it. But a year's interim is sufficient to renew all, and restore the earth to its usual vigour; especially if a fallow *intervene*, of all the assistance the earth gains, the most *admirably advantageous;* for it is the manure of nature, if weeds are *not allowed* to grow on it: for *if they do*, they rob it of its richness, and burying them can make but poor amends, (by their crude and half-digested juices,) and can compensate but little for the support of a naked winter fallow.

That I should venture upon so daring a task, as to give hints to those very gentlemen who possess *such talents in agriculture*, so famous for their well-earned renown, seems a degree of presumption I must apologise for, as it shocks even myself: but from the first moment of my dissecting plants, I thought it must suggest ideas of this kind, and I have with care collected them.

I may be said to arrive at the science by another road, one untried before, and of course having a different view of the subject. In dissecting, I could not but see that nature had formed the plant peculiarly for that individual soil, and to conform itself to its nature, *in every respect* suiting its defects, and possessing each its proper juices, in chemical affinity *with those* of the *soil*, but with that one only. Seeing this, may I not, with all humility, declare it, leaving to every one to draw their own conclusions? satisfied, if one hint thrown out can be of service to those whose science enables them to judge so wisely of the matter. In this case I shall be happy in the undertaking, and think myself repaid for my labours.

I shall now give the clovers, and trefoils, &c. adapted to each soil; and should this letter be so fortunate as to please, I shall in my next give the other plants equally suiting each earth.

Clay.

Trifolium minus, - -	(Small Trefoil.)
Trifolium filiforme, - -	(Slender Trefoil.)
Medicago lupulina, - -	(Black Medic, or Nonsuch.*)
Vicia sativa, - - -	(Common Vetch.)
Poa pratensis, - - -	(Meadow Poa.)
Hog Peas	
Cabbage.	
Anthoxanthum odoratum, -	(Sweet-scented Spring Grass.†)
Poa pratensis, - - -	(Meadow poa.)
Dactylis glomerata, - -	(Round-headed Cock's Foot.‡)

Chalk.

Hedysarum onobrychis, -	(Saintfoin.)
Trifolium procumbens, -	(Hop Trefoil.)
Poterium, - - -	(Burnet.)
Trifoliumo chroleachum. -	(Sulphur-coloured Trefoil,§)
Phleum Alpinum, - -	(Alpine Cats-Tail.)
Trifolium scabrum, - -	(Rough Trefoil.)
Anthyllis vulneraria. -	(Common Kidney Vetch.)

* I have seen this grow six years together, without any dressing, or a very trifling one.

† Excellent in clayey loams.

‡ Excellent for an early cutting.

§ On hills.

Gravel.

Trifolium procumbens,	-	(Hop Trefoil.)
Trifolium medium, -	-	(Cow Grass.)

Sandy Soil.

Medicago sativa, -	-	(Lucern.*)
Trifolium pratense, -	-	(Perennial Clover.)
Trifolium officinale -	-	(Melilot Trefoil.)
Medicago lupulina, -	-	(Nonsuch.)
Lotus corniculatus, -	-	(Common Bird's-Foot Trefoil.)
Plantago lanceolata,	-	(Rib-Wort Plantain.)
Poa trivialis, - -	-	(Common rough-stalked Meadow-Grass.†)
Thymus - - -	-	(Wild Thyme.)

Loamy Soil.

Trifolium pratense, -	-	(Perennial Clover.)
Trifolium repens, -	-	(White Dutch Clover.)

And many others.

Very Wet Soils.

Avena pratensis, -	-	(Meadow Oat Grass.)
Medicago falcata, -	-	(Yellow Medic.‡)
Festuca fluitans, -	-	(Floating Fescue.)
Festuca elatior, -	-	(Tall Fescue Grass.)
Trifolium glomeratum,	-	(Round-headed Trefoil.)

Grows very full, near wet ground.

Euphrasia officinalis,	-	(Officinal Eyebright.§)

* A trial made in planting lucern in tolerably rich ground, and on poor sand, an equal quantity of manure to both. The first yielded of profit - - *l.* 6 4 4
The sand, - - - - - - - - - - - - - - 11 5 6

† Though the cattle do not love the leaves, if the *least old*, yet they are very fond of the *seeds*, and they are very flourishing.

‡ Admirable in most soils.

§ I saw a field covered with this, and one the festuca, and they yielded prodigiously.

Very Dry Soils.

Trifolium albidum. -	-	(White Siberian Melilot.)*
Anthyllis vulneraria.	-	(Common Kidney Vetch.)
Alchemilla vulgaris,	-	(Common Ladies' Mantle.)†
Ajuga reptans. - -	-	(Common Bugle.)‡
Hedysarum, - -	-	(Saintfoin.)

It is a great pity we do not try the *trifolium maritimum*, which all cattle like, and which, if the seeds are raked on the sand in salt marshes, will soon spread themselves all around.

This is but a poor collection; but I am trying each in its own soil, as carefully compounded as I can; and I hope, if the idea should strike as *just*, I shall be able, in most agricultural vegetables, to select sufficient for the farmer, to save all laborious parts of the trial.

Let me not be supposed to say, that each plant will only grow in their original soil; they will most of them live, but they will often fail, get *disordered*, and *degenerate*. It is in this way that grass grows accustomed to its soil, though adverse; but a year or two is not sufficient to reconcile the plant to the soil.

I am, Sir, your obliged humble servant,

AGNES IBBETSON.

The first part of this letter was written more than a year preceding the present time. The trials I have since made have so completely confirmed the necessity of placing each plant in its own proper soil, that the matter will no longer bear a doubt by those who deeply study the subject; for each plant is not only formed by its leaves for the soil in which it was intended to exist, but in the root also; and of course the manner of taking in its nutriment is completely adapted for that soil. Thus, a sand plant takes the greatest part of its nutriment from the

* Admirable in dry sand, if tolerably deep; will spread, as Miller says, without cultivation, if the sand be above a foot deep.

† Spreads excessively.

‡ Very cooling for cattle, and excellent summer food.

atmosphere; it is therefore loaded with hairs of various shapes and figures, which, receiving their juices from the dews, &c. prepare theirs according to chemical affinity, and then permit them (as soon as completed) to run from the hairs into the plant; while the roots (which are often thick and large, but which have very few *radicles*) are almost incapable of taking nourishment from the earth, and therefore the plant depends almost wholly on the exposure to the heavens; and it is on that account peculiarly necessary for these plants, that *aspect* should be most strictly attended to, and that they should be so placed as to face the east or south-east, receiving the morning and evening dew, and not too much exposed, and dried up the rest of the day. To these plants the soil or earth is of infinitely less consequence, than the aspect; and throwing away loads of manure is really expending money without cause or effect; since it will be of little use, except warming the ground, which assists most plants, but to do which only a small quantity of dung is necessary.

For clay plants, which take in less nourishment from their leaves, indeed scarcely *one-fourth*, how different should be the provision the farmer makes for them. The root is formed with quantities of radicles, but all set close round: manure is here, therefore, of great use, if properly adapted; and labour, of still more. No ground costs so much as clay, which should *by rights* be considered in the lease; since to divide, pulverize, and dry, is the principal business of the farmer in clayey ground. Aspect signifies *nothing*, but a summer fallow will always be of admirable service. The root is loaded with radicles, but all close to the spreading part of the root; as the radicles of clay plants seldom like to run to a great distance, for fear of being cut off by the cracking of the clay.

The chalk plant takes much of its nutriment from the earth; this depends chiefly on soil; and adding sand to chalk is often as serviceable as manure; and the being well pulverized and mixed with the sand, is of no little consequence. Here again, therefore, much labour is required: nor is it of less use the ascertaining what sort of chalk it is; some are infinitely more fitted for agriculture than others: some lime-stone or gypsum require only sand to make an admirable mixture; some absolutely require dung to be added to the sand to meliorate the whole.

The water and semi-water plants require *water only*, as food; they take none from their leaves, but have their roots made for the purpose of inhaling water all day, and closing the pipes at night. These, of course, should be placed in very wet soils; and what a pity it is, we do not make use of the *festuca fluitans* in our swampy fields, when *too wet* for common pasture, and where it grows coarse and bad. Then once planting this grass, it would continue to come up each year: it is admirable for food; makes excellent bread, infinitely better than any thing I know, (except the finest wheat;) is good for gruel, and would grow in fields too wet for any corn or good grass. Horses are so fond of it they will half drown themselves to find it; it is particularly good in salt marshes, but grows well in fresh. The *festuca elatior*, which yields still more in fresh water fields, is admirable for grass, though it yields *no seeds:* it is indeed an hybride; but it gives a quantity of admirable grass, which horses will eat, and are extremely fond of; and a very early crop may be had, fit to be cut the end of April. The only disadvantage is, that it cannot be cut without dry weather; or the swampy ground is apt to hurt the men, and destroy much grass.

How necessary is all this knowledge to farmers! What a contrast is the mountain and rock plant! Instead of taking its food from water, as in the last-named plants, it is wholly fed by its leaves; having no impervious skin, (which covers every other plant,) its open pores receive all the juices the atmosphere will bestow. They are so formed, as to take no nutriment whatever from their roots, except what just suffices to form their seeds: the quantity they take in at their leaves is so great, that if the field is on a high mountain, and is well examined with a microscope, even at noon, the plants will almost always be found bathed in dew: many of the clovers, also, are mountain and rock plants, and take in all their nourishment at their leaves, and are constantly seen immersed in dew.

Of what use, then, is manure to such plants? It is throwing away money to expend it, when in other parts of the farm it might be so serviceable: would not this knowledge, so easily acquired, be of the utmost use to both farmer and gardener? So few are the agricultural plants, that rules for this purpose could be most easily given. But let me not be *misunderstood;* in very poor ground, it is necessary first to bring it from that *sick state* to a *better;* every ground requires some good manure; and this is particularly the case, when exhausted and neglected for many years. Then manuring is the best means to restore it to a healthy situation; and till it has got back to its usual state, it must be treated accordingly. For though sand plants take little from their root, yet that little is a rich part, and requires, therefore, *healthy juices;* which, when the ground is sick and poor, it cannot yield. All this will be made most plain, as well as enforce my first principle, by the detail of the manner of laying down very poor land for grass, which has lately been most admirably exemplified on an estate belonging to a friend of mine, bought for a song, and on which I persuaded him to try the experiment. It was supposed, no vegetable, corn, or grass, would grow on it; indeed, this was the first pleasing intelligence he received from his neighbours. Assured that the matter would succeed, from having repeatedly tried it, I pressed him to manage it in my way, treating his ground like a sick animal, and giving it plenty of wholesome nutritious food; but leaving to nature to bring up the proper grasses, nor counteract her in any way. At first, nothing was to be seen, but the poorest tribe of plants; *agrostis pallidior et canina,** *festuca bromoides,*† tuft of the *galium uliginosum.*‡ and *galium aparine*, or goose grass. Hawkweeds, wild carrots, and all the sandy plants common to a very poor, light soil; for the soil was sand, with a bottom of yellow stiff clay. I then persuaded him to thoroughly plough the ground *very deep*, mixing the clay and sand very thoroughly together; and over the whole throwing a good dressing of dung. The next year, the *agrostis* had disappeared, the wild carrot also; the *sherardia,*§ chamomile, and rib plantain, were discovered in their stead. *Bromus mollis, asperula odorata, agrostis littoralis,*‖ and *festuca duriuscula.*¶ The next year the land received a top-dressing of a little dung, but a good quantity of earth taken from a ditch, with lime. I examined the grass before it was cut, and with delight saw a quantity of cow grass or *trifolium pratense;* some excellent *bromi; festuca ovina*, in perfection, strong and thick; *medicago lupulina*, wild chamomile, rib plantain, &c. &c.; in short, some of the finest grasses a sand soil, in a high

* Brown Bent. † Brome Fescue. ‡ Marsh Ladies' Bedstrew.
§ Field Madder. ‖ Sea-side Bent. ¶ Hard Fescue.

state of improvement, will give. Nor does it want any thing, to preserve it in its present state, but a top-dressing every other year. But this would not be sufficient to keep them in this high state of improvement, if they were not in their own soil: if it was a clay, or a gravel, it would be a totally different set of grasses that would come up, as I have experienced. Some people insist, it is the dung *that brings* the seeds; but this *cannot be* the case; or they would not be always fitted to the soil.

A gentleman consulted me what he should do with his ground, plagued as he was with the *tussilago*.* He had ploughed the whole five times, without effect. I only advised him to dress it thoroughly with dung; and then, the next spring, throw on a fine quantity of sand, for the soil was limestone. In two years after, repeating this again, he had not a plant of the *tussilago* left, though, for five years before, he had been labouring against it without effect: the dung killed the poor plant. Thus, the two principles I wish to enforce in this letter, are,—that the plant *should be suited to the soil*, if the farmer wishes to save himself the *expense* of making the soil suitable to the *plant*;—and secondly, that, in laying down grass, no plan is so good as that of continuing to manure, till the proper grasses (suitable to the soil, and fitted for that degree of cultivation) have established *themselves*. When this is once done, a very trifling assistance, every two or three years, will suffice to keep up the state of perfection in which the ground is placed; for when once the *good sorts* are *established*, (*in sand in particular*,) they require but *little manure*.

Of course, the example I have given can belong to grasses and clovers only, which are *natives;* but exotics require still more to be fitted for the soil in which they are placed; since it is better to have to struggle against climate only, than against climate and soil also.

I am, with the utmost respect,

Your obliged servant,

AGNES IBBETSON

* Coltsfoot.

RUBBING CHEESE WITH RED PEPPER PREVENTS MAGGOTS.—BAKED POTATOES FOR SWINE.

Winthrop, February 13, 1817.

DEAR SIR,

RED pepper, so called, is a complete antidote against flies impregnating cheese, so as to produce maggots. Take one and put it into a delicate piece of linen, moisten it with a little fresh butter, and rub your cheese frequently. It not only gives a very fine colour to your cheese, but it is so pungent, that no fly will touch it.

Instead of steaming potatoes, or boiling them for swine, make an oven near your pen, large enough to contain, say six bushels —heat it and bake them. The heat will continue twenty-four hours. Give them to the swine hot. They are much more grateful to them hot, and they will fatten faster in this way, with, or without meal, than any mode I have tried them. If either of the above hints are worth any thing, you may name them to your Society.

Yours, with every sentiment of esteem,

SAM'L WOOD.

Thomas L. Winthrop, Esq.

ON THE PRODUCTION OF BUDS, AND SEEDS OF PLANTS, WITH HINTS FOR THE MANAGEMENT OF FRUIT TREES.

[From Darwin's Phytologia.]

WHEN mature fruit, as an apple or a cucumber, fall upon the ground, it supplies, as it ripens or decays, a second source of nourishment, which enables the enclosed seeds to shoot their roots into the earth, and to elevate their stems with greater vigour.

If the seed be deprived of the fruit, it will indeed vegetate but with less vigour. Hence those seeds which are liable to produce too vigorous shoots, as the seeds of melons and cucumbers, should be washed clear from their pulps, before they are hoarded, and preserved three or four years before they are sown. But those seeds, which are sown late in the season, for the purpose of producing winter fodder, as the seeds of turnips, should be collected and preserved with every possible advantage; and on this account new seed is much to be preferred to that which has been long kept.

Some of the bulbous rooted plants, as the onion and the potatoe, do not flower till the third year, when raised from seed, and then only those of stronger growth. The apple tree does not flower till the twelfth or thirteenth generation of the buds from the seed; each of the buds, in the successive years from the first, producing one principal bud more perfect than itself, and many lateral buds less perfect than itself; that is at a greater distance from that state of maturity, which enables it to form a flower.

The art of distinguishing the greater or less maturity of buds, is a matter of great importance in the management of fruit trees, as in many of them the central bud becomes a spur one year, and flowers the next.

On the stems or branches of trees the buds are of two kinds; leaf buds and flower buds, separate or enveloped in one covering. The bud is termed hybernaculum, or winter cradle of the embryon shoot, and is covered with scales, and often with a resinous varnish, to protect it from the cold and moisture of the ensuing winter, and from the depredation of insects. These by inoculation, or ingrafting on other stems of trees, or by being planted in the earth, become plants exactly similar to their parents. Every bud of most of the deciduous trees may therefore be considered as an individual biennial plant, as distinctly so as a seed.

The pith appears to be the first or most essential rudiment of the new plant, like the brain or spiral marrow, which is the first visible part of every animal foetus, from the tadpole to mankind. In those plants which have hollow stems, this central cavity, though not filled with the pith, appears to be lined with it. The central pith of the bud is seen to arise near the pith of the parent shoot, where the embryon plumula is probably secreted by a gland at the bottom of the parent leaf stalk, finds there its first reception and nourishment, and is gradually protruded and elongated by the pith, which exists in its centre, as the bud proceeds, and thus constitutes the ascending caudex of the new bud:

which is resembled by the wires of strawberries, and other creeping vegetables; whereas the descending caudexes of the new buds, which form the filaments of the bark of trees, are secreted from the various parts of the old bark in their vicinity.

In those plants which have hollow stems, this central cavity, though not filled with the pith, appears to be lined with it. The ingenious Mr. Bradley asserts, "that buds have their first rise in the pith. They are there framed and furnished with every part of vegetation, and forced forward to meet the air through the tender bark, and would drop on the ground, if they were not restrained by vessels which serve as roots to nourish them; and thus as seeds take root in the earth, a bud takes root in the tree; but with this difference, that the seed has lobes to supply it with nourishment till it can select juices from the earth; but the bud has no occasion for lobes, because it takes root immediately in the body of the tree, where the proper juices are already prepared for it.

Each bud is to be considered as a distinct plant, rooted in the tree. In the spring, when the bud begins to swell, it shoots its root downward into the earth; and the intertexture of the caudexes of the buds constitutes a new bark over the old one of the tree. Each bud then puts forth a leaf, which is a respiratory organ, and resembles in many respects the lungs of animals. As many new embryons are generated during the preceding summer in each leaf-bud, they now put forth in succession; each of which has, like the first, its appropriate leaf, which, as they successively advance, compose the annual shoots or sprigs of trees; which in some plants become of great length, as in vines and willows, consisting of twenty or thirty new leaves. Hence, if the first set of leaves be destroyed by vernal frosts, or by insects, a second set of leaves succeeds, which belong to the second embryons of the same bud.

At the foot of each leaf stalk is generally produced about midsummer, either a new leaf bud or a flower bud; if it be a leaf bud it becomes a branch the next year; if it be a flower bud the growth ceases. During the greater vigour of the plants, the leaf buds are solely or principally produced, as in young healthy trees, but when the vessels of the bark or buds become further elongated, as the plant grows taller, the nutritive juices are less copiously supplied, or the buds are become more mature, the production of the flower buds succeeds; as in experiments made by Mr. Walker, the sap of the birch tree in the spring, was two or three weeks later in ascending to the top of a high tree, than to the lower branches." *Edinb. Transac. vol.* 1.

Hence it happens, that the grafts from strong seeding apple trees do not bear fruit, till they are twelve years old; while the grafts from old weak trees will bear copiously in two or three years, and hence very vigorous trees, as pears, produce fruit only at their extremities; but if you take off about an inch of the bark from a branch of a vigorous pear tree, and thus weaken it, that branch will flower, and bear fruit at every bud, like trees of less vigour. It should be here observed, that the words, strength and weakness, when applied to the growth of vegetables are, in reality, metaphorical terms; or express the effect or consequence of their producing leaf buds or flower buds, rather than the cause of it, whereas it is the facility with which the long caudexes of the new buds, which form the new filaments of bark, can be generated, which increases the number of leaf buds, and gives the tree a luxuriant or vigorous appearance; and the difficulty of generating these new caudexes, which increases the flower buds, and thus gives a less vigorous appearance to the tree.

About midsummer the new buds are formed; but it is believed by some of the Linnæan school, that these buds may in their earlier state, be either converted into flower buds or leaf buds, according to the vigour of the vegetating branch. Thus if the upper part of a branch be cut away, the buds near the extremity of the remaining stem, having a greater proportional supply of nutriment, and possessing a greater facility of producing these new caudexes along the bark, will become leaf buds; which might otherwise have been flower buds; and on the contrary, if a vigorous branch of a wall tree, which was expected to bear only leaf buds, be bent down to the horizon or lower, it will bear flower buds with weaker leaf buds, as is much exemplified by Mr. Hitt, in his Treatise on Fruit Trees. The theory of this curious vegetable fact has been esteemed difficult, but receives great light from the foregoing account of the individuality of buds.

For the purpose of converting leaf buds into flower buds, Mr. Whitmill advised to bind some of the most vigorous shoots with strong wire, and even some of the large roots; and Mr. Warner cuts what he calls a wire-worm about the body of the tree; or scores the bark quite to the wood like a screw, with a sharp knife. *Bradley on Gardening, vol. 2, p.* 155.

Mr. Fitzgerald produced flowers and fruit on standards and wall trees by cutting off a cylinder of the bark. three or four inches long, and replacing it with proper bandage. *Philos. Trans. Anno* 1761.

Mr. Buffon produced the same effects by a straight bandage put round a branch; and concludes that an ingrafted branch bears better from its vessels being compressed by the callus produced, where the grafted scion joins the stock.

It is customary to debark oak trees in the spring, which are intended to be felled in the ensuing autumn; because the bark comes off easier at this season, and the sap wood or alburnum is believed to become more durable, if the trees remain till the end of summer, from their expending their saccharine sap-juice in the ensuing foliage, and thus being less liable to ferment and putrify. The trees thus stripped of their bark put forth shoots as usual, with acorns on, the sixth, seventh, and eighth joint, like vines; but in the branches, I examined, the joints of the debarked trees were much shorter than those of the other oak trees; the acorns were more numerous; and no new buds were produced above the joints which bore acorns. From hence it appears that the branches of debarked oak trees produce fewer leaf buds, and more flower buds; which must be owing to the impossibility of their producing new caudexes down the naked branches and stem for the embryon progeny of leaf buds. About midsummer, after the new buds appear in the bosom of every leaf, many authors have remarked, that there appears to be a kind of pause in vegetation for about a fortnight, which they have ascribed to different causes. At this time I suspect the reservoir of nourishment for the new buds is forming about the roots, or in the alburnum of the tree; and that the caudexes or umbilical vessels of the new buds are also at this time forming down the bark, and terminate in those nutritious reservoirs in the roots or new alburnum, like the umbilical vessels, called seminal roots, which are visible in many seeds. The roots of trees at this time sprout with greater vigour, as observed by the ingenious Mr. Bradley, who, on that account, prefers the midsummer season for trans planting trees, if they are not to be removed to any great distance; and adds, that the new shoots in the following spring will put forth with much gre ter force, and the tree will thence be almost a year forwarder in its growth, than if it remains untransplanted till the winter. This seems to be owing to the destruction of much of the nutritious matter deposited in the roots, for the use of the new buds, which are torn off in transplanting, and which can only be replaced at midsummer, or soon after.

Mr. Bradley further adds, that when trees are thus transplanted at midsummer, no part of the top or branches, or foliage, should at that time be cut off; which well accords with the theory above delivered; but if some of the branches are lopped during the winter, the remainder will put forth more vigorous shoots, as their share of the reserved nutriment will be greater.

The facility with which the ruptured vessels of vegetables grow together or heal, corresponds with that of animal vessels in an inflamed state. Thus, a bud taken from one tree and inserted into any part of the bark of another tree, of the same genus, or ingrafted on it, presently receives nutriment, and grows to it by the reciprocal union of the wounded vessels, in the same manner as a transplanted tooth; or as the fingers are liable to grow together, after having been excoriated by a burn. During the winter, when the leaves die and fall off, the vessels which supplied their juices, and which composed the greatest part of the bark, seem to lose their vegetable life at the same time, and to coalesce, and form the alburnum or sap wood, but the vessels belonging to the new buds, which are intermixed with this alburnum, remain alive; and at the returning spring act with astonishing vigour; and after having drank up the reservoirs of nutriment, which were deposited about the roots, and thus having nourished and expanded the new leaves, cease to act, and are converted into alburnum or sap wood, while the alburnum of the last year gradually changes into hard wood, called the heart of the tree; which no longer possesses vegetative life, and is now only useful to elevate and sustain the young plants which cover it; and was probably originally produced for this purpose in the contest of all vegetables for light and air.

This inert or lifeless state of the central parts of trees, called the heart-wood, is evident from those old oaks and willows, which have lost their internal hard wood, and are become quite hollow, consisting only of their bark and alburnum, and yet are furnished with many healthy branches. But the umbilical vessels of the alburnum possess the properties of capillary tubes. or of a sponge, after they are extinct, and cease to act as umbilical vessels; and thus may occasionally attract moisture or suffer it to pass through them mechanically. An instance occurred in which a branch of a young apple tree was so cankered, that the bark for about an inch quite round it was totally destroyed. To prevent the alburnum from becoming too dry by exhalation, this decayed part was covered with thick white paint; in a few days the painting was repeated, and this three or four times, so as to produce a thick coat of paint over the decayed part, or naked alburnum, extending to the ascending and descending lips of the wound; this was in the spring, and the branch blossomed and ripened several apples. In a garden in Litchfield, about four years ago, a complete cylinder of bark about an inch long, was cut from a branch of a pear tree nailed against a wall, this part is now not more than half the diameter of the same branch above and below it; yet this same branch has been full of fruit ever since, when the other branches of the tree have borne sparingly. I lately observed, that the leaves of this wounded branch were smaller and paler, and the fruit less in size, and ripened a fortnight sooner, than on the other parts of the tree. Another branch of the same tree has a part of the branch taken off about an inch long, but not quite all round it, with much the same effect.*

The existence of capillary tubes in dead sap-wood is visible in a piece of dry cane, these permit water or smoke to pass through them; and in the exhausted receiver of an air pump both water and quicksilver may be made readily to pass through pieces of the dry alburnum of wood by the pressure of the atmosphere.

The choice of buds for the purpose of inoculation is probably of more consequence than has hitherto been imagined. As we have endeavoured to shew, that buds from parts of the bark distant from the central bud, and which are not generated in the bosom of a leaf, are in different states of maturity and require more years before they can produce flowers.

* About seven years ago a button wood tree, on the farm of Benjamin Goddard Esq. in Brookline, was barked entirely round at bottom, a space of from three to six inches in breadth, by the mice; there is no appearance of new bark having been formed in this part since; the tree is, notwithstanding, alive and flourishing, July, 1817.

It is curious to observe, that when harsher fruits become sweeter, the blossom becomes whiter, as is universally seen in those of our native crabs, and of our cultivated apples; and that the buds become larger, and the green leaves also become of larger area and of paler complexion. Thus Mr. Knight observes that "the width and thickness of the leaves generally indicate the size of the future apple; and the colour of the black cherry and purple grape may be known by their autumnal tints; and that even in plants which have sprung from seed in the preceding spring; as the tinging matter in the leaves of these plants is probably of the same kind as that, to which the fruits will in future owe their colour."

The strength or weakness of a tree, which are metaphorical expressions, depends on the greater or less facility with which the long caudexes of the new leaf buds, which constitute the filaments of the bark, can be generated. These caudexes pass along the branches and trunk of the tree from the apex or leaf of the bud in the air to the roots in the ground, and may be distinctly traced in the new twigs of trees. But there is no elongation of the caudexes of the flower or fruit buds, in the same manner; the stamina and coral of each flower, probably, only strike their roots into the sap vessels, like mosses or funguses which grow on trees. Whence it appears that by rendering it more difficult for new buds to acquire new caudexes along the branches or trunk, from the summit into the ground, the tree will be necessitated to produce flower buds in preference to leaf buds:—A theory which explains the whole art of the management of fruit trees. It was asserted by Mr. Lawrence, that the more the branches of any tree are carried horizontally, the more apt the tree is to bear fruit; and that the more upright or perpendicular the branches are led, the more disposed is that tree to increase in wood; which he ascribes to the bending down of the branches impeding the circulation of the sap. Mr. Hitt, in his treatise on fruit trees, affirms, that if a vigorous branch of a wall tree be bent down to the horizon or beneath it, it loses its vigour, and becomes a bearing branch. In Lord Strafford's garden, at Trentham, I remember to have seen, many years ago, some standard dwarf apple trees with all their branches bent down, and fixed on a slight frame work about a foot from the ground; which seemed to be uncommonly prolifick, as a circle of white and purple flowers twenty feet in diameter on branches radiated from a centre, appeared to a distant eye like a carpet of rich embroidery. The greater production of fruit buds on branches bended to the horizon must contribute, I should suppose, to the prolifick effect of training nectarine and peach trees on tiles laid on the ground, or on the gentle declivity of a bank of earth facing the south, which has lately been recommended by some one, who has gained a patent for his discovery; and it is probable that the labour of training them in this way would be repaid.

The principal art of producing dwarf apple trees to be great bearers, consists in ingrafting them three or four times, scion on scion, so that the vessels shall be compressed by the callus around the engrafted junction, which, at the same time that it prevents the luxuriant growth of the leaf buds, encourages the production of fruit buds.

When young trees discover too great vigour, Mr. Lawrence advises to cut the most vigorous shoots two parts in three through, leaving a large notch that the wound may not heal too soon; (speaking of wall trees) which he adds will both render them more fruitful, make them more readily conform to the wall or espalier, and preserve such as are dwarfs from too much aspiring in very strong branches, especially of pears. He recommends two or more such incisions to be made in the same branch.

Another method he proposes, is, to break the too vigorous branches half through with the hand, which he has practised with success in apricots and peaches, though some branches have occasionally died by the effusion of the gum.*

In transplanting trees, for any purpose, it may be observed, that they should not be replanted deep in the soil, since the most nutritive or salubrious parts of the earth are those within the reach of the sun's warmth, of the descending moisture and of the air. And as the root fibres of trees, like those of seeds, always grow toward the moistest part of the soil, as the young shoots and leaves grow toward the purest air and brightest light, it follows

* This effusion of gum might be prevented by painting over the wounded part several times.

that the root fibres seldom rise higher in the ground than they were originally set, and seldom elongate themselves perfectly horizontally; so that when a fruit tree is planted too deep in the earth, it seldom grows with healthy vigour, either in respect to its leaf buds or its flower buds.

Mr. Knight, in his treatise on the culture of the apple and pear, page 83, has this passage. "In the garden culture of the apple, where trees are retained as dwarfs or espaliers the more vigorously growing kinds are often rendered unproductive by the excessive though necessary use of the pruning knife. I have always succeeded in making trees of this kind fruitful by digging them up, and replacing them with fresh mould in the same situation. The too great luxuriance of growth is checked, and a disposition to bear is brought on." The same observation was made by Mr. Lawrence. So if beans, which are but a few inches high, be transplanted; they do not become so tall, but they flower and ripen sooner. The same occurs in frequently transplanting brocoli; the plant does not grow so tall, but has earlier flowers, and in great number; and it is hence better to pluck them up than to dig them up for the purpose of transplanting them, as it is well known, that the vessels of animal bodies also are less liable to bleed, when they are torn asunder than when they are cut with a sharp instrument. It is probable that confining the roots of cucumbers and melons in small garden pots would stop the too luxuriant growth of the vines, and make them more fruitful, if care was taken to supply them with water more frequently, and with sufficient nutriment, by mixing with the water some of the carbonick black fluid, which has drained from a manure heap.

DESCRIPTION OF AN INSTRUMENT FOR SOWING BROADCAST;—AND ALSO, OF A MODE OF TYING UP CATTLE.

[Extracted from a letter to the Hon. Josiah Quincy.]

[The ensuing communication is from a gentleman in the District of Maine, whose opinion on all subjects connected with agriculture, both from his science and experience, is deservedly of great weight. His name is not connected with the publication, in compliance with his express injunction.]

[*See Plate*, fig. 2.]

The implement, which accompanies this letter, I procured in England, and is there called a "*Seed Lip.*" They are made of various sizes, adapted to the different uses to which they are to be applied, being larger for lighter seeds. I chose one of a middle size, as the best adapted to common uses.

It is to be placed, when used, just above the left hip, rather before the person, and the left hand to be kept on the upright handle, (*a*) the weight being supported by a strap, or girth, over the shoulder, which strap hooks on to the iron hook (*b*) on the concave side, and remains always over the shoulder, being unhooked when any occasion requires the seed lip to be laid down, to fill it or otherwise. Being suspended by the centre, a motion of the left hand brings the grain to the front, by putting that end the lowest. It is certainly the most convenient thing of the kind we are acquainted with, and is particularly adapted to sowing plaster, which is very tiresome in the usual modes of sowing it, from its great weight. The concave bend in the specimen sent, is not so deep as in the pattern, but could not be altered in the present case. The maker says, if he could get a market for fifty, next winter, he could make them at one dollar each.

Another article sent is a chain to tie up cattle. (*See Plate*, fig. 3.) Instead of the double stanchion in use near Boston, we have a single round stanchion, about three inches in diameter; and these stanchions are put about three feet apart; the first being set within twelve or fourteen inches of the upper, or farthest end of the stable, giving the last stanchion rather more than three feet between it and the other wall. Thirty-two feet being the common width of a barn, it then will contain ten stanchions. The *large* ring is put on the stanchion; and care should be taken, that all the chains are put on the same way, otherwise some attention will be required in fastening them. I think that having the ring-ends upwards, is the most convenient. For large cattle, the whole chain is used; and for smaller ones, the T is put through the second ring, instead of the first. Getting loose with these chains (unless by breaking) is nearly impossible: and if well made, very little danger of breaking is incurred, except by the cattle, as driven in in cold weather, treading on them when the iron is brittle from frost. This is easily avoided by having a pin, on which to hang the extremity of the chain; which will then be suspended in its whole length, with the larger ring confining the middle, and be in the most convenient position possible for the person who ties the cattle. The only caution necessary is, to be sure that the T is *fairly drawn through the ring*. The backs of *two* old scythes make a chain, exclusive of the large ring, or runner. The web of the scythe should be taken off; for it renders it brittle. The expense is under a dollar each.—I have had them in use ever since the year 1801; and I see no reason why they should not last fifty years longer, as the wear amounts to nothing.

SKETCH OF THE CHARACTER OF WILLIAM WEST, A DISTINGUISHED FARMER OF PENNSYLVANIA.

[Volume second of the Philadelphia Agricultural Society's publications, contains a sketch of the character of William West, from which an abstract is here published. In one of our late numbers will be found some account of the distinguished Swiss farmer, Klyiogg, extracted from an account of him, published at Hallowell, in 1800, in one volume, 8vo. by one of our ablest and most valued citizens, from an English edition. The lives of such men afford a full answer to those who call in question the profitableness and dignity of agricultural pursuits. Industry, care, and skill are seen to be as certainly, and as amply rewarded in the career of the husbandman, as in that of the merchant. An honourable independence is equally within the grasp of both. Some illustrious instances there are of men, in our community, who, while extensively engaged in commerce, and still in the meridian of life, have diverted an ample portion of their fortunes into the channels of agriculture, and have afforded, in many things, a valuable example to the plain farmer, and a noble and important patronage to this class, in the free distribution of new seeds, and scions of improved fruits, and in experimenting new modes of culture. We have seen them fertilizing, beyond example, our lands, naturalizing the productions of other climates, enriching our fields with new grasses and a brighter verdure, and our gardens with new varieties of roots and fruits, and blending a liberal display of elegance and taste, with a skilful and profitable husbandry. Distinguished among this class of patriotic men was the late EBENEZER PREBLE, ESQ. for many years one of the most intelligent, zealous, and useful members of the Board of Trustees of the Massachusetts Agricultural Society.]

MR. WEST* was born in the year 1724, and became a farmer at the age of forty, when he purchased a farm of one hundred acres, which, although by nature of an excellent soil, had been so far exhausted, as to be incompetent to the maintenance of the owner, few and simple as his wants must necessarily have been.

The business of farming may be said to have been new to Mr. West, for although he had a general idea of the common operations of husbandry, yet he must have been very deficient with respect to the various minor details, upon which so much of the success and profit of a farm depend. The land he bought was almost a common; there being scarcely a fence of strength sufficient to keep out whatever animal chose to walk over his fields, and they were covered with briars and weeds of every kind. In these respects his farm was not singular; all the agricultural operations of the districts were the reverse of what they ought to have been, and of what they now are. After fencing his land by substantial inclosures, and clearing it of weeds, briars, and wild hedge rows, he looked round for his information, as to the best mode of conducting his farm. He saw cattle half starved in winter for want of food, and pinched with cold from deficient shelter, and but poorly fed even in summer. Grass was the result of the spontaneous, though scanty production of the soil, after the crop of grain was taken off, or, in a few cases of natural rough meadow, or watered fields. The provision of hay was extremely poor. The consequence was, that the stock kept was small in number; or, if the vanity of showing a large stock

* Eldest brother of the celebrated painter, B. West.

infected the farmer, they were of course but half nourished. In either case, manure was scantily made. Successive crops of grain exhausted the ground; the slovenly practice of sowing wheat, or rye, among the standing Indian corn, was universal; and the cultivation of artificial grasses, especially of that great fertilizer *red clover*, which has done so much for Pennsylvania, was unknown. The cattle were, therefore, permitted to wander over the fields to pick up the slender provisions afforded by nature, or to brouse upon young twigs in the woods, to the certain destruction of the growing timber. Grazing, at that time, was solely confined to the rich natural meadows on the peninsula, between the rivers Delaware and Schuylkill, and many farmers depended entirely upon them for the supply of their winter beef, and even for part of the hay for their live stock. In short, he found that the whole management of a farm was pursued, not upon fixed principles, but in a random manner, the object appearing to be, to obtain as much from the land as possible, without regard to the preservation or improvement of the powers of the soil. With these facts before him, the prospect was extremely discouraging. He did not pretend to any knowledge in farming; but what he saw and learnt was sufficient to convince him, that practices, which neither enriched the farmer nor the land, could not be the most eligible, and he, therefore, determined not to adopt them; and as he could derive no information from his neighbours, he read what books he could procure on farming, and for the rest he depended on his own judgment. At that day, the science of agricultnre was at a low ebb, in every part of the European and American world. The useful spirit for diffusing information, by means of books, was not excited in this country; and even in Europe, scarcely any works of much note had appeared on agriculture, except those of Du Hamel, De Lisle, and Tull. The merit of Mr. West was, therefore, the greater, because without the numerous helps which the modern farmer may have recourse to, derived from the works of those who have detailed the result of their experience, or from the good examples of their neighbours, he ventured to alter a bad system, and to establish a new one, which the experience of near half a century in this country, has shewn to be correct, and which has added to the pecuniary resources, and agricultural reputation of our state.

The chief part of the cultivated land in Pennsylvania was in a course of tillage, and grain commanded but a small price. The business of grass, as already stated, was confined to a small district; and the inquiries he made satisfied him as to the superiour profit arising therefrom, when compared to tillage. From this circumstance, therefore, as well as from a partiality for that pleasing branch of husbandry, he resolved, as soon as circumstances would permit, to lay down his land to grass.

The introduction of red clover had taken place only a few years before, and, with the exception of a few districts, was confined to the vicinity of Philadelphia; for prejudice, the great enemy to all improvements, had opposed its progress among the cultivators of the soil. The great advantages, however, of this valuable grass, derived from the immense burden which it produced, were soon seen by Mr. West, and he determined to avail himself of them. Its fertilizing effects were the result of subsequent experience, the knowledge of which, from the recent and partial use of the plant, was yet to be acquired. Clover was therefore sown, and his fields soon bloomed with the novel exotic, affording him treble the quantity of hay, that ever had been known to grow in the vicinity, upon the same quantity of ground. But clover, valuable as it proved to him, and as it still is, he knew required to be renewed, and a permanent pasture was the object to be aimed at, for he held it as a principle, that every country was blessed by a native permanent pasture grass. How, therefore, was this to be obtained? It occurred to him, that a visit to the peninsula, where native grasses abounded, and an examination of the soil on which they grew, might teach him something on the subject. He there saw, that the whole soil was alluvial, and of course very rich; that luxuriant, natural grass clothed the fields, and that the only manuring they obtained, consisted of the droppings of the cattle. Here, then, were the principles upon which the improvement was to be grounded. Manure was applied as equally as possible, to the *surface* of a *rich bottom.* Philosophically concluding, that like causes must produce like effects, he determined to imitate the practice, and the result proved the accuracy of his deduction. The first object, therefore, to be attended to, was to bring his soil, if possible, to the desirable state of fertility of the alluvial district, and this he knew could only be accomplished by the accumulation of manure. How, therefore, was this great desideratum to be obtained, and how increased? It was clear, that the wandering of the cattle over the fields and roads, or in the woods, could not add to the stock of this great requisite; for, in the one case, it would be lessened in quantity, and diminished in quality, by the action of the elements upon it; and, in the other, it would be totally lost. He, therefore, confined his cattle to the barn yard, during the winter, and to increase the quantity of manure, he, in the first instance, plentifully strewed the yard with leaves from his woods, while the scanty crop of straw, corn-blades, and corn stalks, which his first course yielded, assisted in supplying food.

The sites of the old fences he had removed, the earth under the wild hedge rows, which he had previously grubbed, was ploughed up, and together with that taken from the ditches he dug or cleaned out, was formed into a compost, containing a large proportion of lime; while every species of offal and vegetable matter about the dwelling house, and innumerable weeds, while yet unripe, were added to the contents of the barn yard. He provided against drought by leading a spring from a considerable distance along his high lands, so as to irrigate at pleasure some of his largest fields. The precious water from the barn yard, which even to this day is either entirely lost, or permitted by most farmers to run off in wasteful profusion over a particular field, was confined by the construction of the yard, and forced to increase the riches of the fresh materials which were continually in progress to the fertilizing heap.

To all his grass grounds, previously cleansed of perennial weeds by fallow crops, he applied a compost manure early in the spring, always observing to accommodate it to the nature of the soil. He had the satisfaction to see the complete success of the practice. For as the artificial grasses declined, the permanent native green grass* took their place, and only required a repetition of the practice which caused its appearances to ensure its continuance; and for many years he exhibited the only instance in the county of an entire sward of green grass upon

* Poa viridis of Dr. Muhlenberg.

an upland farm, and of fields which had not been disturbed by a plough for upwards of thirty years.

The alteration of the farming system of William West, from the random plans of the country, did not fail to be noticed by his neighbours, and in some of them to excite animadversions; and as in every instance of deviation from prevalent customs or practices, predictions of failure were with great confidence generally made. The event however, proved the incorrectness of their predictions. In the short space of three years, his supply of provender was so great as to enable him to sell hay to a farmer who possessed a much larger tract of land than his own, and who had indulged himself most freely in objections to "the town-man's farming." The people of the vicinity saw with astonishment, field after field, covered with heavy pasture, which formerly were distinguished by the great quantity of briars, and in a few years, they were surprised to see forty head of cattle brought to a farm to graze, which had scarcely ever afforded a bare support to ten head before; but they wondered still more when those cattle were successively led to the capital by the butcher, and moreover were informed, that a large dairy and farming stock were supported during the same season. Such a change could not fail of exciting more remarks than his deviating from the common agricultural system of the country, had formerly produced. In the one case, some little pride was mortified, at seeing the successful practice of a citizen, in the improvement of land by courses, which were so opposite to what farmers thought could not be altered for the better, or the adoption of measures which had either never reached their ears, or were slighted from prejudice, or neglected from want of industry; in the other, the more feeling principle of interest operated to the production of remark, and to a gradual change of their agricultural operations. This change he lived to see effected, not only in his immediate neighbourhood, but in more remote places, and to behold farms, nay, whole districts, brought from a state of poverty to a state of high cultivation, by following the example he had long before set.

When the theory that explains the success of improvements, or the practice of them, has become familiar to us, we wonder that what is so easily accomplished, and is so simple, should have been so long concealed from us, or have been so recently adopted, and this remark will apply with particular force to the present occasion. The practice of producing a fine sward upon upland farms, by the application of manure to the surface, now appears so simple, that it strikes us with astonishment the thought did not occur to others at a more early period; but this wonder will cease when it is known that even to this day, in many parts of the country, the benefit of it remains yet to be discovered. Men who believe the system of farming they pursue admits of no alteration for the better, will of course despise all information derived from agricultural publications; and those who deem it a misapplication of time, or who are afraid that it will be deemed an acknowledgment of their own inferiority to go expressly to view the farms of others, will of course long continue in the practice of their forefathers, however erroneous, and adopt all suggested improvements with caution and reluctance.

It is indicative of Mr. West's disposition to improve, and an evidence of his freedom from prejudice, that he at a very early period adopted the use of gypsum as a manure; conscious that he had much to learn, he was always on the search for information, and he no sooner heard of the beneficial effects which had been experienced from that singular substance, on some of the city lots, than he made further inquiry respecting it, and saw and heard enough to satisfy him as to its utility. Without therefore hesitating as many did, because he could not account for the theory of its operation, he resolved upon its use. The first season convinced him that it was a most important acquisition to the farmer, and the experience of every subsequent year confirmed him in the opinion he had at first adopted. He defended it against the futile and weak objection which he frequently heard urged against it, that it acted upon vegetables like ardent spirits upon the human body, and like them must finally exhaust the powers of the land. He would remind its opponents of the means which it furnished of adding to the vigour of the soil, by means of the great quantity of manure, afforded by the additional number of cattle, which could be maintained from the grass it produced, and which would tend far more to invigorate the soil, than the gypsum would to exhaust it. Much of the fertility to which his farm had reached, he ascribed to the use of that important substance, and his continued confidence in its powers, occasioned the general and extensive use of it in his neighbourhood.

A visit to his farm was well repaid; one saw every thing about the land bearing the strongest marks of industry, care, and skill. The most luxuriant grass every where met the eye; not a weed was to be seen; the fences in the most perfect order, a compost bed ready prepared or in preparation, in the field next to be dressed, and every improvement effected in the most substantial manner. His industry was, indeed, unceasing; for he held it as a point of duty "in every man who occupies land to endeavour, as far as capable, to keep it in an improving state, for the benefit of himself, his connexions, the publick, and posterity. And he who can make an addition or improvement, though small to what is already known, would be doing more good than giving alms all the days of his life."

The construction of his stables, and the accommodations for his cattle, all designed by himself, are superiour to most I have seen; and his stalls are referred to as models worthy of imitation, in two respectable British agricultural publications.

ON OAT PASTURE, AND IMPROVEMENT OF SOILS.

[Philad. Agri. Pub. Vol. 2.]

It is generally acknowledged, that the best land may be reduced to sterility, from an injudicious rotation of crops. It remains in a great measure to be proved, whether a farm, which, from bad management, has been rendered barren, can be restored to its pristine fertility, by a treatment not beyond the reach of every farmer, who possesses the land free from incumbrances which are nearly equal to the supposed value of his worn out farm.

When an inquirer examines the publications of those, who have given the results of their experiments, it appears not only practicable, but easy: frequently, however, some circumstances are not mentioned in the communication, or some thing not attended to by the reader, who intends to make the same successful experiments, but fails, from the causes stated.

The Rockland farm exhibited a subject for experiment, as it had not only been reduced by cropping, but generally, became a common for every animal, to take what remained of the scanty natural, but coarse herbage. Having read in various books the result of sowing plaster and clover, it was presumed, that sowing plaster and clover would be the extent of the expenses required to fertilize the fields, in a few years:—a few experiments proved, that the plaster and seed were both lost, as no one could, at any season of the year, point out what field, or upon what part of any field they had been deposited, unless, where the briars and bushes had been eradicated.

It should, however, have been mentioned that the soil was, generally, a cold clay, loaded with hard blue stone and rocks, chiefly quartz mixed with iron and copper. Some of the experiments were made with plaster, others were made by top dressing with lime, at the rate of twenty-five to thirty bushels per acre: it was formed into a bed of about half a foot thick, and covered with earth, ploughed and thrown over it, before it was slacked. A heavy harrow was afterwards passed over it, so soon as the lime was reduced to powder; the bed of lime and earth was then frequently turned by the plough and harrow, until the whole assumed the appearance and smell of soaper's ashes, containing about ten parts of common soil to one of lime. It was then carted and spread regularly over the field, and in every instance it gave a return of clover, equal to ten loads of stable manure to the acre. The idea of mixing the lime and earth, was suggested from spreading the refuse mortar of lime and sand, gathered from the above buildings, and laid upon the field, the effect of which I observed was more immediate than any equal quantity of lime; though mixtures of lime and earth were equally so, in both cases the lime was equally pulverized, and the sand and earth broke up the communication of lime with lime, and the succeeding rains carried the fertilizing principle of the lime, as from a sieve, into the soil where it was spread; it completely divided the soil, rendering that open and warm, which before was compact, and too cold for the roots of the grain to live in.

The whole soil, which before felt dead under foot, became so elastic, that persons of observation, by walking over the field in the night, distinctly told how far the lime compost and earth extended. The colour of the soil was likewise changed into that of chocolate.

These effects presented several ideas, which had not occurred to me before; viz. that any thing which would separate the particles of the soil, and admit the air, would render these cold and heavy clays warm and fertile; that the free intercourse of air would carry off the acid. To meet this, ploughing in the fall was adopted, and found successful; one half of a field six years ago was ploughed in the winter, the other half ploughed in the spring; that part which was ploughed in the spring, had never brought grain or grass equal to the other. It should have been observed, that the field had not been ploughed for upwards of twenty years, and of course, a great body of rubbish and roots were ploughed in, after the briar hook and grubbing hoe had smoothed the surface. Spreading manure in the autumn from the compost heap has also been introduced with universal success, both upon grain and grass fields; the lye or salts of the manure being carried into the soil by the rain, upon the breaking up of the frosts, which have in some measure prepared the soil to receive it. High agricultural authorities, even bottomed on accurate observation, are opposed to the practice of spreading out manure in autumn; amongst these we find the justly celebrated Lord Kaims, in his Gentleman Farmer, a work upon first principles, and deservedly of the highest authority. A departure from his judgment would only be allowed, where facts would censure silence; nor should his name have been mentioned, unless to avoid the charge of writing without attending to what has been said upon the subject. It is no conclusive objection, that "the strength of the manures will be carried off by winter rains, or exhausted by the frost." Are not the warm rains more exhausting, and are not the exhalations more copious in a warm, than in a cold temperature? Is the descending of the same in trees no monitor, as to the season for spreading out manures, and about the operations of nature, for renewing and invigorating the process of vegetation?*

* Marshall, in his "Minutes of Agriculture," has some very judicious remarks on the application of manures. A *clayey* soil, in winter, he says, resembles a sponge filled with water, and whatever is then put upon it, will not penetrate, but remain on the surface, liable to be washed away by the rains, or to be evaporated. But in

Briar bushes, and all vegetable substances, have been covered up with earth, rotted, and used with the same success as stable manure, and so far, and so long, as they separate the parts of the soil, and admit the air, they fertilize and change the colour of the mould. These experiments, tested by frequent repetition, have laid a foundation for experiments less expensive, and equally fertilizing, for the production of grass and grain.

Ploughing and sowing, for the purpose of producing pasture, and accumulation of vegetable soil, have been adopted. For this purpose, wheat, rye, Indian corn, buck wheat, and oats, have been sown upon fields ploughed, which were incapable of producing any crop; none of these grains have produced pasture and vegetable soil equally valuable with that from the oats. Where the others have failed, its roots have pierced, disarmed, and vanquished the inhospitable soil, and rendered it fertile; the winter ploughing is continued, and the oats are thrown in early as the season will allow, sometimes, even in February; either upon what has been ploughed in autumn, or in the fields which were in corn the preceding year, or in pasture oats, the preceding fall. In general, they afford early pasture, and when they are reploughed in July and August, and sown again with oats, they furnish excellent pasture, from early in September, until late in December, during that season when all other pasture is usually dried up. The first sowing of oats gives only about two months pasture, but the roots and remaining herbage affords a manure for the second sowing, and this always yields four months valuable pasture, which no other course known to me will afford. In September, October, November, and December, considerable attention is required, to preserve the young clover, which the field will be able to raise in the second year of the oat pasture: if sown with the oats in the spring, the cattle should never be put in while the ground is too moist, as they would destroy and tread it into the soil; and sometimes, dry seasons are

summer, such a soil, whose absorbent power, as well as its power of retention, is very great, greedily absorbs the moisture applied to it. The danger in applying manures to light open soils, in the spring or summer, is, that as fast as it liquifies, it will be hurried through the vegetative stratum. In winter, the absorption is more gradual, and there is greater probability of the strength of the manure being incorporated with the soil, than of its descending into the subsoil. EDIT.

Vid. page 298, of No. 3, Vol. 4, Massachusetts Agricultural Repository.

also highly injurious to the clover. When the clover is sown with the second sowing of oats, the same care is required to prevent its being trodden in by the live stock, for this purpose it is always necessary to have a spare field of old pasture, which they will feed upon in wet weather, and which they would not relish in dry weather.

To guard against a dry season, it is most proper never to pasture the oats, where the clover is sown, so much, as to prevent the herbage of the oats from giving shade to the clover. So soon as the field will produce clover luxuriantly, there is no farmer at a loss how to make his fields as rich as he pleases; and having got them into good heart, it will be for his interest to put them in such rotation, as shall increase the vegetable soil, and consequent fertility of his fields.

It is almost unnecessary to mention, what will make its way to the understanding of every farmer; viz. the many advantages gained from treating his barren field in this way.

1st. Early and late sweet pasture from such fields, which otherwise, produces a scant coarse herbage, unpalatable to every animal.

2d. Immediate reward for his labour; the stock are supported by it within two months from the time seed is sown: the two returns give six months green food; he is not however, to depend upon it for all his summer pasture.

3d. It is an easy and profitable way of clearing grain fields from weeds, as it will convert them into vegetable soil, and enable the farmer to raise whatever grain or grass he shall judge most suitable to the soil.

4th. It enriches the farm from within itself, and no expense is required beyond the reach of any farmer: by rising one hour earlier, and working one hour later than usual, he may, for two weeks, plough and sow two acres, as an experiment. The pasture will recompense his labour, while his soil will be greatly improved. It is equally evident, that the fertility of the soil is acquired, partly from the roots of the oats, opening the soil and introducing the air and warmth of the sun, and partly from accession of vegetable soil, produced from the decomposed roots of such pasturage; but even before the roots are converted into soil, they produce the most beneficial effects. Those from the spring sowing, retain the moisture and supply the summer sowing with it. The roots, from the fall pasturage, being full of sap, introduce winter frosts every where into the soil, which, swelling with the congelation, separates the particles; for it is to be observed, that roots, while the stem is eaten down, do not become hard, but are more numerous, than when the plant is matured into grain. It is however, necessary to sow at least double the quantity of seed, to that required for crops of grain; the pasture being so much the thicker, and the increase of vegetable soil from the decayed roots so much the greater.

It is not to be expected, that one or two repetitions of the series of oat pasture, will make the soil equally rich as a common dressing of stable manure, which, from a farm of one hundred acres, will not in general extend over more than ten or fifteen acres; this gives to one acre nearly the vegetable soil produced from seven or ten acres. It is to be remembered, that the object proposed is to render worn out, or barren fields, productive; and in no case have I found a field which was not, after two years oat pasture, capable of producing clover, and received the gypsum with evident advantage. It is in every one's power, to estimate what the ploughing and seeding per acre of oat pasture will cost, and according to circumstances, so will the expenses be; but, in general, where the expenses are high, the value of the pasture is equally so; and if even granted, that the cost of ploughing and seeding be double in value to the pasture produced, let the comparative value of the field be fairly estimated, before the course was begun (a waste, or worn out field) and what it is now, when the course is completed and laid down in clover or other grass.

It will be of the first importance to have at least two, otherwise, if the cattle are constantly upon the same field, it will not be found so productive, and, in wet weather, they should be turned into some field where the herbage was too hard in dry weather. It will be eaten greedily by the cattle, after they have been satiated with the soft blades of the oats. Under this management, beeves have been fatted for family use, and taken off in December without any grain. It is observed, that the oats scour at first, but the free use of salt readily corrects the complaint, and in no pasture do they rise faster in flesh, and the juices of their meat are uncommonly grateful.

The fields, which have been in corn the preceding year, have also been sown in the spring, without being reploughed, and have done equally well, except upon heavy clays, when the spring has commenced with heavy rains, which have rendered the soil too compact to be opened, even with a heavy brake harrow, drawn by four horses. The fields, from the oat pasture the foregoing autumn, have also been sown without reploughing, when the spring has set in without much rain, after severe frost: not only the oat pasture, but the clover sown therewith, have answered well.

Oats have, also, been sown among the hills and drills of corn, after it has received the last dressing. It has succeeded without any visible injury to the corn, provided care has been taken not to injure the roots by the plough or harrow, at the time the oats were sown.

It has been inquired, are not all crops of oats exhausting? If so, how can two sowings of oats in the same year, render the soil fertile? It is granted, if oats shall be matured into seed, they will certainly exhaust; but if cut off while in the blade, they, and all culmiferous plants, will fertilize. The experiment was made with Indian corn, sown broadcast, cut twice, and carried to the stable, and a crop of turnips taken off the ground the same season: the manure was laid on before the corn was sown, but none was given when the turnip seed was put in.

Another way, in which oats fertilize, appears to be from increase to the vegetable soil; this is within the view of every observer; the remains of the pasture ploughed in, particularly in July and August, is speedily decomposed, its tenderness and moisture aiding the dissolution. But dry stubble and husky roots are with difficulty decomposed; nor do they produce so much carbonic or coally matter in the soil, which chemists say decomposes the water, and produces the air required to promote vegetation. As the vegetable is produced from air and water, and not from earth, which seems to be no more than the laboratory where the process of vegetation commences, and, finally, serves as a matrix to hold one part of the plant, while the other parts are raised aloft in quest of superior aid, to complete the inscrutable operations of the vegetable fabric. It has also been inquired, will this process of oat pasture fertilize every where? It is answered, that where the soil and climate are the same, the effects will be the same also. A description has been given of the soils, where the experiments were made, and are still going on. If experiments of the same nature shall be made upon a different soil and climate, the result will be different, and more or less favourable, according to circumstances, and for which the practice now mentioned cannot, in justice, be rendered accountable. Whoever makes the trial should be careful not to take a crop instead of the pasture in the spring. If it shall still be inquired, how does the oat pasture fertilize? It may be also observed, that the constant verdure and green herbage prevent the rays of the sun from parching the soil, and depriving it of its moisture and air, both of which are highly necessary to vegetation. The double portion of juicy vegetable matter, arising from the two crops of pasture in the same summer, being every where united with the common soil, partly mechanically and partly chemically, renders the soil capable of retaining sufficient moisture and elastic air, to make it open and warm, and by which the soil does not only become thicker by going downwards, but actually expands or rises, so as to give a furrow considerably deeper than formerly, over immoveable rocks. Some years ago, a field in view of the farm house, marked the broad rocks, during the course of every crop; they are now covered with so much soil, that they are seldom observed. The two ploughings *also* contribute to the increase of the air in the soil, without which no soil can be fruitful. Tull's horse hoeing husbandry was introduced under the idea, that the *pabulum* of plants was pulverized earth; the fact daily before us, that *pulverized earth retains the moisture and air, as the handmaids of vegetation.* Some experiments have lately been made, the results of which favour these remark, viz. that *soils* afforded quantities of *air* by distillation, somewhat corresponding to the ratios of their value.

Note, by the Editor of the Philadelphia Agricultural Memoirs.—The samples of soils (treated according to the method recommended above) sent by Mr. Young, exhibited the most marked difference. The progress, from absolute sterility to rich mould, might be traced by the colour of the several parcels. I, with great pleasure, bear testimony on the subject of Mr. Young's improvements. In the years 1806 and 1808, I saw cattle feeding in good pasture, and good crops of grain and grass growing in fields, which, in 1804, I thought totally irreclaimable from briars, garlic roots, and original poverty of soil. Where manure is at hand, and capital in the possession of the cultivator to purchase it, any soil may be rendered fertile; but Mr. Young affords the best example of good farming, viz. enriching a naturally poor soil, and restoring fertility to exhausted land, by returning thereto its own produce, raised with the least possible expense.

J. M.

MR. BENJAMIN HALE'S ACCOUNT OF THE SAVING MADE BY THE USE OF HOTCHKISS'S STRAW CUTTER, EMPLOYED TO CUT HAY AND STRAW AS FODDER FOR HORSES.

Mr. Hale is proprietor of a line of stages running between Newburyport and Boston. He says,

	Tons.	*cwt.*	*q.*	*lb.*
The whole amount of hay purchased from April 1, to October 1, 1816, (six months) and used at the stage stable, was - - - -	32	4	0	10

At twenty-five dollars per ton (the lowest price at which hay was purchased, in 1816) - - $800 00

From October 1st, 1816, to April 1st, 1817, whole amount of hay and straw purchased for, and consumed by the same number of horses, viz.

	T.	*cwt.*	*q.*	*lb.*	*Cost.*
Straw - -	16	13	3	10	$160 23
Hay - -	13	14	1	00	350 00
					$510 23

Deduct, on hand April 1st, 1817, by estimation, four tons more than there was Oct. 1st, 1816, at $25 per ton 100 $410 23

Saving by the use of Hotchkiss's straw cutter, four months of the last six months, or the difference in expense in feeding with cut-fodder and that which is uncut - - - - $389 77

Whole amount of hay used for the horses of the Salem stage, twenty-five in number, from April 1st, to October 1, 1816, viz. - -	*T. cwt. q. lb.* 22 0 0 0		
At $30 per ton (the lowest price in Salem) - - - - - - -			$600 00
Whole amount consumed by the same number of horses, from Oct. 1, 1816, to April 1, 1817.			
	T. cwt. q. lb.	*Cost.*	
Straw - -	15 13 0 0	$187 80	
Hay - -	2 15 0 0	81 09	$268 80
Saving in using chopped fodder five months			391 20
Total saving in using the straw cutter nine months, viz. at Newburyport four months -			389 77
At Salem five months - - - - - -			391 20
Total - - - - - - - - -			$780 97

The member of the Board of Trustees of the Massachusetts Agricultural Society, to whom the above account was communicated by Mr. Hale, was informed by that gentleman, that he used no more grain from October, 1816, to April 1817, than was used from April 1816 to October 1816.

MISCELLANY.

There is an experiment related by Dr. Roebuck, in the Edinburgh Transactions, Vol. I, which seems to shew, that the grains of oats continue to fill and to become heavier even during the autumnal frosts, which may, probably, be the case during the sunshine of the middle part of the day, as occurs in the vernal frosts of this part of the country. In 1780, near Burrowstoness, the oats were green even in October, when the ice was three-fourths of an inch thick. He selected several stalks of oats of nearly equal fulness, cut half of them, and marked the remainder, which continued fourteen days later in the field; after being dry the grains of each parcel were weighed, and eleven of those grains, which had remained in the field, weighed thirty of those which had been cut a fortnight sooner.

This important experiment should teach our farmers not to cut their peas and beans too early in inclement autumns; which are so frequently seen to become shrunk or shrivelled in the barn or granary, and inclined to rot from deficient ripeness, and consequent softness or moisture; and thus contain much less flour, in proportion to the husk or bran.---*Darwin's Phytologia*, p. 406.

The Bredon lime stone, in England, contains magnesia, in the proportion of one half, and is valuable as manure, in soils which abound with vitriol of iron, or with gypsum (plaster of paris) as the magnesian earth would unite with the vitriolic acid, and leave an ochre of iron in one case, and lime in the other; at the same time a soluble salt, called Epsom salt, would be formed, which, according to the experiments of Dr. Home, promotes rapid vegetation.---*Darwin's Phytologia.*

It will be found advantageous to steep many kinds of grain in the black liquor which oozes from manure heaps. It is believed in China to forward the growth of the plant, and to defend it from a variety of insects, according to the information given to Sir George Staunton. Mr. Chappel, as mentioned in the Bath papers, found great benefit by steeping barley in the fluid above mentioned, for twenty-four hours.

Whether Beans and Peas, or Oats, are preferable in respect to economy, as provender for horses.—A bushel of oats weighs, perhaps, forty pounds, and a bushel of peas and beans perhaps sixty pounds; and as the skin of peas and beans is much less in quantity than that of oats, I suppose there may be fifteen pounds of flour more in a bushel of peas and beans, than in a bushel of oats. There is also reason to believe that the flour of beans is more nutritive than that of oats, as appears in the fattening of hogs; whence, according to the respective prices of these articles, peas and beans generally supply a cheaper provender for horses than oats, as well as for other domestic animals. But as the flour of peas and beans is more oily than that of oats, it may in general, be somewhat more difficult of digestion, hence it may be found expedient to mix finely cut straw with them.

Gardeners, in general, prefer new seeds to old for their principal crops, as they are believed to come up sooner, and with greater certainty, and to grow more luxuriantly. But peas and beans of a year old, Mr. Marshall observes, are by some preferred to new, as not so likely to run to straw. And cucumbers and melons are best to be several years old, as they shoot less vigorously, and thence become more fruitful. But this principle is carried too far by some gardeners, who say, these seeds cannot be too old, and will allow ten years to be within bounds; three for cucumbers, and four for melons, however, is age enough.

Peas and beans, says Marshall on gardening, will germinate very well at seven years of age; but the seeds of lettuces and kidney beans, and some others, are not to be depended upon after a year or two, and, generally speaking, the smaller seeds are of the least duration.

[The following Certificates, in recommendation of Mr. Luke Johnson's apparatus to facilitate ploughing, were not received in season to be inserted with Mr. Parsons's Letter on the same subject.]

Brighton, July 11th, 1817.

SIR,

In conformity to your request I have the satisfaction of stating to you my opinion of your new invention for assisting in ploughing. During the time we made use of it, I was convinced that it saved a very considerable part of the team, that would otherwise have been required; besides, I have observed the cattle are relieved, in consequence of lessening the pressure on their necks, and the plough runs more steadily. We were convinced of the utility of the machine, having attempted to plough a piece of land without it, I was necessitated to leave it for the want of more team. The following day, with the same team and plough, and with the assistance of your machine, we were enabled to plough the land without difficulty.

Respectfully, yours, &c.

FRANCIS WINSHIP.

I the subscriber having made trial of a machine, invented by Capt. Luke Johnson of Leominster, for the purpose of aiding cattle in drawing a plough, am satisfied that ploughing may be done with said machine, with about one fourth part less power than without it; also, that the hinder cattle are relieved from the heavy pressure on their necks, and likewise, from having their legs galled with the chain, when turning.

HENRY LARNARD.

Brighton, July, 1817.

We the subscribers hereby certify, that we have tried a machine, invented by Capt. Luke Johnson of Leominster, for the purpose of drawing a plough; and from the trials we have made we are satisfied, that a considerable saving can be made by using said machine, as by the aid of it ploughing can be performed with about one fourth less number of cattle than without it, and we think it will prove a useful improvement, and recommend it to the notice of farmers.

January, 31, 1817.

WILLIAM NICHOLS,
LEVI NICHOLS, 2d.
PETER JOSLIN,
SILAS ALLEN,
JACOB FULLAM,
JAMES CARTER,
THOMAS ROBBINS,
DANIEL NEWHALL,
WILLIAM BASCOM,
BEZALEEL LAWRENCE,
SILAS RICHARDSON,
MOSES EMERSON,
PAUL WILLARD,
NATHAN WILLARD,
WALLIS LITTLE.

The subscriber hereby certifies, that he has tried a machine, invented by Capt. Luke Johnson of Leominster, for the purpose of drawing a plough, and from the trials he has made, is satisfied that a considerable saving can be made by using said machine, and thinks ploughing can be performed with about one fourth less team than without it. The plough runs more true than without said machine, and the hinder cattle are considerably favoured on the neck, by the chain not chafing, when turning.

EDWARD SPARHAWK.

Brighton, July 12th, 1817.

CATTLE SHOW AND EXHIBITION OF MANUFACTURES, AT BRIGHTON,

ON THE SECOND TUESDAY OF OCTOBER, 1817.

THE Trustees of the Massachusetts Society for the promotion of Agriculture, encouraged by the renewed patronage of the Legislature of this state, intend to bestow in premiums, not only the sum granted by the government for this purpose, but also the whole amount of the income of their own funds. They therefore announce to the public, their wish to have a Cattle Show, and Exhibition of Manufactures, at Brighton, on the second Tuesday of October, 1817; and they offer the following Premiums.

FOR STOCK.

For the best Bull raised in Massachusetts, of any age,	$ 40
For the next best do. do. - - - -	25
For the best Cow, not exceeding eight years old, -	40
For the next best do. do. - - -	30
For the next best do. do. - . - -	20
For the best Ox, fitted for slaughter, and weighing not less than 1800 wt. - - - - - -	50
For the next best do. do. not less than 1500 wt. -	40
For the next best do. do. not less than 1300 wt. -	30
For the best pair of working Cattle, not exceeding eight years old - - - - - - -	40
For the next best do. not exceeding eight years old, -	30
For the next best do. of any age, - - -	20
For the best Merino Wethers, not less than six in number,	20
For the the next best do. - - do. -	10
For the best native Wethers - do. -	15
For the next best, - - - - .	10
For the best Merino Ram, not less than three years old,	20
For the next best do. of any age, - - -	10
For the best Merino Ewes, not less than five in number, and two years old, - - - - - -	30
For the next best do. do. - - - -	15

For the best Boar, not exceeding two years old, -	10
For the next best do. - - - -	5
For the best Sows, not more than four years old, and not less than two, and two in number, - -	10
For the best Store Pigs, not less than two in number, and not more than two years old, - - - -	10
For the next best do. do. do. - - - -	5
For the best Bull hereafter imported by a citizen of Massachusetts, having regard to the adaptation of the breed for meat as well as dairy, - - - -	100
For the next best imported do. - - -	75
For the best milch Cow, imported, - - -	75
For the next best do. - - - -	50

Any of the above stock, when raised, and still owned, at the time of exibition, by the person who raised them, will entitle the claimant to an allowance of ten per cent. in addition.

FOR AGRICULTURAL EXPERIMENTS.

To the person who shall raise the greatest quantity of wheat on an acre, on a tract not less than one acre, specifying the nature of the soil and culture. - -	40
To the person who shall raise the greatest quantity of carrots, potatoes, or turnips, having regard to the quantity of land and mode of culture, - . - -	40
To the person who shall introduce any new vegetable or grass, and prove, by cultivation, its superiority to those now in use, or its being a good substitute for them, -	30

INVENTIONS.

To the person who shall invent the best, simplest and least expensive machine for thrashing wheat or any small grains,	75
To the person who shall invent the best and simplest, and least expensive machine for sowing small seeds on an extensive scale, - - - - -	30
To the person who shall invent the best plough for common purposes, - - - - - -	20
To the person who shall introduce the drill plough, and apply it successfully to the culture of any small grains or seeds, - - - - - -	20

To the person who shall produce at the show any other agricultural invention, which shall, in the opinion of the Trustees, deserve a reward, - - - - 20

FOR DOMESTIC MANUFACTURES.

To the person or corporation who shall produce the best specimen of fine broadcloth, not less than six quarters wide, and 100 yards in quantity, from wool grown in Massachusetts, and manufactured within the same, - - 50

To the person who shall produce the best specimen of broadcloth as aforesaid, not less than 100 yards, : - 30

To the person who shall produce the best specimen of broadcloth as aforesaid, manufactured in his family, and not less than twenty yards, - . - - 20

To the person or corporation who shall produce the best specimen of cotton cloth, manufactured in this state, not less than fifty pieces. - - - . - 20

To the person who shall produce the best specimen of any other fabrics of wool or cotton, or both, manufactured in this state, in public factories, - - - 20

In private families, - - - - - 20

It is understood, that whenever merely from a want of competition, any of the claimants might be considered entitled to the premium, under a literal construction, yet in the opinion of the Judges, the object, so offered, is not deserving of any reward, and is not superiour to many similar ones not offered, the Judges shall have a right to reject such claims.

Persons to whom premiums shall be awarded, may, at their option, have an article of plate with suitable inscriptions, in lieu of the money. Premiums will be paid within ten days after they shall be awarded. The rules and regulations of the Cattle Show will be made known some weeks before it will take place.

By order of the Trustees,

J. LOWELL, *Chairman of the Committee for Premiums.*

MEMBERS ELECTED SINCE JANUARY, 1817.

[The name of John Parkman, Esq. of Brighton, and that of Daniel Parker, Esq. of Paris, an honorary member, were accidentally omitted in the list of members contained in the last No. of the Repository.]

NEW MEMBERS.

Hon. Daniel Waldo, *Worcester;* Hon. Samuel Dana, *Groton;* Mr. Robert Lapish, *Bangor;* Mr. Nathaniel Chandler, *Petersham;* Hon. William Abbot, *Castine;* Mr. Isaac Locke, *West-Cambridge;* Dr. Eliakim Morse, *Watertown;* Marshall B. Spring, Esq. *Watertown;* Hon. James Humphries, *Athol;* Hon. William Moody, *Saco;* Gen. Ebenezer Mattoon, *Amherst;* Mr. Samuel G. Derby, *Weston.*

Note. The sum of *five dollars* is assessed upon each member on his admission, on payment of which to the Treasurer,* he will be entitled to receive all the publications of the Society, without further expense, during life.

HONORARY MEMBERS, NEWLY ELECTED.

Sir Joseph Banks, *Baronet;* Sir Benjamin Hobhouse, *Baronet--President of the Bath Agricultural Society, in England;* Nicholas Hammond, Esq. *of Easton, Maryland;* James Wadsworth, Esq. *Canandaigua New-York;* Herman Le Roy, Esq. *New-York.*

The price of the *Repository*, for the future, will be fifty cents each number.

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* John Prince, Esq. Boston.

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