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AMERICAN

QUARTERLY JOURNAL

OF

AGRICULTURE AND SCIENCE.

CONDUCTED BY

DR. E. EMMONS AND A. OSBORN ESQ.

VOL. III.

FROM JANUARY TO JUNE.

ALBANY:
PRINTED BY J. MUNSELL,
No. 58 State Street.
1846.

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391

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NUMBER ONE.

APR 15 1942

NUMBER TWO.

Respectfully Yours
Silas Wright

AMERICAN QUARTERLY JOURNAL

OF

AGRICULTURE AND SCIENCE.

JANUARY, 1846.

PORTRAIT OF GOVERNOR WRIGHT.

With this number we present our patrons with a fine steel engraving of His Excellency Silas Wright, Governor of the State of New York. In this act we by no means wish our friends to infer that we are treading, or intend to tread, upon political ground. The engraving is given in obedience to the desire which is manifested among the great body of the people to possess works of this character; and in obedience to this desire, we intend hereafter, should the Journal be sustained, to embellish it in this manner. Mr. Wright has now attained that period of life when the judgment and intellect have reached the highest stage of developement—when the physical, intellectual and moral man, sustain and invigorate each other—when the hand to execute is strong and unfaultering—the capacity to devise the greatest, and that of doing good, the widest. It is at this period that the character becomes national, and when what a man says and does lives the longest in posterity, and remains a monument of his folly or wisdom, when his earlier or later acts will be forgotten.

THEORY OF AGRICULTURE.

The formulas by which men express their beliefs, are not regarded by enlightened minds with indifference, or as useless. It may be, that they are often erroneous; and it may be, too, that if not erroneous in the main, they contain errors of minor importance. Still, few are found at the present day who on this account are willing to discard theory, or formulas of belief, as we have here termed them. Indeed it is impossible to throw those formulas entirely aside, and rest solely upon matter of fact expressions, and stand substantially upon a creedless foundation. We may indeed go farther and say that it is impossible for us to think without becoming theorists, or framing substantially for ourselves crude formulas at least; and we say, also, that to such a result all our thinking should tend, and the more distinct and clear our theoretical views the better; and farthermore, if our reflections do not end in something of the kind, they are decidedly defective, and we are in danger of losing those benefits which might accrue to ourselves by stating in brief and comprehensive terms, what we are authorized to believe on the one hand, and what we are bound to deny on the other. It is true, and this we by no means would forget, that what we have here prescribed, may not be possible in some cases, on account of the paucity of our facts; or the data in our possession or within our reach may be quite insufficient to warrant such a statement of our beliefs, and give them an intelligible expression. Still, our aim should be to reach this end, and this should be the object of our investigations.

We have said that men rarely think without theorizing also; and though many agriculturists (the class for whom our remarks are now intended), may deny it in words and even speak disparagingly of theory, still these very men when closely scanned will be often found to be theorists of the worst kind; that is, of a class properly denominated speculators, who never take the trouble to substantiate their views by facts. In agriculture bare speculations are always to be deprecated, or at least to be considered useless, for it is a complicated science, involving considerations and subjects of a complex nature; and even when interrogated by well conducted experiments, the mysteries of vegetable physiology are rarely fully removed. This admitted, however, it does not render it improper to form judgments expressive of our belief; especially where they are based on observation and experiment: and even when these fail, analogy holds out important lights by which we may form at least rational hypotheses, provided a common sense view of the matter in question is taken: and we are more secure from error the closer our opinions conform to the simplicity of nature. This course is especially the true one, where different opinions are entertained by distinguished men, for past experience proves that truth is more likely to be found upon that side which is the simplest, and where the main points lie nearest to a straight line.

Complexity, then, so far from being an objection to the use of that function of the mind which is termed theorizing, it is upon those very subjects that we shall derive the most advantage—and which needs it the most. It is this view of the subject which induces us to offer to our readers the theory of agriculture, which we have been led to adopt—views founded partly upon the experiments and observations of others, and partly upon facts which we ourselves have observed.

Our creed is not, however, set forth as above attack, or without fault. All we would claim for it, is an approximation to the true. We do, however, entertain the hope that we shall advance to a true theory, which we doubt not, for ourselves, is a great desideratum in agriculture. We are constrained to entertain such a belief, both from what we know of the intellect, and from its achievements in science. It is here that we have a promise of a better day. We may look with pleasure at what has been done in astronomy, as an indication of what may yet be done for agriculture. Here one of the early, though great achievements, was the determination of the true motion of the planets, from which has been deduced the universal law of gravitation—a theory of universal application. But before this great achievement could be effected, more than two thousand years of observation were required. Such a period must elapse before a just theory of the heavenly bodies could be proposed, or before their mechanical adjustment could be understood. Each observation must be regarded as a step to the accomplishment of this end. Indeed truth, under whatever name it is sought, whether astronomy, geology, or chemistry, or agriculture, can only be attained in this way—that is, in a patient, unprejudiced investigation. In the spirit of patience, then, we may hope and expect that there is nothing too great to be attempted, and nothing too minute, which may not be studied with present profit, or with a prospective value.

We have said that the true theory of agriculture is difficult of attainment, in consequence of the complicated nature of the questions which must first be solved in our experiments and observations. This renders it necessary that we should disengage it, as much as possible, from all extraneous questions: all those which do not strictly belong to it. We must consider it in its simplest aspect. We need not regard climatology, for instance, as at all connected with the theory of agriculture; so there are many questions in vegetable physiology which are strictly special, and need not be taken into consideration.

A theory of agriculture, when reduced to the most general expression, or what is the same thing, when comprised in one or more formulas, should express the relation subsisting between the products of vegetation and the forces to which they are due; or to give another expression to an idea equally general, they should express the mutual dependenee subsisting between the vital functions of plants and the inorganic matters which surround them. In such a formula would be comprised a view of the origin of the products of organization, together with the variations in the products which may result from an exposure to a variety of causes.

The range of such a formula does not require that we should know what life is, in the abstract, nor *how* living organized matter acts upon the dead, in order to assimilate it; neither is it required that we should determine aforehand whether life is an independent principle, or whether it is a mere result of chemical and physical action.

With these preliminary remarks, we proceed more directly to those points which bear upon the subject before us.

In the first place, it will be necessary to say a few words upon the elements concerned in vegetation, by which we mean the proximate elements, rather than the simple undecompounded ones; for the former are rarely, if ever, received uncombined into the vegetable tissues. The whole number of elementary bodies now known amounts to 54 or 55; but of this number only about fourteen are of importance in vegetation. Even of these, only a few seem to possess such a general range of affinity as to be always present in a vegetable tissue. We are in the habit of estimating the importance of a substance by the frequency of its presence and the quantity or per centage in which it enters into combination. There is sometimes, however, an importance which is not indicated by this rule; for instance, oxygen, which constitutes nearly one-half of the solid matter of the globe, has an importance above other elements, which is not measured by quantity or universality; thus in the execution of a function, it possesses a pre-eminence, and may be termed, with propriety, a controlling element.

No organized being is destitute of it, neither in the condition in which things are constituted here, can any living thing exist without it. Indeed, they seem to have been created with a direct reference to it, and to be so subordinated to its properties that life is conditioned upon its existence.

Carbon, too, ranks high as an element in all organized bodies. As a solid material, it is more abundant in the vegetable kingdom than all the rest put together; though, in some structures its quantity is less; still, compounding the whole together, it is vastly greater. It can hardly be said that in this state, and in this condition of things, it is absolutely essential to life. Its relations to life are certainly different, and its functions are of a different kind. Oxygen, for example, stands in such a relation to the function of respiration, a function never absent in any living thing, that life is at a stand, when it is interrupted. We cannot say this of carbon, or any other solid. In this matter, we do not mean to be understood that there are not mutual relations and mutual dependencies, and hence in many instances it would be improper to speak of one element as possessing an importance greater than another.

The atmosphere, as is well known, is the great source of oxygen. It constitutes four-fifths of its material. Water is the great reservoir of hydrogen, where it is found in the proportion of 15 to 85.

Sulphur, phosphorus, lime, magnesia, iron, silex, and alumine, compounded with oxygen, are often elements essential to the perfect constitution of organized matter. It is unnecessary to speak of the distinctive properties of these substances—these may be known by reference to any elementary work on chemistry. Constituted as soil now is, every element which we have named is found in it. Carbon, in combination with oxygen, exists as an acid in combination with the alkalies and alkaline earths. It is also found dissolved in rain water, in the soil, and forms the base of all vegetable products, under whatever name they are known, as humus, humic acid, crenic and apocrenic acids, peat and muck. As carbon forms so large a proportion of vegetable matter, the source from which it is derived by the growing plant, has been the subject of much speculation. A contrariety of opinion is known to exist.

The source of carbon, according to a distinguished chemist, is the atmosphere; and as the vegetable tissues are composed of a very great per centage of this substance, it is maintained that the only adequate quantity can be found in the atmosphere which the leaves of plants can abstract, and which is then conveyed, after due elaboration, to distant parts of the individual.

The views of Liebig are based on experiments instituted by Saussure, for the purpose of ascertaining the fact of the absorption of carbonic acid by the leaves of plants. Besides, Liebig states that the carbon of soils, that of humus for instance, is comparatively insoluble, and hence cannot be received into the vegetable tissue. Humus or mould, requires for solution 2500 parts of water, converted into humic acid it enters into combination with the alkalies and earths, and forms humates of lime, potash, soda, magnesia, &c.; these are more soluble than humic acid;—besides, humic acid is only soluble when recently precipitated. When dried, or when it has been exposed to frost, it becomes comparatively insoluble. When mould has been acted upon by 100,000 times its weight of water the fluid remains colorless, and contains but a trace of it in solution.

Hence, it is the opinion of Liebig, that humus, as it exists in the soil, does not yield the smallest quantity of nourishment to plants.

To present the case, however, in a still stronger light, Liebig goes on to show by calculation, that all the salts of humic acid which are found in the soil are insufficient to furnish nutriment to growing vegetables; for a Hessian acre of woodland produces annually 2920 lbs. of dry wood, which contains 6.17 lbs. of metallic oxides. But reasoning from the composition of the humates only, 100 lbs. of carbon will be formed in one year on an acre of woodland, if there were no other source of carbon than that of the soil in which they grow, which of course makes a great deficiency of matter, for there is really produced no less than 2920 lbs. of wood, the greater part of which is carbon.

To fortify his position still farther, Liebig goes on to speak of the produce of an acre of wheat, the straw of which amounts to 1961 lbs., the composition is known to be the same as woody fibres, but the quantity of woody of woody fibre which can be introduced into a crop of wheat straw, would be only 93 lbs. which would correspond to 63 lbs. of humic acid. So also it is shown that the quantity of humates which can be introduced through the medium of rain water, providing none of it was lost by evaporation, is totally insufficient to meet the demands of any growing cultivated crop. A Hessian acre receives 771,000 lbs. of rain water during the months of April, May, June, and July, the four months during which the matter of grown crops is accumulated. This quantity of water will take up and convey to the tissue of plants only 330 parts of humic acid, since one part of humic acid requires 2,500 parts of water for solution.

But the same quantity of land produces 2,843 lbs. of corn, exclusive of roots; 22,000 lbs. of beet, exclusive of leaves and radical fibres; 2,920 lbs. of wood, consisting of firs, beeches, pines, &c.; and 2,755 lbs. of hay. One hundred parts of dry fir-wood contain 38 parts of carbon, which amounts to 1,109 of carbon in 2,920 lbs. One hundred parts of hay contain 44.31 parts of carbon, equalling 1,111 of carbon in 2,755 lbs. In 22,000 lbs. of beet root there are 1,032 lbs. of carbon, of which 833 lbs. belong to the sugar, and 198 lbs. to the cellular tissue. One hundred pounds of straw contain 745 of carbon, hence 1,961 dry straw yield 745 lbs. carbon.

From these facts Liebig founds the doctrine that humus or mould is not the source from which plants derive their carbon, and as the atmosphere is the only great reservoir of carbon, from it plants must of necessity obtain this element.

To this doctrine Bousingault also subscribes. He says that* the decomposition of carbonic acid by plants is admitted; we have still to examine whether, in the phenomena of vegetation, the leaves decompose the carbonic acid of the atmosphere directly, or the acid gas previously dissolved in the water which moistens the ground, and thus be conducted by the way of absorption into the tissues of vegetables, there to suffer decomposition. This question, whether the carbonic acid in the tissues, is derived from

* Rural Economy, p. 40.

the atmosphere surrounding the leaves, or from the soil, Boussingault seems to consider settled in favor of the latter source, by his own experiment detailed p. 41 of Rural Economy. Thus in our experiment, where the air contained 0.0004 carbonic acid, after it had passed in a current over the branch of a vine in a glass balloon, it contained only 0.0001 carbonic acid, three-fourths of the whole quantity having been absorbed by the leaves of the vine. He says, nevertheless, that in operating with the same apparatus in the night, opposite results were obtained. The air in traversing the balloon generally acquired a quantity of carbonic acid, the double of that which the atmosphere contained at the same moment.

This being the fact, it appears to us to prove one thing, viz., a constant supply of carbon under all circumstances, by night or by day for the soil, though it may be that it is only assimilated during sun light; but this is not proved, for there are some facts which seem decidedly opposed to this view: some vegetables grow far more vigorously in the night; the hop, and especially the pumpkin vine: the latter has been known to grow five feet in three nights. In this instance there must have been a fixation of carbon in the absence of light. But this is not the place for the discussion of this point.

In the preceding pages we have seen that Liebig takes the ground, that the atmosphere furnishes *all* the carbon of plants, and his views are so expressed that most readers, if not all, understand him as saying, that the carbon is taken directly by the leaves from the atmosphere, and that it is not introduced into the tissues by the roots. It will be seen, too, that this doctrine rests on what is put forth as a fact, that the quantity of soluble carbonous matter is totally insufficient to furnish the amount of carbon which is yearly taken up and fixed by any cultivated crop, or even the amount which is fixed in a forest, consisting of pines, firs, maples, beech and birch.

It is time now to examine the truth of this doctrine. What we propose to prove is, that, contrary to what Liebig says, there is an abundance of soluble matter containing carbon in the soil, in proximity to the roots, the very organs which nature seems to have designed for taking up carbon, or nutriment, and conveying it to the tissues of the plant. But that we may not be misunderstood we deem it proper to state that we by no means intend to question the results of Saussure, Liebig or Bousingault in their experiments on the action of leaves on the carbonic acid of the atmosphere. But finding in soils and waters the *nutriment* of plants, we infer it is from these sources *principally* that plants derive their carbon and other matters necessary for their growth and perfection.

In our examination of soils of New-York, as well as many others, we have taken one or two hundred grains and infused it for several days in five or six ounces of rain water. We then evaporate the solution in a porcelain dish, until it is reduced to almost half an ounce; when the evaporation is completed in a platinum capsule; and we continue the evaporation until the contents are perfectly dry, or even browned, in order to expel all the water in combination with the residual matter. This is then weighed in the capsule, previously balanced, while hot; then the capsule with its contents is exposed to a red heat so long as it loses weight. The loss is vegetable and animal matter; principally the former.

Now the amount of soluble products obtained in this way varies from 0.75 gr. to 2.00, sometimes more than two grains. The soils which are known to be poor and unproductive, without exception, furnish the least vegetable soluble matter.

Now the products obtained in this way consist of crenates and apocrenates of lime, magnesia, or vegetable acids in combination with alkalies and alkaline earths. Crenic acid is a yellow, uncrystalizable substance, with an astringent taste, and soluble in alcohol or water. The apocrenic acid is brown, uncrystalizable and astringent, but far less soluble than crenic acid. They both resemble the ordinary vegetable extracts, and are undoubtedly taken without change into the vegetable tissues by the roots.

From these facts it follows, that the soil at any one time contains a great abundance of the food of plants in a form and condition to supply, not only carbon, but the alkalies and alkaline earths; most of which are important matters in the vegetable economy. We see, too, that the state and condition is such as to be well adapted to the wants of a growing vegetable; that is, in such a state of union or combination as to supply food in a state the best adapted for its assimilating powers. The amount of the available soluble crenates and apocrenates is over and above twenty tons to the acre in a depth of soil not exceeding one foot. But farther; we have found in all our spring and well waters, more or less of the crenates of the alkalies and alkaline earths—also in our marls, and even in the stalagmites of caverns, though white as snow, the same substance. A matter, then, which is so generally diffused, so abundant in soils and in waters, and withal so well adapted, by its composition, to the wants of vegetation, cannot be without its use and influence in the vegetable kingdom. Nay, farther, we say that the common-sense view of this subject, we believe the right one, the most philosophical and most agreeable to known facts.

Dr. Jackson informs us that he has used the organic salts with great success in the cultivation of plants; that they promote in a remarkable manner the growth of vegetables. Here we have proof direct of their influence upon vegetation.

We should state in greater fullness Dr. Jackson's views of the use and function of the organic acids, or rather salts. But as they are found detailed in his Rhode Island and New-Hampshire Reports, and also in President Hitchcock's Report of Massachusetts; and as we expect something farther from him, we do not intend to dwell upon this part of the subject now. We will only extract a few paragraphs from a letter just received from him, in which he alludes to the vegetable compounds. He says:—"Crenic acid probably is always combined with lime in your district, as it is often here. It is a valuable manure, but is not so rich in nitrogen as the apocrenic. Crenic acid contains 6 per cent of nitrogen; apocrenic 15 per cent. Crenate of lime is soluble; apocrenate nearly insoluble, but is readily decomposable by the alkaline carbonates. Organic manures disengage carb. ammonia which decomposes all crenates and apocrenates and humates, and makes ammoniacal combinations, which are powerful manures. Even bog iron gives up its apocrenic and crenic acids. Hence, the benefit of manures, and of alkaline carbonates on ferruginous soils. Soils without organic matter never have been made to bear perfect plants with fruit or seed, all statements to the contrary notwithstanding. I repudiate, for I know by numerous trials, that the experiments cannot be made, for fungi and masses will invariably vitiate the experiment by their growth. I could not, in any of my experiments, prevent green mosses from growing in granular quartz, and forming a primary mould, nor could I prevent some of the roots of the plants from decaying and forming mould. Hence all experiments on this subject are futile. In pure water, plants soon die. In apocrenate of potash, they live and do well, and the color gradually disappears from the brown apocrenic solution."

The common experience of all experimenters, in regard to the growth of fungi, in all places and under all circumstances, coincide with the statements of Dr. Jackson. They plant themselves upon the trunks of trees, living and dead, upon rocks exposed to the sun, or in the shade, on the cold, inhospitable mountain top, and in the mild and fertile valleys, stretching along its base; in the deep, dark and damp mine, upon the roofs of our houses, and in our cellars, and indeed everywhere where the atmosphere penetrates, they are seen, first in a light green film upon the surface, then in the minute branching form of miniature trees and forests, and finally they become a thick green matting of evergreen moss; or it may be only a dry foliaceous covering of lichen, fit for the food of the reindeer and other herbiverous quadrupeds. They are every where the harbingers of a more vigorous vegetation. Burn your soil, drench it with acids, or make an artificial one of the hard, grinning quartz or granite, and the moss and lichen will seize upon it as their domain, and plant their rōotlets upon its surface, and bring forth their generations. Such is their hold upon life that we may dry them till they crisp and break in our hands, or steep them for months, still they bear it, and spring forth with increased vigor when we cease to torture them. In all these facts, we see the operation of an Intelligent Cause. These life-tenacious beings are sown broadcast through the universe of matter, that they may preoccupy the barren fields, and prepare for the more noble and useful generations which form our forests and our meadows. When their office is so fulfilled, and their functions as living orgasms finished, they die and leave their ashes to fertilize the spot they had humbly adorned in their lives, while their seeds or spores float in the air till they light upon some other barren, which they may reclaim, by their humble office, to the use of the more perfect, but less hardy tenants of the soil. We see, then, how it is in all attempts to cultivate plants in a soil destitute of organic matter; for in attempting it we are braving a law of nature; as the orgasms of which we are speaking are invested with a law; the places where they plant themselves, and which nature has given them power to do, are the very places which we select for our experiments, and they are enabled to fulfill the law, both by their constitution, and by the infinities with which their seeds or spores are produced.

We see another law in all these arrangements, which we cannot forbear to mention in this place. It is the law of succession, a law which dimly shadows forth the future—which is prophetic of the life which is yet distant—perhaps not yet in embryo. Life, whether vegetable or animal, begins, as we have seen, with the little and the humble. In vegetable nature, it is perhaps a gray speck adhering to a dry rock, or to a grain of sand, or a mite floating in the water; these multiply and finally form a film, or spread over a wide area. To this succeeds larger beings of a different kind; it spreads wider, and is more conspicuous, and then another species appears among them, and the process proceeds till families and classes are multiplied; but all of the minute and humble of the vegetable kingdom. They have congregated, and constitute the miniature forest which we have already referred to, as various as the maples, birches, firs, pines and walnuts of our groves. But at this stage, the successive deaths in our miniature forest has prepared the way for the resurrection of the woody stems and the grasses. Here begins a more vigorous growth; the intertwining of roots, the firm mat which is formed, together with the shelter and shade which is created, favors the hitherto struggling efforts of nature, and she now begins to plant the soil with species whose trunks stretch forth their limbs to the breeze.

The law of succession, of which we have spoken, or which might be termed the law of progression, is much the same as that of rotation, now familiar to all farmers; only nature begins with the least and ends with the great—a feature which is not imitated by man; for he has no time to convert a waste into a fruitful field, by following nature's law strictly, the law of succession. By the same plan the waters are peopled. The law of succession is here as strictly followed as in the vegetable kingdom. We do not, however, in these remarks intend to inculcate the idea that there is an age of mosses and lichen, an age of the little exclusively. The era begins with the little, it goes on till the great are fully formed and constituted: the little live on still, and occupy their humble sphere, on various spots of earth, for there is still room for them. It may be, however, that in any given period marked by the commencement of the life of the little, and extending to a full establishment of the great, that there are closer affinities and relationships between the products of this era, than between those of any former or subsequent one, embracing in it the same characteristic classes of beings. Geologists, in speaking of an era of lizards, do not mean that lizards constituted the whole of the living beings of that period. It may be, however, that there is, as we have just said, a closer affinity among the several orders which exist in an era than there is between the beings of an adjacent era. This is a subject worthy of careful study; yet it makes a digression here, and we now return to the consideration of the organic matter of our soils.

The organic matter, then, in the state of humus, or more properly the state termed by chemists crenic and apocrenic acids, so far from being inert and inactive are the main things in a fertile soil, notwithstanding the opinion of some distinguished chemists to the contrary. By some cause or other, which we cannot explain, Liebig has inculcated the doctrine that vegetable matter, in the form of humus, does not, *in the least*, administer to the growth of vegetables. He bases his assumption, as we have seen, on the ground of its insolubility. Now, on this point, we take this position: that in all soils which have any claim to fertility, there is a great abundance of soluble matter at any given time, amounting to six or seven times the weight of the heaviest crops which are ever removed from them. This view is sustained by the quantity of soluble matter which can be obtained from a soil by the action of cold water alone, and not by the action of acids or alkalies. This fact shows, at any rate, that soluble matter exists in the soil, and that it is derived from vegetable matter, which is the precise fact required in order to show that plants can supply themselves with carbon, and are not necessitated to absorb it by their leaves from the atmosphere. We do not attempt to invalidate the position of vegetable physiologists, that leaves receive from the air carbonic acid. What we do insist upon is, that there is a storehouse of carbon in the soil, in the combinations we have already given; this is sufficient for our purpose. We do know, from Dr. Jackson's experiments, that these combinations are highly active in the promoting of the growth of plants. We do know too, that perfect plants and perfect seeds can be produced only in soils which contain vegetable matter—and we think that we are warranted in saying that a soil is fertile in proportion to the quantity of organic matter it contains, and that its capabilities for the present and the future, rest mainly upon its quantity. If it is in small quantity, the soil is comparatively unproductive, though the crops growing upon it have all the advantages which they have in other cases, to absorb carbonic acid from the atmosphere.

One of the best facts of every day occurrence, which goes to support the doctrine that plants derive a part of their matter from the carbonic acid of the atmosphere, is, the successful cultivation of clover by means of gypsum for the purpose of growing wheat, by which plan the fertility of some soils is maintained a long time. Yet even in this practice, exhaustion is to be expected in the end, though we have soils in New-York which bear a constant cropping for 25 or 30 years. This results from the fact that the sedimentary rocks contain some vegetable matter and iron in a state of protoxide, which, by its farther oxidation, forms ammonia. The most important inorganic bodies required for the growth of crops, exist in abundance in the soil, and the underlying rock too, furnishes a fresh supply as its decomposition goes on.

We have now brought before our readers the most important facts which lie at the foundation of a consistent theory of agriculture. We may now sum up some of the results; first, that vegetables derive their sustenance from the organic matter incorporated with the soil, or the debris of rocks, and that this organic matter exists in the form of acids, in combination with the alkalies and alkaline earths. These matters are continually forming. The organic matter or humus is oxidated slowly, and when oxidated, combines with the inorganic matter of the soil and forms with it a soluble salt. These soluble salts constitute the food of plants. The practice in all countries, and in all times, favors this view. Any course of cultivation which dissipates the organic matter, tends to produce barrenness. Thus deep ploughing in warm climates exposes too much organic matter at one time to the action of air and other agents, and hence is found to be injurious, or to exhaust rapidly. On the contrary, deep ploughing is required in cold and temperate climates, for the chemical action upon the organic matter is slower, and is required in order to create abundance of food, by exposing a greater surface to the action of oxidating agents.

In the second place, crops take some portion of their food from the atmosphere. Without doubt it will be found that there is a great difference among plants in the quantity which is derived from this source.

In the third place, plants differ among themselves as to the kind and quantity of the vegetable and mineral salts which they require; and yet it is undoubtedly true, that the losses of saline matters may be substituted for each other; or in other words, may replace each other in the same crop under different circumstances.

The above statement, we believe, comprises the great points in the theory of agriculture. They are points which are eminently practical, and which conform to experience and the results of the most successful practices in farming. In new soils, such as are first turned up in the west, too much vegetable or organic matter exists in the soil, or may exist. After a short period of cultivation, however, this is not the case, and even after this great surplus is removed, the best method of farming consists in husbanding as much as possible the organic matter which remains. In the poorer soils, those of New England for example, it is scarcely possible to add too much to a moderately sized estate, or to any estate; and the great point in the husbandry of the estate is to exhaust as little as possible, and to add as much as is possible, for all experience goes to prove, that farming, or rather cropping, cannot be carried on without organic matter, notwithstanding there is at all times carbon in the atmosphere.

We have nothing to say of the mode of increasing the organic matter of soils, nothing of composits or manures; it is the great importance of these matters that we insist upon here.

We have been induced to dwell upon this subject at considerable length, in consequence of the influence which the modern doctrines are exerting upon many farmers. When it is said that all plants derive their entire nutriment from the atmosphere, with the exception of two or three per cent of mineral salts, it seems to us that plain common sense farmers are far more likely to be bewildered with the doctrine, than enlightened: they had been in the habit of seeking in the soil for the elements of fertility, and when they have added much organic matter to their cultivated fields, they have certainly derived benefit from it. Such has been their experience. Humus or mould, however it may behave in the laboratory, is not such an intractable substance, when incorporated with the earths, and in a moist condition. Here it is an active agent entering into combinations with most of the inorganic matters of the soil, and forming with them food for plants. Hence we infer, that although an experiment may be very good in the hands of a chemist merely, yet it may stand in the same difficulty as that of gypsum and carbonate of ammonia, the latter of which in the laboratory forms with the former sulphate of ammonia; but in well-tilled grounds, the carbonate of lime reacts upon the sulphate of ammonia, and there result carbonate of ammonia and sulphate of lime.*

The mechanical condition of the soil is practically important; but the theory of agriculture need not complicate itself with facts relating to this part of the subject. Whatever is done to ameliorate the mechanical state of the soil, must operate so as to favor and support the general theory which we have maintained in this article. Coldness and wetness hinder the formation of organic acids, and their combinations; compactness, has the same effect, by excluding air and its circulation. If too sandy and loose, due moisture will be wanting, which is required in all cases to promote chemical action.†

It may appear to some of our readers, that we have spent too much time in attempting to prove that plants derive their carbon from the soil, through the roots; this may be so, still we hope the facts we have given may be useful. There is another object at this time in presenting in a strong light the value of organic matter in soils, it is to prevent the injurious effects which will follow if farmers rely upon patent mineral manures for maintaining the fertility of their soils. For, however important these manures may be, still they do not and cannot do away with the organic. The two must go together. This position is supported by the fact, that the gypsumed lands fail, sooner or later, notwithstanding the clover crop is interposed to sustain them.

* Bousingault's Rural Economy, p. 334.

† When vegetable matter is immersed in water, and in a certain temperature, the chemical changes are of a different kind than where the same matter is disseminated through a warm soil. In the former case, it is preserved in the form of peat, in the latter it is slowly burned.

CENTRAL CAVITY OF THE MASTODON.

BY J. AUGUSTINE SMITH, M. D., NEW YORK.

A paper read before the Lyceum of Natural History, of New York.

Dr. Hulse procured from Orange county, and deposited in our Museum, the head of the mastodon, which proved to be admirably fitted for ascertaining the size of the cerebral cavity in that animal. The cranium has been accordingly used for that purpose, and has furnished for the first time, within my knowledge, the means of determining an interèsting point in comparative anatomy.

The individual, it may be premised, was a perfect adult—was supposed to have been above ten feet in height—and had been found in a peaty soil. It lay so near the surface, that the year before, a laborer, in cultivating the field, had struck one of the bones with his ploughshare. The creature is conjectured to have lost its life from being unable to extricate itself from the mire into which it had sunk—a mishap, by the way, that in appearance, has terminated the existence of almost every specimen, of which the skeleton has been discovered and obtained. To this rule, however, the cases of Hackett's Town, New Jersey, are complete exceptions. For here the remains of several of these monstrous creatures were found in a pond, not much surpassing in extent a large room. And, furthermore, the exhibitor of the mounted skeleton in this city, assured me, after being strictly questioned, that one of the animals had died with his legs drawn up under his body, and that another had manifestly expired lying on his back. In these instances, therefore, death could not have been the result of sinking so deeply into a bog that escape was impracticable.

When the skull procured by Dr. Hulse, was forwarded to the Lyceum, at its superior and anterior surface, the outer table was entirely wanting, but the inner was perfect. The immediate bony covering of the brain formed a dome so flat that the cerebrum must have been much less curved than in man. The following are the dimensions of the cranial cavity,

Length of right side, - - - - - - -	7.6	inches.
" left " - - - - - - - -	8.2	"
Depth from vertex to the opening of the foramen magnum, - - - - - - -	10.5	"

Cuvier estimates the brain of the elephant at $\frac{1}{050}$ of the whole animal. The ratio would seem to be far less in the mastodon, which, if not taller, was probably the bulkier creature of the two.

The anterior lobes of the cerebrum must have been small and much elongated, particularly on the left side, which extended .8 of an inch beyond its fellow on the right. The brain, therefore, it is to be presumed, was not symmetrical.

The posterior surface of the cranium was complete, and, with the exception of the ligaments of the neck, exceedingly free from inequalities of any kind. Its elevation was nine inches, of which by far the largest portion was due to a separation of the two plates of the parietal bone. The space thus formed was filled with a multitude of cells,* very various in size, and the whole arrangement had doubtless been adapted to afford adequate insertion of the muscles destined to support the enormous head and tusks. Beneath the sockets of those tusks, it may be mentioned, and rising at a quarter angle, are two long, oval hollows, the uses of which are not very apparent. But as their contents must have communicated with the tusks at their origin, to the formation of these last they were probably subservient.†

*The space has been ascertained in the head of the skeleton found about the same time, in Orange county, and mounted by Dr. Prime, to be 11¼ inches (see last vol. of this Journal, page 209.—Ed.).

† No communication between these cavities and the socket of the tusks could be discovered in the skeleton which we recently arranged, and which we examined carefully for this very purpose. For a full description of this skeleton with a drawing, see last vol. of this Journal, page 203.

We noticed a remarkable difference in the size and length of these two cavities, in the skull deposited with the Lyceum of Natural History by Dr. Hulse. It would have beena curious question whether the corresponding tusks exhibited any difference in size.—Ed.

I may further state that one of the tusks had had a considerable portion broken off, and the end of the stump had been worn smooth. But the most remarkable circumstance respecting these weapons was this—the points instead of turning upward, were everted, precisely like a pair of callipers reversed. And to add to the singularity, in the skeleton arranged by Dr. Prime, precisely the opposite curvature took place, the regular calliper form being preserved. If to these two instances, that of Dr. Koch's in the British Museum be added, it would seem to follow that in the mastodon, as in rams and bulls, the garniture of the head assumed various and fantastic forms.

I cannot conclude without adverting to the extraordinary state of preservation in which the bones of the mastodon are found. Judging from their appearance alone, every one would suppose, but very few years could have elapsed since they formed parts of living creatures. That these animals were contemporaneous with our Indians, admits, I think, of no doubt; but as to the cause of extinction in them, in elephants, horses and other extinct races, I have no conjecture to offer.

Note by the Editor:—That this extinct race of gigantic animals in this country, was not destroyed by any great deluge or convulsion of nature, we think will abundantly appear from the circumstances in which the remains are found. The single case of the skeleton described in the last number of this Journal, found in just the position an animal would assume which sank in the mire, and struggled unavailingly to extricate himself, is enough to show that the death of those found in our peat bogs and marl beds was altogether accidental. The greatest amount of all these races have died probably on the higher lands which they frequented. But their bones, exposed to atmospheric influences, have decayed and been scattered to the winds, so that no trace of them is now left. We only find those which have been buried soon after death, and that have been protected from those causes of decay which have wasted others. It is asserted by many that the marl possesses antiseptic properties. Others say that the tannic acid of the peat is the cause of preservation. If the latter cause were the true one, we might expect to find the bones imbedded in the peat in a better state of preservation than those in the marl. Such, however, is not the fact. Those found in the peat are always the most decayed. All these remains of the mastodon in the United States, we believe, are found in these recent, fresh-water deposits, and never in connection with the diluvial deposite. We have seen but one specimen that was fossilized. This was a portion of a lower jaw in the cabinet of Yale College, and was evidently altered by this process.

ON THE IMPORTANCE OF DEEP AND SUBSOIL CULTIVATION.

BY A. SAUL, NEWBURGH.

Nearly all cultivators of the soil agree, and acknowledge, that deep cultivation, by either spade or plough husbandry, is among the most important operations of Agriculture and Horticulture; indeed it may be considered the basis on which the success of all other operations depend, (presuming, however, in the first place, that the land is either naturally or artificially drained, in all cases, for unless excess of water be carried off, all other improvements will be ineffectual,) and while all, or nearly all, admit its importance, a firm conviction that it is not so generally or extensively put in practice, as it deserves to be, is the only apology I offer to the readers of the American Quarterly Journal, &c., for trespassing on their attention. In all countries where the various modes of deep cultivation have been most extensively practised, by trenching, subsoil ploughing, and deep ploughing with improved implements, their advantages have been signally successful; indeed, perhaps to this cause alone, more than any other, is the success and superiority of British farming to be attributed. And while its advantages are so manifest, in the humid and comparatively less varied climate of Great Britain, they doubtless are immeasurably greater in the extremely variable climate of the United States. Every person must have observed, who has paid the least attention to the subject, that crops grown on light, friable soils, cultivated in the ordinary way, (say ploughed to the depth of 6 inches or less,) which look green and thriving in spring and early summer, seldom or never yield any thing like as good, as crops grown on stiff clay land, which often look thin and weak in spring, but uniformly make the best growth, and the most uniform and abundant crops. It is also the case with subsoiled land, by incorporating the subsoil with the friable surface, it is made stiff and retentive, as well as giving it a double depth of soil for the roots to run into. Why is this so?

In the first case, the cultivated portion of the soil is so limited, and if manure be applied, it is mixed with so limited a portion of the active soil, that at the first appearance of genial weather in spring, the effects are immediately perceptible, the roots of the plants only ramify through the surface soil; consequently they have but little hold of the ground, from the horizontal direction they have taken, and are necessarily placed under the influence of atmospheric changes; thus it is in spring we see seeds and plants prematurely excited into growth, and looking well, until dry weather sets in, when they stand still, the soil and manure in it gets dried up, and becomes inactive, and in wet weather the subsoil being hard, will not receive water, but force it to the surface, carrying with it all the soluble substance within its reach, and the roots having but little hold of the ground, a little wind loosens the plant, and it is blown out; also in spring such plants are more susceptible of injury from being thrown out by frosts.* Whereas in deeply cultivated land, seed sown, at first exerts the whole of its energies in the production of roots which strike deeply into the soil, and when they become excited are prepared for vigorous and luxuriant growth; situated thus, it is obvious that changes of the weather cannot so easily affect them. Thus sub-

* The above remarks are particularly applicable to seedling trees of all kinds, with which nurserymen are very familiar. Fall-sown wheat, rye, &c., are also very often injured from the above causes.

soil cultivation, in a measure, renders plants comparatively independent of the season; for if the season is dry, by encouraging deep rooting, and the retentive nature of soil thus cultivated, the plants or crop cannot suffer much, as it retains for a longer time a sufficiency of moisture; and in wet weather the depth of soil readily absorbs the water, and conveys it to its natural or artificial outlet. Of two pieces of land of equal size, and an equal quantity of manure on each, the one deep cultivated, or subsoiled, and the other in the ordinary way, the manure in the shallow cultivated lot, not having a sufficient body of earth incorporated with it to rectify its rankness, the crop on it may at one stage of its growth look more luxuriant, than the crop on the other lot at the same stage of growth; but when dry weather sets in, the organizable portions of the manure not already appropriated by the growing plants become inactive, or more frequently are lost in evaporation; consequently the plants become stunted, and a short crop the result; whereas, in the deeply cultivated lot, the manure having been rectified by mixture with a great mass of earth, every particle of organizable matter in the manure is retained in the ground, and is taken up by the plants as they require it; the consequence of which is, the growth of the crop has been more gradual and natural, and less the result of artificial excitement.

Another reason why subsoil cultivation is beneficial, is the under soil very often contains what the upper soil requires. Take, for example, lime; it has a tendency to sink in the earth, and is retained by the subsoil out of reach of the common plough, and when this is found to be the case, all that is necessary is the use of the subsoil plough. There are, however, occasional dangers to be apprehended from subsoil ploughing and trenching, as the soil may occasionally contain noxious matter, when brought in contact with vegetation, that may prove destructive; and here is one of the instances where a knowledge of agricultural chemistry would enable the cultivator of the soil to proceed knowingly in his operations, and not in the dark, as the great majority of us are obliged to; since by chemical analysis, he could ascertain exactly what the soil contained, and if the subsoil contained what the surface soil required, or what was injurious to it, he would be enabled to proceed understandingly. But though subsoiling may not be universally beneficial, or may be occasionally attended by injury, as a general principle its utility is admitted. Among the excuses (reasons they are not) why subsoil cultivation is practised by so few, is the expense and want of time to perform those operations thoroughly; but when it is remembered that autumn is not only the most convenient, but the best season for such operations, I think there are few farmers who could not find a week, or two, previous to the ground being too frozen, that would be more economically and advantageously employed in this way, than doing work that could just as well be done after the ground is frozen, and during winter; there is not a farm in the older portions of the country, that has been under cultivation for any number of years,* that one or two weeks of this kind of work in fall, would not prove more profitable than any other in the course of the year, and by perseveringly following it up for a few years, it is astonishing what an amount of good land is made, and the ease with which after cultivation may be pursued, together with the abundant return in shape of good crops, &c. Those portions of the farm intended for spring-planting should be that selected for subsoil cultivation, ground intended for corn, potatoes, ruta-bagas, turnips, carrots, beets, &c.; it is worse than useless to attempt the cultivation of the four latter, unless the ground is naturally deep, or made so by breaking the subsoil to give depth of surface; upon this system mainly their success depends, and ground thus prepared in the fall, by manuring and subsoil ploughing, leaving the new surface exposed to the action of the frost, &c., for pulverization, thereby rendering it more friable for working in the spring, by cross ploughing, scarifying, &c., these crops cannot fail to succeed, and prove useful and profitable on every farm, and no ground can possibly be in better order than ground thus prepared, for wheat, &c., the next fall.

* Under this system of cultivation the worn-out soils of Virginia and Maryland, may be again restored to fertility.

Trenching ground by spade husbandry more legitimately belongs to the Horticultural department; and even in that it does not receive that extensive patronage it demands; and as I must have one word to say on that subject, I do not think I can do it better than by giving in detail the *modus operandi,* as performed on a piece of ground here two years ago, together with the success attending the result. In December, 1843, a piece of ground, the poorest and shallowest belonging to this establishment, the surface soil having been nearly all washed away, the subsoil a stiff clay with a great portion of slate rock, an opening was made at one end two feet wide by two feet deep, and the whole piece of ground trenched to that depth, that is turned over, the top spit of earth turned to the bottom and the bottom brought to the top, and all the large rocks taken out to that depth. This may appear a very tedious and expensive process, but there is more in the idea, than in the reality; and for small orchards, and fruit, and vegetable gardens, money and time thus spent is well invested. This piece of ground was laid up rough for pulverization by frost, &c., during winter, and in spring, had a top dressing with a compost of manure, muck, lime, and some coal ashes, and planted mostly with imported fruit trees of new kinds, for specimens, to prove them, and as is generally the case with new and rare kinds, the plants were small and feeble, and rendered still more feeble, by a long sea voyage; and being packed and out of the ground a long time. Notwithstanding all this, they nearly all lived and made vigorous growths, when the transplanted trees in other parts of the grounds were dying by hundreds from the very dry season of the early part of the summer of 1844, (up to the middle of July,) which is the most trying time for newly transplanted trees; but the great trial was the past summer. A similar lot of trees were received last spring, and planted on a portion of the same ground; and during the unparalleled drought of the past summer, they not only lived, but made considerable growth, while the newly transplanted trees, comprising many thousands here and elsewhere, were dying wholesale. There has been also planted on this piece of ground, gooseberries, currants, raspberries, strawberries, rhubarb, &c., all of which have succeeded equally well. Among the raspberries were some canes of Fastolf imported, which produced splendid fruit. From pieces of rhubarb roots planted in May, of the new colossal variety, was cut stalks that received an extra prize at the New-York State Agricultural Show, at Poughkeepsie, September, 1844, for its extraordinary size, &c.; and it was by no means as fine as some cut earlier in the season. The strawberries also were much larger, better flavored, more prolific, and continued bearing much longer, than plantations in other parts of the garden, that were much stronger plants and better established. In a word, everything planted on this plot of ground did not appear to be affected in the least with the drought during the extreme dry summer of 1845; they grew vigorously the whole time, while similar things were actually perishing for nourishment the whole country around.

It is well known to gardeners that the soil of an old garden, however rich from manure, &c., is unsuitable for many plants, and strawberries are particularly so, as also turnips, potatoes and many other things, which all run to leaves and vines, and little or no fruit or roots, in old soils; while all must have observed how they delight in new earth, producing fruit, &c., remarkable both for quantity and quality. Among the reasons why plants thrive better in soils new to them, than on soil on which they have been long cultivated, are: 1st, the extraction from the old soil of those mineral substances required as food by the plant, and which are seldom returned to the land in the ordinary mode of manuring, of which it may be supposed the new land has an unexhausted store, and perhaps, 2d, the accumulation, in the old soil, of excrementitious matter from the plants grown there, rejected by them as unsuited and injurious to their growth; all of which, by judicious subsoil cultivation, may be made to answer good and proper ends; for by bringing to the surface the new, fresh subsoil containing those mineral substances, which always have a tendency to be carried that way, and retained there, and by turning to the bottom the old soil containing these rejected excrementitious portions of former crops, so injurious and unsuited to wholesome and fertile vegetation, it gets purified in due time by rains which carry off those noxious ingredients into the drains, and leaves the soil in a fit state to be again brought to the surface in due time, when the new surface soil has become in the same state the old was when turned under.

RESOURCES OF ORANGE COUNTY FOR MANURE.

The following paper was prepared as a "Report of the Committee on Manures" for Orange county. But, by accident, not being prepared at the proper time, it is now offered to the public through this Journal, being adapted to all the river counties.—A. J. P.

The full investigation of the subject of *manures*, of necessity involves a thorough consideration of the whole art of agriculture. We must start upon the broad principle, that all plants are living, organized beings, dependent either upon the soil or the atmosphere, or upon both, for food to sustain life, and by the process of nutrition impoverishing these sources of nutriment, and eventually exhausting them, unless the loss is supplied by means of manures. The science of farming then is the science of manuring—the whole art of farming is the art of making and using manures. They are the food of plants, and upon the amount of food, together with its quality, depends the amount and quality of the crop. These are facts which are so well settled, and so extensively known at the present day, that it would seem superfluous to mention them, did not the truth stare us every day in the face, that multitudes do not know them, and most men disregard them. In order then, to come to as full an understanding as possible of this subject, it is necessary, very briefly, to notice some starting points.

1. Continual cropping exhausts any soil. The plant does not send down its roots into the earth merely to sustain its top in a vertical direction. The roots themselves are the proper mouths by which every vegetable draws a large portion of its nourishment from the soil. Part of this food is a portion of the soil

itself—part is furnished by organized substances decaying in the soil, and part comes from the atmosphere, taken up either by the leaves as they spread out their broad surface to absorb it, or washed down by the dews and rains, to be soaked up by the long, fibrous roots that pierce every portion of the ground. Let us examine the substances of which a plant consists—not by a minute analysis, but only to ascertain the different classes of substances, in order to find the source from which they were originally derived. To do this, we need only burn the plant. By this process the greater portion is dissipated—driven off into the atmosphere—but not lost, for we can collect it all and determine what it is. The smaller portion remains in the form of a light ash. This is unaffected by the fire—a portion of it only is soluble in water, the greater part being earthy materials, and which are evidently derived from the soil. The portion which has been driven away by the heat, may have been obtained from water or air, but this cannot come from such a source. The growing plant has extracted it from the soil, and although each successive crop does not take away the same amount, yet the quantity is a constantly diminishing one, because there is every year less left for the succeeding crop to take. Thus in process of time the soil is exhausted of these materials. The same thing is true with regard to a considerable portion of those substances which were dissipated by heat. They came from the soil, and are exhausted from the soil by the same process.

2. This analysis opens to us a second point; a fertile soil consists of two kinds of materials—the one, earthy—the other, formed by the decay of animals and vegetables, in or upon the soil; the first, called usually *inorganic*—the second *organic*. Both are necessary to the healthy growth and perfection of a plant; but the latter is usually found in very small quantities, and wherever it predominates, or exists in large proportions, it is found injurious. We should commit an enormous mistake, therefore, if we were to infer, that because the earthy matter forms the smaller portion of a plant, the same is the case with the soil. On the contrary, the mineral part of the soil predominates largely in every fertile soil;

but the solubility of the two kinds of matter, is, to use a technical phrase, inversely as their quantities—that is, the organic matter rapidly, and the inorganic very slowly, passes into that condition in which they can be taken up by water and carried to the mouths of plants.

3. Plants require their food in a fluid state. The extremities of the roots are the proper mouths. They consist of a spongy substance, pierced with numerous pores, by which they imbibe every thing fluid which comes within their reach. Nothing solid can enter these pores, no matter how minutely it may be divided. All the soluble parts of the soil, and all soluble substances in the soil, are taken up by water passing through and carried to the roots of growing plants, and passing into the circulation, all parts which are of use in the vegetable economy are retained, and the others rejected.

4. A plant, then, is a highly organized living being, requiring food and care to bring it to perfection, and repaying the care just in proportion to the amount bestowed on it.

Without multiplying points of consideration, which would only grow upon us as we proceed, we will regard those cited above as including all the groundwork upon which to construct a history of manures, and their application. And without pausing to make any artificial divisions of manures, into organic and inorganic, insomuch as all organization is destroyed before they become the food of plants, and they are reduced in fact to inorganic matter, we shall proceed at once to the subject, considering every thing as a manure which promotes the growth and perfection of the plant. But it will be impossible to cover the whole ground in the brief space belonging to such a paper as this. We shall, on this account, aim at being as local as possible, and have reference principally to the sources of manures which Orange county has within its own borders, and their use and preparation.

In a county possessing all the natural advantages which this possesses, it is folly of the grossest kind to undertake the cultivation of the soil, or even the restoration of worn-out lands by the introduction of manures from abroad. We have ever been disposed to repudiate in the strongest terms the introduction of such fertilizers as guano into this county, from the sole fact that the manner of using them requires more knowledge and care than our farmers can commonly lay claim to. Men who have been accustomed to apply their manures by the cartload, can hardly be persuaded to reduce the quantity to a tea spoonful. But this is not all. The accidents and losses which occur under the circumstances of climate, and wet or dry weather, &c., in using these powerful fertilizers, are a powerful argument against their use. The single summer of 1845, will long be remembered by those who chose to neglect the resources they had at home, in order to improve the precarious chances of foreign aid. Thousands of tons of guano were imported, and as far as can be learned, in the ordinary farming operations, have been entirely useless. It might as well have lain upon its original dung hills in the islands of Africa or South America.

We would depend upon the resources which we have within our own borders for all the improvements which can possibly be attained for generations to come. These resources we have in abundance, to make the fields of Orange county as fertile, and to cover them with as luxuriant harvests as ever waved upon them. These, it is now our purpose to examine, somewhat in familiar detail.

1. The Farm Yard.—Here must ever be the grand hope of the farmer. It is the place into which is collected every thing that is thrown away as good for nothing but manure. It is the most important spot on the farm, and according to the condition of the farm yard, will be that of the whole farm. Several things connected with it deserve particular mention.

Its locality.—This should not be, as is often the case, the top of a hillock, whence all the juices of the yard can be leached off into the nearest pond or creek. Neither if it is somewhat hollow so as naturally to hold the wash, should it be carefully ditched, as we have seen done, to drain off the wet. A place should be selected where there is a gentle inclination to the centre from all sides, forming a sort of basin, capable of containing all the wash of the yard and stables.

Its preparation.—The bottom of the yard should be either paved or covered with a layer of clay, well packed down, so as to be as near as possible water tight. Into it, then, is to be thrown all that is wasted in the house or barn. A good supply of vegetable matter should be kept there, such as straw, weeds, chaff, or peat, of which we shall speak hereafter. Drains must be made from the stalls of the cattle and horses, by which all the urine shall be carefully brought to be mixed with the contents of the yard. Here also must be thrown the dung from the stalls, the hog-pen, and the hen-roost. Every thing which has ever helped to form a plant, or an animal, must be brought in here to undergo decomposition, in order to fit it to become a plant again.

Some would advise the construction of a vat in the lower part of the yard, into which all the liquids will flow, and from which they can frequently be pumped and distributed over the solid contents of the yard. And to this recommendation there is a good deal of force, when all the advantages of a barn yard constructed on this plan could be appreciated and used. Thus the repeated application of the liquids from the vat would aid in the rotting of the straw and litter, and the liquids would also be absorbed and retained by the spongy mass thus produced. The excess of liquid would then flow back into the vat, whence it would be repeatedly drawn as it was required to wet the contents of the yard, and the surplus, in the spring, could be carted out in casks, and sprinkled over the fields.

Too little value is placed on the liquid manures of the yard and stables. No pains are taken to preserve the latter, and provision is very often made to drain off the former. When a vat is not used in the yard, other means should be contrived to absorb all these liquids. Porous substances should be freely sprinkled upon the floors of the stalls. For this purpose nothing can be better than powdered charcoal, because it will not only absorb the urine of the cattle and horses, but will also preserve it from putrefying till it is put on the land. But whatever is used, it should be added to the contents of the yard, to increase its quantity and to add to its quality. We shall speak of peat, as useful for this and other purposes, when we come to that substance and its uses.

If the adaptation of particular manures to particular crops were well understood, it would unquestionably be proper to preserve all the various manures of the farm for their specific uses. Thus the stable dung of horses would be applied to one species of crop—that of the cows to another—so of the contents of the hog-pen, &c. But we know as yet too little of the adaptedness of individual manures, and therefore the wisest plan is to mix them all together in the barn yard. We make to this but one exception, and that from actual experience as well as observation. When poultry are kept upon a farm they produce a manure in their dung, which is the most powerful of all that are made about the farmery. Its quantity is not so great as to add materially to the amount in the yard, but its strength is such, that a little will go a great way. We, therefore, advise this to be kept distinct, and applied to corn just after it comes up, about one gill to each hill, and mixed with the earth.

Treatment of Yard Manure.—The contents of the barn yard will not always take care of themselves, and being exposed often to great loss and injury, it is highly important to understand how to take care of it and prevent this loss. The great danger is from too rapid rotting, and the escape of nutritious gases. This will take place very readily at any season of the year when manures of this kind are thrown together in loose heaps, allowing a free circulation of air through them. Fermentation takes place—intense heat is often produced, and the inside of the heap is often reduced to a half burnt state. Whilst this has been going on the various gases which are formed escape into the air, and are lost. The question then is, how to prevent this process from taking place.

If the contents of the yard are kept constantly wet and trodden down hard by the cattle, there is little danger of an amount of decay which will materially injure the manure. A slow and even process of rotting will take place, by which the whole will be converted into a soft, black mass, easily broken up, and containing a considerable portion of soluble matter. The water which soaks it, will prevent the formation of much gas, and will absorb any portions which may be generated, so that a mass of fine rich manure will be ready in the spring to be applied to the land. This of course, supposes the yard to have been constantly supplied with the dung and litter of the stables, and all the straw and waste of feed, &c. The care, then, to keep the manure in a good state, when trodden down in the yard, is very little.

The case is different, however, when it must be removed from the yard before it is applied to the farm. Some care and knowledge is necessary, then, in order to preserve it without great loss, for its situation will be materially different from what it was in the yard. It now becomes necessary to stack it carefully. This should be done on one side of the yard, where there is slope enough towards the middle to save all the leachings of the piles. After a pile is begun, as fast as sufficient manure accumulates, it should be laid on the pile in an even layer, and well packed down. It is the access of air to the interior of the heap that produces fermentation and consequent loss. By packing hard this is prevented, whilst sufficient air is admitted to ensure a gradual and uniform softening and partial fermentation, by which the whole mass is brought into the same state. In the mean time the heaps should be often and thoroughly saturated with the liquids which accumulate in the yard or in the vats. While the heap is forming also, it may be useful, with every layer of manure, to add a thin sprinkling of plaster or a solution of sulphate of iron, (copperas) or even powdered charcoal. These substances will arrest any gases which would otherwise escape, and save them. These heaps may be made of any length and breadth, but should never exceed four or five feet in depth, and should then be covered throughout with a layer of earth at least two inches thick, and this should be beaten down compactly over the whole. An occasional layer of earth or peat will be found very useful, in the process of building up the heaps. These also should be evenly put on and beaten firmly down.

We have spoken before of the disposition generally to neglect the liquid manures of the yard, and to let them entirely escape. We cannot close this part of our subject without saying that of all the contents of the yard, the liquids are the most important. They are the direct food of plants, holding in solution all that is contained in manure which can be used by vegetables as food. The liquid manure of the stables, the urine of the cattle and horses, is generally entirely lost. This is of vastly more value than the solid excrements of the animals, and should be saved with great care. Of the best method of saving it we shall speak hereafter.

Let us sum up this branch of our subject now in a few words. The farm-yard is the great dependence of the Orange county farmer for the manufacture of manures. Here he must look for the means to render his farm fertile, and in order to make it the most sure he must waste nothing that can by any possibility be converted into manure. All must be gathered into this spot, which is the great reservoir of vegetable food. Here it must undergo those preparatory processes which are necessary to bring it into a state to be readily absorbed when applied to the land. In our opinion there is no danger of manure being too much rotted, provided it is only rotted in the right way. The more nearly they are reduced to that state in which the plant requires them, the more powerful will be their action. It is not the slow and gradual decomposition of manure, by which it affords a constant, but at the same time scanty supply of food that makes the crop most perfect and abundant, but a plentiful supply at all times, and especially just when the plant begins to grow, and for a little time at least after it has begun. Then the full tide of vital action having set in vigorously, a steady and rapid growth may be expected, resulting in a crop large in quantity and of excellent quality.

Let us here, before proceeding to our next head, mention one source of manure, which we have passed over—that is the *privy.*

The contents of this establishment are far more valuable than an equal quantity from any other part of the farm. In China, a country that bears a high character for agricultural skill, this manure is held in the highest estimation, and every particle of it is carefully saved. A little care bestowed upon it would remove all unpleasant odor, so that it could be managed as well as stable manure. All that is necessary is to have a box to slide in to receive it, and whenever a small quantity accumulates throw in some lime. This will dry it and deprive it of smell, when it can be taken out and mixed with the contents of the farm-yard.

2. The Peat Swamp.—This is the second resource of the farmer for manure. Orange county is rather remarkable in this respect. Formed of a constant succession of rolling ridges of land, extending north and south, almost every valley lying between these ridges, however small, is the depository of a peat swamp. In some places the peat is a mere layer upon the surface — in others it is of considerable depth. But we believe that there are few farmers who understand what we mean by peat, and it is therefore necessary to define it.

It is the substance known by geologists as peat, that is called by farmers, swamp muck. It is the black, vegetable mould that makes the surface of our swamps, and is formed whilst the ground in these little valleys has been partially overflowed with water, by the growth in the bottom of the water of moss, grass, weeds, &c., and they have died from year to year and formed a bed a little more elevated for the growth of the next year. Thus, by alternate growth and decay, the swamp is gradually filled up with this black, coally looking mould. There is no county in this State that so abounds in this as Orange. In this county alone there are nearly 50,000 acres of peat, which will average two feet in thickness. What an inexhaustible source of fertility to the farms in this county, whenever its value is understood.

Almost the entire mass of peat has at some time formed a part of growing plants. It is therefore manifestly just the thing for manure. But having grown, and died, and decayed, and lain for hundreds of years under water, or perfectly saturated with it, it is when fresh dug in a very improper state to apply to the land. It has not undergone those changes which fit it for being food for plants. It requires a considerable preparation to make it good manure. And this takes us back to the barn-yard and the compost heap.

No better and easier use can be made of peat than as a covering to the floor of the yard, before other manure is put there. The yard should be prepared as directed before, and then the bottom of it should have a thick covering of peat. Over this the manure of the stables and the droppings of the cattle should be evenly spread, in order to be trodden down and well mixed with the peat beneath. The liquids will all be absorbed and retained by the peat, so that whilst it is being prepared itself to become a manure, it is also aiding in preserving other manure which would otherwise be lost. Dr. Dana, of Lowell, says that two loads of peat mixed with one load of stable manure will soon be converted into a mass of manure equal to three loads from the stable. Such being the case, it will readily appear, that when properly used in the farm-yard, an immense amount of manure may be manufactured.

Where the manure is heaped up as directed above, the peat can be employed with equal advantage. After each layer of manure is put on and packed down, let a layer of peat be added of twice the thickness. Let the heap be frequently well wet with the liquids from the yards, and when completed be covered with a thick coat of the peat, and when wanted for use it will be found of the very best quality.

A very important use of peat remains to be mentioned, and that is as an absorbent of the urine from the stables. Too little value is commonly set upon this kind of manure, and it is therefore suffered to waste. Yet, of all the excrements of our domestic animals, it is the most powerful when properly preserved. If collected in large quantities, it would soon undergo a change, by which a large portion of valuable material would be lost. It is necessary therefore to use great precaution against loss. It is commonly recommended to have tanks constructed, either under the floor of the stables, or in such convenient place as the liquid can easily be conducted to. These tanks are then to be filled with charcoal or peat to absorb the liquids which flow into them. And this is a very good arrangement, but in the constructiou of tanks, conductors, &c., it is attended with unnecessary expense, which can be easily obviated, and yet the same object be effected. To do this, let the floors of the stables be laid so that the plank shall be a small distance apart—just enough to allow all the urine to flow through. Let some of them be moveable, or else doors made elsewhere, through which the space below can be at any time filled with peat. In this condition it will absorb the liquids as well as in tanks, and plaster or a solution of sulphate of iron (copperas) can occasionally be added, to prevent any waste that is liable to occur. The peat may be taken out at any time that it becomes saturated, and mixed with the contents of the yard or added to the compost heaps, and its place supplied with more; or if enough can be put in to last till time to carry it out on the land, that may be done; but the former plan is preferable.

One great consideration in manuring land is to supply, as far as possible, the precise substances which are wanting. There may be a great abundance of vegetable mould in the soil, and not enough of those substances which constitute the ash when plants are burned. It would therefore be unwise to apply the peat itself to the soil. But the ashes of peat will be a capital application. For this purpose the peat should be cut up in square blocks, and thoroughly dried, and then piled in large stacks and burned, and the ashes strewed over the soil. It is probable that over a large area in Orange county, this would be the best way to use the peat. At the same time it can be advantageously applied as directed above. Peat may very easily be converted into most excellent manure by the agency of animal matter or potash. The former is mentioned because an animal often dies upon the farm or in its immediate neighborhood, whose carcass is suffered to waste in the open air, or is buried at once, where it can never be of any use.

Now, if it were cut up and mixed with a pile of peat, the whole mass would be brought into a state of decomposition, fitting it to become the food of a large crop.

The soap-maker will pay a shilling a bushel for ashes. After he has leached from it a large proportion of its potash, the Long Island farmer will send to the door of the soap-maker, often as far as 160 miles, and pay for the leached, the same sum originally paid for the unleached ashes. Now, if it is worth a shilling per bushel, besides the transportation, to him, after all its soluble potash is extracted, are our farmers who make the ashes and sell it to soap-manufacturers paid for it? Would it not be worth more than the shilling to them to put on their land? We have no doubt this is true in reference to any of the long-cultivated lands in this country, setting aside the particular necessity for particular soils. But here we wish only to mention it as of use to decompose peat, and prepare it for manure. One cart-load of ashes mixed with ten of peat, and turned over a few times before it is applied, would make a mass of manure nearly or quite equal to as much of the best farm-yard manure, and more profitable to any farmer than to sell his ashes for cash at a shilling per bushel.

The same use can be made of lime. It is a powerful converter of insoluble vegetable matter into soluble. We have seen somewhere a recipe like this:—dissólve one bushel of salt, and make it a paste with a cask of lime. After it has stood a few days, add it to three cords of peat. Turn the mass two or three times before using.

Under this head may also be included those large accumulations of vegetable and mineral matter in the bottom of ponds of standing water. In this matter we have a powerful manure, which is too generally neglected. Sufficient probably collects in a large mill-pond, to pay for drawing off the water and cleaning it out every year. It consists not only of the vegetable matter which is accidentally transported thither, but of the wash of soluble and insoluble substances from the hill-sides and slopes of ground throughout the whole district of country through which the streams pass which supply the pond. Here they accumulate, and settle to the bottom of the stagnant water, and being almost entirely excluded from atmospheric agency, a partial decomposition only takes place. Of course it is better not to be immediately applied to the soil. At the same time it contains a greater proportion of soluble matter, and whenever applied its action will be found to be more speedy, but less durable than peat.

3. Marl.—Underneath almost every peat swamp in this county, may be found a marl bed, but these marl beds vary much in quality and in quantity. In some places they are several feet in depth, whilst in others they form a mere layer of lime under the peat. In some beds it consists of almost pure carbonate of lime, and in others this substance is but thinly scattered through the mass. Whatever may be the character, the farmer may put it down as a source of great fertility, if he find one of these beds upon his farm. There are few farms here that have not a marl bed, at least in the immediate vicinity, for we have set down the amount of peat at nearly 50,000 acres, and the marl will average nearly the same in extent, and probably will be found, in general, to exceed the peat in thickness.

Marl is formed in two ways—i. e., the marl which abounds in Orange county. In the bottom of small ponds, the waters of which contain an excess of carbonate of lime, that substance is deposited, or settles in the form of a fine white powder. At the same time the grass and other vegetation that grows in the same position dies and decays, and becomes mixed with the fine carbonate of lime and the fresh water shells, which abound in waters charged with lime. Thus although the marl may be chiefly composed of the fine powder, it will be found sprinkled, and sometimes largely, with three or four kinds of small white shells. In some cases the shells compose almost the whole of the lime, and the remainder of the marl is a coarse vegetable matter. This substance is probably still forming in the bottom of our ponds.

Although marl is so abundant throughout the county, yet it is a fact that comparatively few farmers know it when they see it, and still fewer understand its uses. It will, therefore, not be misspent time to examine this subject at large.

Liming the soil.—Lime is an essential ingredient in a fertile soil, yet by the processes of tillage it becomes entirely exhausted. This takes place either by the extraction of the lime by the roots of growing plants, or by its being dissolved and washed down through the soil by water. A French writer on agriculture, M. Puvis, attempts to fix laws for the liming of lands, and supposes that land which contains 9 or 10 per cent of lime requires no more, but if it contains less it should be applied. That some laws of this kind might be established, very rationally, we have no doubt. But the impossibility of reducing them to general practice in this county, would render them utterly useless. It would require an accurate analysis of a soil before a farmer could determine whether he should apply lime to it. Such a practice would not suit the farmers of Orange. It will, therefore, be a better general rule for them, that all land which has been subjected to long and severe cultivation, needs lime. This will not require an analysis of the soil to determine whether the land has the 10 per cent of M. Puvis, but from the known deterioration of land by tillage, it is certain that the lime, one of the most easily dissolved of the earths, will be exhausted with equal pace with other substances; and when other manures are applied, lime should also be used. But a prominent use of lime in the soil is owing to its effects upon vegetable matters, in decomposing them. It will, therefore, be advisable to add lime to soils abounding in vegetable mould, without so much reference to the quantity already contained. To peaty lands, after they have been drained, lime will be eminently useful. To all lands which abound in inert vegetable matter, the lime should be slaked and not applied in a caustic state.

But in the marls of Orange county, the lime does not exist in a caustic state, but in the form of a carbonate of lime. In this condition, besides a mechanical action upon the soil, it acts directly upon the growing plants, supplying them with an indispensable portion of food. Not only does it furnish lime, but being composed to a considerable amount of the shells of once living creatures, it is found to contain still the remains of animal matter, to which some eminent men have attributed its principal power. But it is evident that it also establishes the condition of the soil, for plants require lime as well as animal matter. Thus, the English agriculturists have for years been applying it in great profusion, and within a few years in our own country considerable use is made of it. An eminent French agriculturist says that the application of marl doubled the produce of a piece of ground in the department in which he lives: "Before the application of the marl nothing but dwarfish crops of rye were gathered, yielding at most three for one of the seed; at present eight for one of seed, and that wheat, are obtained, and the good effects are found to continue for ten and even twelve years." It would be interesting, but consume too much time, to quote largely the evidences of the use of lime from those who have tested it, we therefore proceed to the practical uses of marl.

It should be dug in the fall and laid in heaps on the land, to be acted on and broken down by the frost before it is spread. Much of the marl of the county, such as that found in the towns of Minisink and Wallkill, is so pure that after it has become dry, after taken from the bed, it will easily fall into a fine powder. But we have seen specimens of marl from the eastern parts of the county, in Newburgh, which contains a very large amount of vegetable matter, and upon drying becomes hard and compact, and cannot be reduced by any artificial means to such a state as to be useful on the land. Hence the necessity of exposing it to the action of frost. The water by which all the mass is filled, freezes, and when it thaws separates the whole into a powder almost as fine as the slaked lime. In this state, as soon as it has become perfectly dry it should be spread upon the land. This should not be done carelessly, but as evenly as possible. That which falls into a fine dust without the action of frost, may be advantageously applied to fall crops and plowed immediately in, but not very deep.

Marl may be used very advantageously in mixture with stable manure and in the compost heap. Indeed, it may be considered as true that this is the best way to apply all manures. It is not the lime alone which will render land fertile. The other manures are just as necessary, and in equal quantities, as without the marl. Indeed, by a thorough marling of the land, it may be stimulated suddenly to so great fertility as to become rapidly exhausted of vegetable matter, and this has been often the case, and the farmer has been disappointed that the effect of the marl was not more durable. Finding his crops diminishing, he has applied more marl, but still without effect, for what was wanted was the presence of organic matter in the soil. If stable manure is freely used after liming, a continued effect may be expected.

No rule can be laid down as to the quantity of marl to be applied to an acre. Much will depend on the quality of the marl which we have stated to be extremely various, and much upon the character of the soil. The soils of Orange county, however, are so uniform that if the tillage of all were equal, the same quantity would be applicable to any portion. But from the known difference in the quality of the marls, it will be impossible to lay down any rule. There are marls in this county which contain as much as 90 per cent of carbonate of lime—there are others again where there is not more than 10 to 20 per cent. So that a much greater quantity of the latter will be required to furnish the same amount of lime with the former. The richest that we have seen are from Minisink and Wallkill. In the former town are to be found thousands of acres of the finest quality. It would be advisable, that experiments should be carefully made in different parts of the county, to ascertain the amount which is sufficient of the different marls. Injury is often produced by laying it on so thick as to exclude the air from vegetation. But we apprehend little or no injury from an overdose of marl, when it is thoroughly incorporated with the soil. There are no caustic properties to injure vegetation.

Marl will unquestionably be a valuable application to all kinds of crops in Orange county, but to none others do we apprehend it will be of more use than to the grass crop. It contains the principles which are necessary to produce a rich, nutritive grass, and in a county whose great resource has been for years the produce of the dairy, it will be easily perceived that there is probability very strong, that these very substances have been exhausted from the soil, and that by a free use of marl in connection with other manures, vast improvements may be made in the peculiar produce of the county. Marl is a great fertilizer, and there is a great abundance in Orange county.

We have thus examined, very hastily, the three most important sources of manure for the farmer in this county, viz: the farm-yard, the peat-swamp, and the marl-bed. In these he has inexhaustible sources of fertility to his farm. He need not resort to any foreign sources—he does not want guano, nor any of the patent manures—he has all at hand that is required to give boundless productiveness to his soil. We might have mentioned other manures, such as ashes of wood, and coal ashes—a capital thing for grass—of gypsum, but it may be entirely dispensed with where marl is used—and of poudrette, but the farmer does not need to buy it. But we have confined ourselves to the locality for which we write, and have shown that we need not stir from home for manure. If we have done any thing to open the eyes of the farmer to his own resources, we are abundantly satisfied.

It only remains for us now to urge upon the farmers of Orange county, what ought to be superfluous, viz: that the produce of the soil is proportionate to the care bestowed in the tillage of it. "In the sweat of *his* brow," man must eat his bread, but God has provided means by which his labor may be diminished, and whilst he is exposed to the influences of natural causes which oppose him, he may grapple with them and compel nature to his own will. The earth must be tilled if it is expected to produce. Food must be supplied to plants, if we expect them to grow. The whole earth belongs to man, but it depends upon him whether it brings forth enough for his support. And whilst he exhausts the soil by cultivation, he must restore by means of manures what he has taken away, and thus he may render the earth perpetually fruitful.

ENTOMOLOGY—NOVEL PRODUCTIONS.

BY THO. BARLOW.

The laws of nature in the insect world, so far as the production of its kind is concerned, are the same as in the vegetable. We are told, by high authority, that in the creation of the world, it was declared that every seed should "bring forth after its kind." Whilst this is the case, there are many apparent departures, which seem at first as a revolution of the laws, and to confound our researches.

From the aurelia of the butterfly, I have seen hundreds of small flies spring forth; from the pupa of the common apple-tree caterpillar, in the cocoon, I have known a number of the common horse flies to come; from the pupæ of several kinds of moths, I have seen various kinds of the ichneumon fly come forth; out of all these, when regularly formed, the perfect insects, as indicated by the various aurelias, pupæ, &c., were expected. These departures arise from the fact, that the parents of the various flies penetrate the walls of the pupæ with their ovipositors and deposit their eggs, which hatch out, destroy the butterfly or moth, live upon it until perfected, burst the walls of their cell, and come forth.

I have a variety of such specimens among my collections, which for their novelty are very interesting. But I have one specimen, for the production of which, I cannot account; neither can I find it spoken of by any naturalist. It is a worm, in size and appearance very much like what is commonly called the hair snake, and between four and five inches in length. It is rather larger than the hair snake, and of a yellowish flesh color. It was produced by the house cricket (achata domestica).

I saw the cricket in my path, and being unusually large, I concluded to preserve it; and after having it in my hand a moment, it ejected the worm. Being surprised by the singular production, I cast them both upon the hot earth (it being about noon of a very warm summer day), and the worm immediately coiled up into a knot. I gathered them up again, and now have them in my collection.

I subsequently saw an account of a similar production, in the state of Maine, from the field cricket (achata campestua). That was spoken of as a wonder of nature; and the question was propounded, in the same account, whether hair snakes were not thus produced.

The cricket produces its young by depositing its egg in the ground, which hatches out the imago in the same manner as the family gryllidæ, or grasshoppers.

Were it natural and regular for the cricket to produce such specimens, I think it would have been mentioned before now by naturalists, at least, when it is known that this insect has been the studied favorite of entomologists for ages. Many lovers and students of nature have sought to have these musical creatures dwell and multiply in the walls of their houses, and have fed and tamed them, to enjoy their chirping notes through the lone hours of evening and night. Their nature and habits have been studied, and if such a production were legitimate, I think it must have been noticed.

This worm cannot be considered as any stage or state of the cricket, for the latter undergoes no such change. Had it been produced by an insect in the larva, pupa, or nympha state, I should not have deemed it so strange; but as the production of a perfect insect, it presents itself, as it were, as an anomaly in the insect world, though one other instance of the kind, it seems, has been noticed, which would indicate something of a regularity or legitimacy. It is possible that naturalists have observed the same, and may have spoken of it; if so, I should be pleased to learn it.

MANURES—THEIR APPLICATION.

BY C. N. BEMENT.

On the subject of manures much has been written, and much has been said; still it is fertile and full of interest. The subject cannot, in my opinion, be too frequently agitated, or brought into view, nor too strongly urged.

When we consider how much the productiveness of our farms depends upon the manure heap, and how much this matter is at times neglected, a few remarks, I trust, will not be unacceptable; and although familiar to most of you, if they stimulate any person to apply them, who has hitherto neglected to do so, the object in making them will be obtained.

The collection and application of manures, I consider to be the grand secret in good farming. It gives us grass and grain. It is by a liberal application of manure that extraordinary crops have been obtained. It is consequently an object of minute attention to collect as much as possible, and to apply it in the most advantageous manner. Although there is little danger of applying too great a quantity to land, it may be used to excess. Indian corn is a voracious feeder, and will bear a copious dressing, but the crops of small grain may be injured by manuring too highly.

Manuring the soil forms a grand item in farming, both on account of its expense and its need to replenish the land; it is, therefore, very important to know the art of managing this department with the greatest economy, and preventing waste in any possible shape.

Very few farmers ever have a sufficiency of animal manures for their purposes. Hence recourse must be had to other means for augmenting the manure heaps.

The great principle of all manures may be understood from this fact, that whatever animal or vegetable substance dies, is converted into manures for other plants in the living state, by the natural process of putrefaction. By this process it is gradually, but effectually, decomposed; and the parts are fitted for entering into new combinations, and for adding to the substance of the living plants. Thus, instead of nuisances, nature furnishes manure, and no substance whatever is lost. This is one of the beautiful and admired láws of nature; and though we cannot investigate her very minute operations, we are able, by observation, to learn much, and by industry to derive great advantages.

A great deal has been said about the fertility of plants. Pulverised earth, water, as an element, carbonaceous matter, in a soluble state, and various gaseous substances have been successively in repute; some plants have been supposed to draw part of their food from the atmosphere, in a larger proportion to others; and it has been thought that grain and green crops require to be supported with food proper to each class; and that one particular crop, on that account, exhausts the substance on which it feeds, if too frequently repeated.

Practice has introduced more discoveries into agriculture, assisted by observation, than science. At the same time, though the man of science will not presume to dictate to the skilful practical farmer, he may not only improve, but enlighten, and even give dignity to agriculture as an art, by rendering it, in some degree, a science also.

The application of manures depends on the natural state of the soil, and on the purposes for which it is to be applied. Observation and experience determine how to act, and what to apply; also how and when the application should be made. Yet it would be of important use to the farmer, in remarkable cases, to call in the aid of science. Many expensive trials have been made in redeeming some soils, or turning them to useful purposes, in vain.

The farmer knows, or ought to know, that some soils want solidity, and others have too much; that some exceed in cohesion, others in looseness, and that a moderate degree of these properties is considered essential to fertility. With this view sand is applied to tenacious clay; and clay on sand and gravel. But these applications are not made in the strict order of manures; they are mechanically wanted, in order to give to the soils a proper consistence for admitting plants to grow in them, and to push their small roots without losing hold, and at the same time, to feed in a regular manner, imbibing in just proportion, the moisture and nutriment it contains without being either parched or drowned.

Putrid manures, applied in proper quantities, furnish direct nutriment for plants; and calcarious manures probably do the same, in some degree; but they certainly furnish it indirectly, by resolving organic substances contained in the soil into a mucus, assisted by moisture. At the same time these manures are always productive of mechanical effect, in opening and deepening the soils to which they are applied.

From my own observation and experience, I have come to the conclusion that manure, arising from animal and vegetable substances, should be exposed as little as possible to the sun, the air, and drenching rains, and when applied to the soil be immediately plowed in. It is my opinion also that manure, when plowed in, cannot be kept too near the surface, provided it is well mixed and covered, that the essence will be dissolved by rain and taken up by the roots of the plants. So extremely minute are the mouths of plants, that the nourishing parts of manure can enter them only in a state of solution by water.

My object and great aim is to make and get manure; and to carry this into effect, nothing that would contribute, in the least degree, for increasing the manure heap is thrown away. I have always made it a practice of converting every article of rubbish and filth about my premises, weeds and coarse grass around the fields and fences, into manure; and have even hauled saw dust, turner's chips, and sumac leaves, from the morocco dressers, to bed my cattle and absorb the urine previous to mixing in the compost heaps. I also haul anthracite coal ashes from the city, on which I set a high value, for a top dressing on my meadows.

But however correct and economical may be the manner of saving and applying manure, the quantity, it cannot be denied, still falls short of the farmer's wants. How to supply this deficiency merits the deepest attention of the husbandman.

I am an advocate for compost, and for that purpose I mix all the produce of the cattle yard, the sheep yard, the horse stable, the pig stye, and the poultry house.

The dung of the hog, owing to the greater fatness of the animal, and nature of its food, is the richest and strongest; that of the horse, the most heating; that of cattle, the coldest, but the most durable. The dung of sheep, it is conceded, is quick in its operation, and powerful in its effects; therefore the mixing of cattle, horse, hog and sheep dung for all kinds of soils and all kinds of crops, is always to be preferred, and the one corrects the defects of the other, and prevents the fermenting process from going on too rapidly.

The utility of fermented dung is proved from the little advantage derived from what is dropt upon the ground, and has not undergone that process. In the course of its being fermented also the seeds of weeds and the eggs of insects are destroyed.

My yard is dishing, still it sometimes overflows, and where the excess passes off, I caused a basin to be excavated to retain the liquid. Near this basin, which is outside the yard, I place my compost heap, which I commence with a layer of yard manure about one foot in thickness; then a layer of soil, then a layer of green weeds; then a coat of shell lime and ashes; then a layer of turf; then a layer of horse, hog, or sheep dung; then a coat of soil, and so on, with such materials as are available. In short, every thing of a fertilizing nature is placed in the heap, carrying up the sides square, until the pile reaches to the height of from five to six feet. As the heap progresses, each layer is saturated with the liquid which escaped from the cattle yards and then covered with fine soil, to prevent the escape of the volatile parts of the manure, and in the next place, to absorb the gases—so that the soil used for a covering becomes itself a valuable manure —a point long since established by the practice of many enlightened farmers. After remaining a sufficient time, I cause the whole heap to be carefully and completely turned and mixed, throwing on liquid manure as the work progresses. A fermentation soon takes place, sufficient to destroy the vitality of the seeds of such weeds as may find their way into the heap. After two turnings it generally gets completely broken down and comminuted. By mixing a small quantity of salt to the heap, I have no doubt it would add greatly to its fertilizing properties.

In this way I have added from one hundred, to one hundred and fifty loads of good manure per year.

I have used with good success, bone dust, horn shavings, bristles, salt fish, and poudrette. They are all highly concentrated manures, and are valuable for the immediate crop, but for after-crops and enriching the soil durably, give me the compost heaps.

I once had great faith in the use of gypsum, but after several experiments with it, I became satisfied that it was of no benefit on my soil; I have, therefore, abandoned its use altogether.

The understanding holds the middle ground between the external and internal worlds—that of *sense* and that of *spirit.* The external senses, those of sight and feel, give the understanding the materials of which it forms its judgments of material things—while the reason is the sense which enlightens us of things belonging to the spirit, and those truths which are absolute and of universal acceptance. By the understanding our relations, by means of the senses, is preserved with material objects. In futurity those senses may not exist, for reason may then open a direct intercourse with spirit, and our understanding will be enlightened and taught by means of this intercommunication with the spiritual world. The senses may become extinguished; but reason will maintain the eternity of mind, and become the sense by which immediate intercourse is held with the Eternal—with the good—the beautiful and virtuous.

It is certain that every age possesses certain characteristics—and if we would understand the causes which have controlled human affairs, we must study those characteristics. Those characteristics will explain to us many events which appear as anomalies, when considered only by themselves.

NEW PUBLICATIONS.

REPORTS ON THE GEOLOGICAL SURVEY OF THE PROVINCE OF CANADA.

(Presented to the House on the 27th of January 1845.)

The reports referred to in the above title are comprised in a pamphlet of 159 pp. 8 mo. W. E. Logan Esq., is the geologist, who is favorably known by his investigations in the coal fields of Great Britain.

The report is not designed to embrace a full and complete account even of the labors so far as they have progressed; and hence, is merely a sketch of the labors which have been expended upon a few isolated points in Canada and Nova Scotia, together with a brief account of the reconnoisance of the field generally.

Mr. Logan gives a very clear and distinct account of the coal fields of the United States, New Brunswick and Nova Scotia. The details of all that part of the report relating to the United States, is acknowledged to have been derived from the geological reports of New-York and Pennsylvania; and on page 53, Mr. Logan says, that in investigating each group of strata, I have usually endeavored to determine its equivalent in the State Geological Survey of New-York, referring to the classification of rocks established by that survey as a standard by which a vast amount of labor and time might be saved in Canada. Mr. Logan divides the territory which falls under his inspection into two divisions, Western and Eastern. The line of separation is drawn along the Hudson river and Champlain valleys to Missisquoi bay, and then to Quebec. The Western division, as connected with the geology of Canada, Mr. Logan describes as a gigantic trough of fossiliferous strata conformable from the summit of the coal to the bottom of the lowest sedimentary formation, with a transverse axis, reaching from Michigan to the neighborhood of Washington, a distance of seven hundred miles; and a longitudinal one extending from Quebec in a south westerly direction to the Tennessee river in Alabama. In this great trough are three subordinates, in the centre of which, there spreads an enormous coal field. One commencing on the southern borders of Kentucky and extending north westerly to Rock river, in Illinois, is 360 miles long, and in breadth 200. It is of an oval form, and is intersected by the river Illinois, Wabash and Ohio. It is bounded by the Mississippi, which sweeps along nearly the whole western margin. It covers an area of 55,000 square miles. The second coal field, the heart of Michigan, extending one hundred miles east and west, and one hundred and fifty miles north and south; commencing from the neighborhood of the rivers Manistee and Ausable and terminating at the source of the Grand river near Jackson. It has a superfices of 12,000 square miles. The third carboniferous area stretches in a north-easterly course about 600 miles, beginning in the State of Tennessee and extending to the north corner of Pennsylvania. Measured transversely, or from the north branch of the Potomac, in Maryland, to the south-eastern corner of Summit county in Ohio, it is 170 miles. Its form is somewhat rhomboidal, and is suppósed to comprise an area of 60,000 square miles. It is traversed by the Ohio and Susquehanna; the main trunk of the former passes through its centre, or traverse it for about 400 miles. The latter intersects with its tributaries, the north-eastern extremity, and denudes and lays bare the series of rocks down to the New-York system beneath, and which of course are exposed in their outcrops.

The most important part of Mr. Logan's report is the Appendix, which constitutes nearly one half of the pamphlet. It comprises a detailed examination of the Nova Scotia coal measures as developed at Joggins, on the Bay of Fundy. The whole formation has been reduced to vertical thickness, and every subordinate mass measured and described.

The formation consists of sandstone, gray, brown or drab, and slates and shales of a variety of colors, as red and brown of various shades, together with dark colored slates in which the coal seams are usually found. The rocks with which our readers will be most familiar, are the gray and greenish-gray sandstones, which are seen through all parts of the United States, in what are called the Nova Scotia grindstones; most, if not all, are taken from carboniferous formations of this region.

The whole thickness of the Nova Scotia coal measures, as determined by Mr. Logan, is fourteen thousand five hundred and seventy feet and eleven inches. We look with great interest to the completion of this survey. This being finished, we shall then be in possession of the geology of so much of this continent as is embraced in the area lying between the Gulf of the St. Lawrence and the Gulf of Mexico, and from the Atlantic to the plains which border the Rocky mountains.

Such has been the spirit with which geology has been pursued in this country, by American geologists principally, that those in the oldest rank of observers remember when the first blow was struck and when the first hammer was raised upon our rocks. We groped in the dark nearly two-thirds of the time in which geology has been pursued in this country. The most important advance which has been made in this science, was achieved when the geology of New-York was determined, and when the order and arrangement of series was first exhibited. We then had, and not till then, the key to North American geology.

We do not, however, mean to be understood, that all has been done even in New-York, so that nothing more remains; the leading parts and principles only are settled. We have the great outlines of our geology laid out. What remains is the work of filling up with local details, which from their nature will result some of the most important discoveries belonging to this department of knowledge.

ANNUAL REPORT OF RANSOM COOK, ESQ., AGENT OF THE CLINTON STATE PRISON.

(Presented to the Senate on the 19th of January, 1846.)

We have from the beginning taken a deep interest in the establishment of this prison. The proposed employment and the improved discipline of its inmates, gave to this project greater importance than belongs usually to affairs of this kind; and we are pleased with the prospect of success which appears to await the judicious efforts and management of the Agent. It is not our object, however, to speak of the police of this institution, but to bring before our readers the mode of ventilation which Mr. Cook devised for the main building, or that part of the building which is appropriated to the confinement of the prisoners.

No person has ever visited a jail or a prison, who has not been half suffocated with the effluvia on first entering its walls. Hence it has been a great desideratum ever since philanthropists began the work of ameliorating the condition of this class of our community, or since men have begun to think that prisoners may possibly suffer more than their crimes deserve, to find some mode by which the offensive air might be removed. The attempts hitherto have only partially succeeded. On this point we copy a paragraph from the *Medical Chirurgical Review*, vol. 2, 1845, new series.

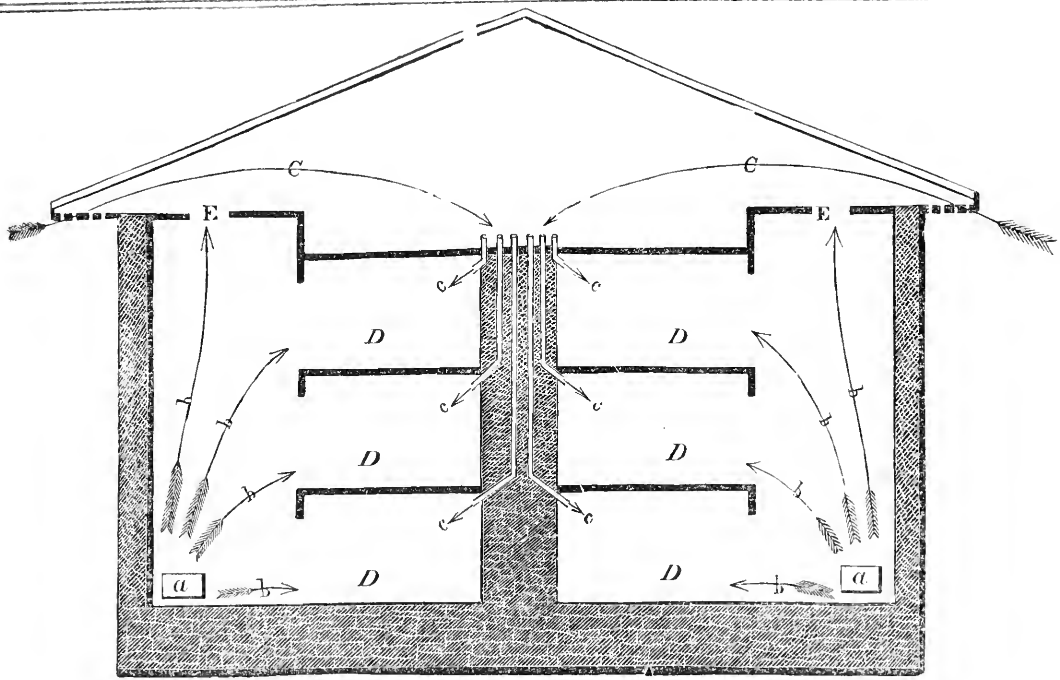
" Simple as this object may appear to be, it is, as we have previously noticed, difficult of attainment, and moreover most of the plans, especially when applied on a large scale, are so expensive, as to be on that score impracticable."

We are happy to say, that Mr. Cook, the Agent of this prison, has succeeded in this highly important end; for it is an end which is important to community generally, but especially to all public institutions where men are congregated. The following is Mr. Cook's description of the plan of ventilation.

" The plan adopted for ventilating this prison, is as follows: a pipe of sheet iron four inches in diameter, passes from the back of each cell near its ceiling, into the centre wall, where it is surrounded by masonry, and continued in the wall to its top in the garret. The outer wall of the building, and that on the front end of the cells, is carried three feet higher than the top of the upper story of cells. On these two walls rest the timbers supporting the ceiling of the hall. This elevation of the ceiling forms a pit-like recess over the whole block of cells in the garret. In the ceiling of the hall there is a row of ventilators eighteen inches square, and twenty feet apart. A full supply of fresh air is received into the garret, through openings made in the projection of the roof over the building. The aggregate capacity of the ventilators in the ceiling is about three times greater than that of those in the cells.

"This experiment has proved entirely successful. The fresh cold air of the garret falls into the pit above the cells, from whence it descends into them through the ventilating pipes; it there meets and mixes with the warm air from the stoves in the hall, which readily passes through the lattice work of the cell doors. The vitiated and over-heated air passes off through the more elevated apertures in the ceiling of the hall. The prison being steadily heated to about 60° F., the mason work of the block of cells is of course brought to the same temperature. The cool air descending through the ventilating pipes, which are surrounded by this warmer masonry, will of course be raised in temperature in proportion to the length of pipe through which it travels. Hence the air which descends through a pipe about eighteen feet in length, to reach the lower cells, will enter them with a temperature higher than that which enters the upper cells through a pipe but sixteen inches in length. In short, the heated air from the stoves in the hall enters the cells with a temperature raised in proportion to their elevation, and its heat is there counteracted by its union with a current of descending air, reduced in temperature, and increased in quantity in a similar proportion.

"The following sectional view of the arrangement of the cells, with the pipes and apertures for ventilation, will assist in understanding the subject."



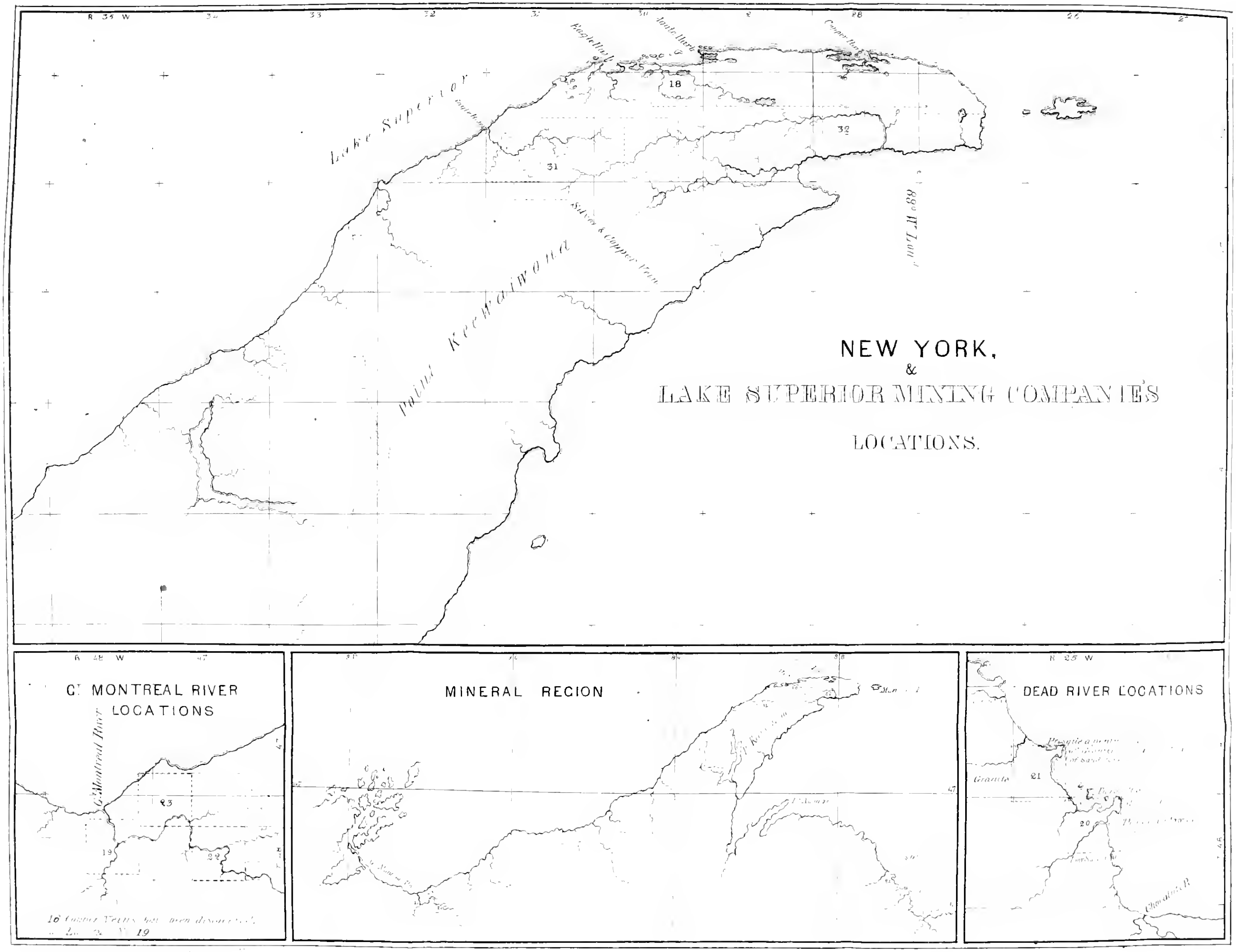
b a a. Stoves in the hall, with horizontal pipes about 40 feet in length, when they ascend and enter the chimney in the wall.
Warm air radiated from the stoves and their pipes.

C. Cold air, which enters through the perforated projection of the roof and passes between the ventillators in the ceiling of the hall, to the pit above the cells.
D. Cells. E. Ventillators in the ceiling of the hall, 20 feet apart.

Before we dismiss this report, we feel it our duty to give the sentiments of the author, as he has expressed them on the last page of the Report. The remarks are in our opinion of great value, and will deserve the consideration of all concerned in legislation, or in the management of those who are undergoing the sentence of the law for their crimes.

"The convict well knows that by his sentence he is degraded as a felon, cut off from society, and stripped of his right of citizenship. That he is to be confined a given number of years at hard labor, without fee or reward. All this he knows he must bear, and he very naturally feels that his punishment is sufficiently severe. But he also knows that cold, hunger, unnecessary flagellation and all cruelty, however inflicted, forms no part of his sentence. When, therefore he sees those in authority inflicting tortures at which his own hardened nature revolts, he readily concludes that himself, though a felon, is a better man than his keeper, who holds a reponsible office. This conclusion leads him to the conviction that merit is without its reward and promotion is obtained by villany. A belief that the world is as bad or worse than himself; that he is a victim of oppression, rather than a subject of penitentiary reform, is soon adopted. An impatience of restraint and a hatred of all law and its officers speedily follows. He consequently leaves the prison much worse than he entered it; at war with his race and urged on by a desire of avenging his former injuries. His subsequent conviction and return to the prison, which soon follows his discharge, is then triumphantly urged as a proof that he merited the cruelties inflicted and even much more. This routine of severity of discipline, discharges from prison and subsequent convictions, instead of awakening a suspicion as to the correctness of the policy pursued, seems only to have confirmed its advocates in a conviction of its justice; to have rendered keepers more callous, and the public more indifferent.

That the power of kindness is the strongest known to human nature, is too sensibly felt and too well understood by all, to be taught as a new discovered truth. Under its and softening influ-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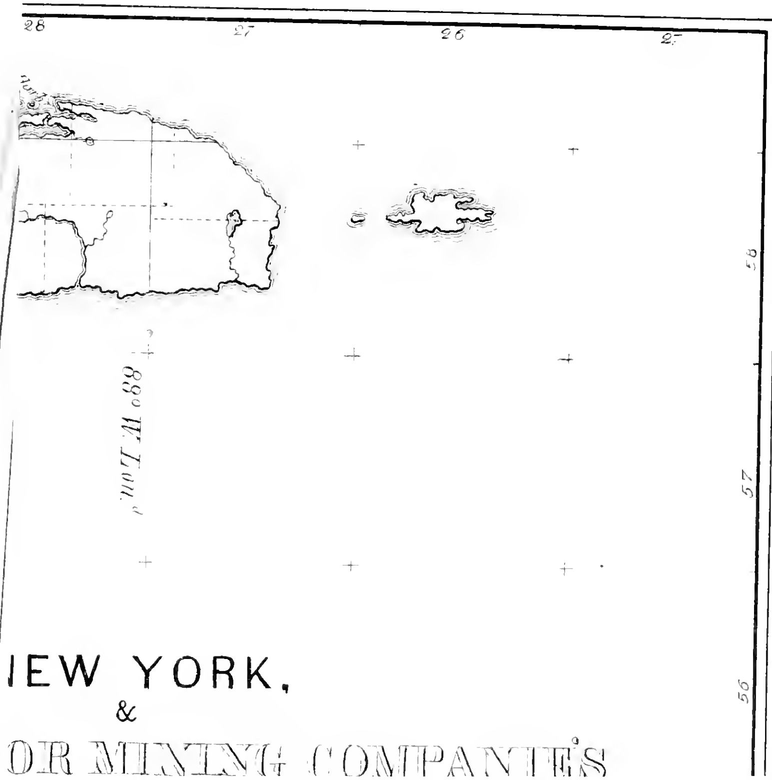
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ence vice is abashed, ferocity tamed, and a man voluntarily lays down his life for his friend. When it can be shown that harshness and cruelty are capable of producing the same results, we may find an excuse for discussing the propriety of adopting one, or the other system, in prison discipline."

COPPER MINES.

1. *On the Copper and Silver of Kaweena Point, Lake Superior.* By C. T. Jackson, M. D.
2. *Outlines of the Geological Structures of Lake Superior Mineral Region.* By James Eights, Mineralogical Surveyor.
3. *On the Junction of the Transition and Primary Rocks of Canada and Labrador.* By Capt. Bayfield, R. N. G. S.

During the last two years, the mining region of Lake Superior has excited unusual attention. The reports concerning the veins of copper, whose value is said to be greatly increased by silver, both alloyed and native, has heightened this interest, and has created an intense desire to know more of the truth of the statements which have been floating in the community. Indeed the excitement seems equal to that which attended the lumber fever of Maine, or that of the water lot speculation of our western neighbors in 1836. We by no means, however, intend to convey the impression that it is all empty speculation; for we have no doubt that valuable metals are now found, and will be found in greater abundance hereafter, when the country is cleared of its dense growth of trees and underbrush, than in any other region in this country. Even more may be true than the most sanguine expect; still, when we take into consideration the fact that nearly one thousand locations have been selected for mining, we are forced to believe that but a few only will prove valuable; and as in most cases of the kind, the final result will be, that where one man has made a fortune, fifty will lose money by their operations.

Our business, however, now is, to state facts and leave conjecture to others. On this subject our facts are derived partly from oral communications, and partly from the published reports of those who have been employed as mineral surveyors in the copper region. Two of these reports are before us, and we have selected Capt. Bayfield's general observations for the purpose of making this communication more complete on the geology of the region which forms the subject of the essay.

Dr. Jackson states that the earliest accounts of the existence of metals on the south shore of Lake Superior, date as far back as 1760. Since then many persons have partially explored those shores, with greater or less success. Masses of native copper have from time to time been discovered, but the most accurate explorer of this region was Henry R. Schoolcraft, who published an account of it in the third volume of Silliman's Journal.

Among those, however, who have examined the region of the northern lakes, Capt. Bayfleld has probably explored a much greater space than any other individual. Lake Superior, according to his observations, is placed in an oval basin or depression, and is surrounded by hills, whose average height does not exceed 700 ft.; even the highest do not rise over 2000 ft. above the lake, whose surface is about 623 feet above, and its extreme depth about the same number of feet below the tidal waters of the Atlantic ocean. These hills or mountainous tracts are composed of various granitic aggregates, in which horneblende is often a prominent element. These compounds often pass into sienite and greenstone, by the diminution of quartz, mica and feldspar, and the increase of horneblende. The general direction or strike of these formations is north-east. Basaltic dykes of enormous width traverse these formations, and range up the hills for miles. In addition to these rocks he describes various trap and amygdaloidal rocks, which occur on both sides of the lake, but are more fully developed upon its northern shore.

The minerals of the granitic rocks are schorl, garnet, amethyst, rock-crystal, epidote, purple fluor spar, chlorite and green earth, calcareous spar, specular iron, barytes, iron pyrites, and copper pyrites. The trap rocks are also very rich in minerals; among them are calcedony, carnelian, jasper, agates, various zeolites, epidote, augite, olivine, green earth, prehnite, fluor spar, satin spar, amethystine quartz, graphite, malachite, copper pyrites, native copper, native silver, green silicate of copper, red and black oxide of copper.

Extent and Distribution of the Sand-stone and its Conglomerate.

According to Capt. Bayfield and Dr. Eights, this rock forms the entire shore of the lake; it is rarely removed from its original horizontal position, but is frequently shattered and broken by the disrupted trap which often reposes upon it. It does not extend itself in a continuous mass, but occurs in beds disconnected by igneous, as well as by diluvial action, but still may be traced from the southern to the northern shore, along which it appears in headlands from 30 to 60 feet high. It also appears upon all the islands.

Hence it is considered as a general formation spreading over the basin of Lake Superior, and resting on granite, excepting when the amygdaloids and trap are interposed, or intruded between them. The height to which it rises is not over 400 feet above the Lake. The greenstones, trap or amygdaloids, associated with the conglomerates, sandstone and sandstone shale, are of an origin entirely different from the latter, and having been ejected from below, they have brought up with them the metals which are the objects of so much attraction; hence the position of the metals must be, in all cases, in the vicinity of these ejected rocks: usually at the junction of the lowest, that is, the conglomerate and the trap or igneous beds, and sometimes the metal is disseminated in the trap; it never, however, extends into the conglomerate or sandstones by dissemination. One general remark seems to be called for in this place, viz: when metals or ore occur in sedimentary rocks, we may infer, as a general rule, that the igneous rocks, or the granites and trap, are not far distant, and the close proximity of all the primary rocks to the sedimentary, is a strong reason for believing that the mineral region of Lake Superior will prove an exceeding rich one.*

In addition to these rocks there occur reposing upon them unconformably those belonging to the sedimentary class, which consist lithologically of cemented quartz, trap and greenstone, forming a singular conglomerate. This is the lowest mass; and, in tracing it upwards, it passes into a red or brown sandstone, mottled in many places with green: it is also traversed extensively with quartz seams which often branch out like the roots of a tree, or else form a net work of the same material. This arrangement imparts a singular aspect to the cliffs when they are exposed upon the shores. Of the conglomerate and the sandstone, into which it passes, there are innumerable varieties, differing from each other: some in color, some in hardness, and others still, in the arrangement of the elements which compose them.

Dr. Eights, in his communications, makes a distinction between this conglomerate beneath the sandstone and another which he styles a *trap tuff*, which is clearly of a recent origin, being really a consolidated diluvium, which consolidation, instead of being produced by infiltration of the carbonate of lime, is really a baked mass, or consolidation effected in later times, by igneous, rather than by aqueous action.

* It is proper to say to those of our readers who are not familiar with the names and characters of rocks, that trap, amygdaloid and basalt are rocks of igneous origin; they are, in other words, ancient lavas which were poured forth in a molten state, from below, while the surface of the country was covered with water. Hence they appear as filling fissures or wide cracks, and frequently they appear to have overflowed the parts adjacent to these cracks, which, when filled, are called *dykes*. These rocks have been formed at all periods, and hence may rest upon and cut through any sedimentary rock of any age. They frequently bring with them to the surface the metals in the form of sulphurets, oxides, native or alloys. The amygdaloid resembles most frequently a recent lava, only the pores, or vesicles, are generally filled with spar, or some mineral substance which has infiltrated into them since the period of their formation: what is called greenstone, is far less vesicular, and basalt is perfectly compact; they have the same origin, but were subjected to pressure at the time of their ejection, and hence the vesicular structure is wanting.

In consequence of the absence of fossils in the sandstone and its concealment at, or near, the places of junction with succeeding rocks, its age yet remains undetermined. It would seem, however, to be analagous to the Potsdam sandstone of the New York series, and this opinion Mr. Lyell is inclined to adopt. It rests upon the primary, for it is not customary to separate it from the conglomerate beneath. Capt. Bayfield's views of its place and age are quite indistinct, and the only definite opinion which he expresses is, that it is older than the old red sandstone — the rock which constitutes so large a part of the Catskill mountains. It is, however, below the Lake Huron limestone, a limestone which is in fact equivalent to the Niagara limestone in the New York system. This would of course make it much older than the old red sandstone, and would either make it equivalent to the Medina or the Potsdam sandstone. Our opinion is, that it is the latter, disguised in various ways by its heterogeneous composition and the intense igneous action to which it has been subjected. The Potsdam sandstone, near the falls of Montmorenci, is particolored and stained with copper, and at many places it is a brown or red color, and contains iron—in other places, it is white, gray, brown, striped, and sometimes iron-black with quartz seams, and somewhat resembling graywacke, except that its color is much darker.

Having stated very generally and briefly some of the facts which relate to the rocks of Lake Superior, we now propose to speak of them as mineral depositories, after which, we intend to follow Capt. Bayfield back through the northwest region, that we may lay before our readers the principal facts connected with the junction of the sedimentary with the primary rocks, from this lake to the Gaspé district upon the Gulf of St. Lawrence.

Locations of the New York and Lake Superior Mining Company.

This company has leased sixty-five square miles of the mineral lands in eight tracts, of which two are situated near Dead river, three at Keweena point, and three upon the Great Montreal river.

The company has already expended over fourteen thousand dollars.

Agate Harbor, on Keweena Point, and situated upon the coast, as will be seen by reference to the map, has not been sufficiently explored to determine its real value. Many veins of spar with copper are seen traversing the trap and conglomerate, but the vicinity is low and the underbrush extremely dense and difficult to penetrate.

At Eagle river, the indications of a rich mining field consist in the great abundance of broken fragments of rich veins, which are profusely scattered about.

At the Great Montreal river, a great number of veins have been discovered. These are situated, as usual, at the junction of the trap and sandstone, or conglomerate. At one point, no less than sixteen distinct veins have been discovered, all of which exhibit masses of native copper. The matrix of these veins consists of laumonite, carbonate of lime, prehnite, epidote and serpentine.

The Dead River location, a vein of copper ore occurs about four feet and a half wide. It consists of green carbonate and sulphuret of copper, filling small interstices in barytes which constitutes the gaugue. A specimen of the ore yielded twenty-eight per cent of copper.*

* As much interest is beginning to be felt by the community generally in the mineral wealth of our country, the following extract in relation to the "Consolidated and United Mines," (at present the richest mines in Cornwall, England) taken from the report of Captain G. W. Hughes, of the United States Topographical Corps, made to the Secretary of War, April 9th, 1844, may be of some interest to our readers.

Captain Hughes, while on a tour in Europe, examined attentively many of the mines in England, and has given a very full and satisfactory report, not only of the nature of the mines, but also the manner of working them, and of reducing and refining the metals :

"Elevation of the surface above the level of the sea, from 200 to 300 feet ; depth below the sea, about 1370 ; total depth of mine, 1500 to 1600 feet. Ores—chiefly yellow copper ore, occasionally native copper, variegated copper red oxide of copper, blue and green carbonate of copper; Tin ore or oxide of tin also occurs, but not in very great abundance. Produce of the ores—9¼

At Copper Harbor a vein of the black oxide of copper has been discovered in the conglomerate about 14 inches wide, and has been traced fifty feet. At Hayes' Point, the chrysocolla a green hydrous silicate of copper has been known for a long time.

It is stated by Dr. Jackson that one of the most valuable locations of Lake Superior Mining Company is situated on the west side of Eagle river, eight miles from Eagle harbor, and about a mile and a half from the lake shore. The ore, which consists of native copper and silver, is disseminated in the trap rock, so thickly as to yield between ten and thirty per cent of its weight. What is interesting, is the association of the copper and silver; first in an alloy, and then again the silver forms a plate adherent to the copper, without being at all alloyed with it. The copper contains three-tenths per cent of silver. The vein has no regular walls, but its workable extent is about eleven feet. It has been traced half a mile. The yield of silver to the ton of this ore is equal, according to Jackson's analysis, to $25\frac{2}{10}$ lbs. per ton of silver; the copper to 1257 lbs. per ton. The above yield was obtained from the coarsely sifted pieces; to this must be added for the fine washings and siftings, a yield of $3\frac{4}{16}$ lbs. of silver, and of copper 250 pounds per ton. According to this analysis, the value of silver in a ton of ore equals $568, and the copper $241.12; value of the metal $701.12 per ton of ore. It is proper to add that the reports from Lake Superior this win-

per centum of fine copper, average produce in one hundred parts of ore. Depth of the principal shafts—Woolf's engine shaft, 248 fathoms; Pearce's engine shaft, 275 fathoms. Quantity of water raised, from 2000 to 3000 gallons per minute. Power employed in drainage, 9 steam engines. Average annual expense of drainage, £12,700 ($63,500). Quantity of ore annually produced, 16,400 tons of copper ore, and a few tons of tin ore. Produce in metal, 1517 tons of fine copper, and a little tin. Total returns or value of the produce in metal, £119,900 ($589,000). Total cost of the mines, £98,500 ($492,500). Clear profit to the proprietors, £21,000 ($105,000) per annum. Amount of capital invested, £75,000 ($375,000). Interest on capital invested 280 per centum, after paying back the original capital. Number of men employed, about 2500 persons, of whom 1450 are employed under ground. Manner in which the ores are disposed of, sold to the smelting companies, and smelted by them at Swansea, in South Wales."

ter are still more flattering than they have been at any former time; especially in regard to the prospects and value of the Pittsburg Company's location. We are informed that this stock now sells at eighty per cent above par; that an analysis of the copper recently found in their deepest workings, yields silver in value equal to $10,000 per ton!

Leaving the region of Lake Superior, and proceeding to Lake Huron, we are informed by Capt. Bayfield that the sandstone with its conglomerates is succeeded by limestone; but the geological position in the series is not clearly set forth in the treatise before us. It is probable, however, that the upper beds of the limestone belong in the New York series, to the Niagara group, inasmuch as the pentamerus oblongus, is one of the fossils which occur in the limestone; but it is at the same time probable also, that in passing over the space between Lake Superior and Huron, the lower limestones also exist, and that among them there will be found the Trenton limestone, a rock which is very persistent in this country. It is stated however, that the sandstones of Lake Superior are wanting, and that the limestones rest directly upon the primary rocks; excepting at or near Lake Cloche where the quartz or sandstone is interposed between the limestone and granite.

From Lake Huron eastward, the same limestone has been traced across Lake Simcoe to the Rice Lakes and thence on the north of Lake Ontario to Kingston and the Thousand islands, and then again by Bytown, Perth and Lake Chat, across the Ottawa to Montreal and Quebec. From this statement of Capt. Bayfield, we are satisfied that he is far too general and loose in his account of the rocks of this region; for when he speaks of the limestones of the Thousand islands and the region thereabouts, we know very well that they all belong to the lower limestones of the New York system; consisting of the calciferous sandstone, birdseye and Trenton limestones.

The northern shore of the St. Lawrence, from Cape Tourment eastward to the Mingan islands, is composed of primary rocks. While upon the southern, beds of limestone and graywacke occur.

The Mingan islands are limestone, and so also is Anticosti; they have a southerly dip. From the list of fossils which Capt. Bayfield gives, we have no doubt but that the series of limestone at the Mingan and Anticosti islands extends upwards so as to embrace the Onondaga limestone. We have seen a mass of limestone from Anticosti, which could not be distinguished from the pentamerus limestone of the Helderberg.

From the Mingan islands to the straits of Belle Isle, the coast of Labrador consists exclusively of primary rocks, but on the east side a sandstone is met with, which passes into gneiss. It extends thirty miles along the northern shore of the straits of Belle Isle, and forms table lands 400 to 500 feet high. This sandstone is undoubtedly our Potsdam sandstone. On the Newfoundland side the limestones which we have already referred to occur again.

We have now occupied so much space upon these geological details, that we deem it inexpedient to follow Capt. Bayfield in his description of the rocks of Canada, in the Gaspé district. It is, however, interesting to us to find the succession of the rocks so much like New York. We see in all these facts, the uniformity of the operation of nature; the rocks themselves, as well as the phenomena accompanying them, are the same as on our own borders. Besides, it is useful to know the great American ranges, and be able to compare them with what falls under our own observation at home—we can say more than this—that it is astonishing that we can trace one series of rocks, abounding in the same organic bodies, for thousands of miles. It is true, that the characters are not absolutely uniform—but any geologist, with only ordinary opportunities for observation, can determine the position of almost any rock, provided he is supplied with some of its fossils. The application of this kind of knowledge to the determination of the position and age of rocks, constituted an era in geology—and it has been, in the hands of the well taught geologist, a key to the solution of some of the most important questions in this department of science.

CRITICAL NOTICES.

1.—*Notes on the Iroquois, or Contributions to the Statistics, Aboriginal History, Antiquities and general Ethnology of Western New York.* By HENRY R. SCHOOLCRAFT, Hon. Member of the Royal Society of Northern Antiquaries, Copenhagen, &c., &c. Senate Document 24, pp. 285. Bartlett and Welford, Astor House, New York.

This work, though it appears in the form of a statistical document, yet the author has embodied a large amount of valuable history of the Five Nations. It is written in the clear classic style of the best historical writers of the present age; in fact, Mr. Schoolcraft is one of those men who can write a respectable octavo volume without saying a foolish thing, or giving utterance to a silly sentiment. There are some repetitions, and some blunders of the press, but these do not essentially diminish the value of the work.

2.—*Third Annual Report of the Managers of the State Lunatic Asylum. January* 23, 1846.

It appears from the report before us, that this highly important institution is conducted with ability, and has already become highly useful, and has the full prospect before it of fulfilling the benevolent ends for which it was established.

During the last year, 553 patients have been in the asylum; 282 men and 271 women. Of these 293 have been admitted, there being at the commencement of the year 260. The number of patients who have been discharged is 268; 135 of whom had recovered, 78 improved, 34 unimproved, and 21 died; leaving at the end of the year 285; 143 men, and 142 women.

The whole number of patients admitted since it was opened for their reception (January, 1843), is 844. Whole number discharged 559. Of this number 320 have recovered, 139 improved, 56 unimproved, and 44 have died. 509 have been supported by towns or counties, and 335 by their friends.

The charge at the institution for board, is $2,50 per week; for indigent persons, $2,00.

3.—*Mr. Alger on New Localities of rare Minerals, and the identity of species supposed to be distinct.* Read before the Boston Society of Natural History.

Of new localities for rare minerals, Mr. A. credits *Phacolite* to New York, in the form of implanted crystals or calcareous spar. Color, wax or a honey yellow, with a waxy lustre; translucent; no indication of cleavage; hardness=chabasite, with which it is supposed to be identical.

Yttro-cerite, has been observed by Alger in rolled masses of limestone, from Orange county, N. Y., and associated with brucite.

Ottrelite from Sterling, Massachusetts. It is disseminated in small, thin plates in an argillo-micaceous slate. Color, brownish black, or grayish black; lustre, semi-metallic; opake. Identical with *phyllite.*

Dysluite is considered, from recent observations, to be identical with automalite.

Polydelphite, Mr. Alger coincides with Dana in the opinion that it is a variety of garnet.

Beaumontite, of Levy, and *lincolnite,* of Hitchcock, has been shown to be identical with *heulandite.*

Ledererite is admitted to be simply Gmelinite; the presence of phosphate of lime is now supposed to be accidental.

Washingtonite, of Shepard, Mr. A. considers to be identical with ilmenite, a titanite of iron.

4.—*Report of the Chemical Examination of several Waters for the city of Boston.* By B. Silliman, Jr.

This document is an able one, and though made up of dry details, is still interesting as well as instructive.

6.—*The Quarterly Journal and Review, No.* 1. L. A. Hine, Editor and Proprietor. Cincinnati.

It is a literary and scientific work combined, and has commenced with a valuable number. We hope that it will be supported. It is devoted to politics, education, science, literature, art, moral reform, labor and capital, biography and history. Terms, one dollar per year.

5.—*Report of the Commissioners of the Canal Fund of the Tolls, Tonnage, and Trade of the New York Canals.*

Of this valuable document, we have space only for one of its tables.

It will be seen that there is an increase in the tolls, compared with 1844, of $199,807. Of this increase, $154,294, or 77 per cent, is on descending freight, and $45,513, or 23 per cent, on ascending freight.

The total tonnage of all the property transported on the canals, ascending and descending, its value, and the amount of tolls collected for the ten years preceding, is as follows, viz:

Year.	Tons.	Value.	Tolls.
1836, ...	1,310,807	$67,634,343	$1,614,342
1837, ...	1,171,296	55,809,288	1,292,623
1838, ...	1,333,011	65,746,559	1,590,911
1839, ...	1,435,713	73,399,764	1,616,382
1840, ...	1,416,046	66,303,892	1,775,747
1841, ...	1,521,661	92,202,929	2,034,882
1842, ...	1,236,931	60,016,608	1,749,196
1843, ...	1,513,439	76,276,909	2,081,590
1844, ...	1,816,586	90,921,152	2,446,374
1845, ...	1,985,011	100,953,245	2,646,181

FARMERS' MISCELLANY.

SALT—A FERTILIZER.

BY C. N. BEMENT.

The value of salt for agricultural purposes, has long been known, both in Europe and in this country, and why it has not been more generally used is beyond my conprehension. More than one hundred and fifty years ago, Sir Hugh Platt, an eminent writer of that day, speaks very decidedly of the benefits which might be derived from the practice of sprinkling salt upon land, and calls it the "*sweetest* and *cheapest*, and the most *philosophical* of all others." He relates the case of a man, who in passing over a creek on the sea-shore, suffered his sack of seed corn to fall into the water, and that it lay there until it was low tide, when, being unable to purchase more seed, he sowed that which had been in the salt water, and when the harvest time arrived he reaped a crop far superior to any in the neighborhood. The writer adds, however, that it was supposed the corn would not fructify in that manner unless it actually fell into the water by chance; and, therefore, neither this man nor any of his neighbors ever ventured to make any further use of salt water.

The same curious writer tells also of a man who sowed a bushel of salt, long since, upon a small plot of barren ground, and that to that day (the time he was writing), it remained more fresh and green than any of the ground round about it.

Dr. Brownrig, who wrote more than a century ago, in speaking of salt says, "it is dispersed over all nature; it is treasured up in the bowels of the earth; it impregnates the ocean; it descends in rains; it fertilizes the soil; it arises in vegetables; and from them conveyed into animals."

In the neighborhood of the salt works, in Great Britain, the value of salt as a manure is well known and acknowledged; "that when wheat and barley has followed turnips, on land which had been salted, the ensuing crop has invariably escaped mildew, although that disease had affected all the grain upon the lands adjacent, on which salt had not been used."

It has been asserted that salt is the mother of all manures, as every kind of manure is higher or lower in value according to the salt it produces; and every kind of manure is portioned out to the land according to the quantity of salt or nitre it is thought to contain.

"Nothing in nature," said Hollingshead, "is so powerful as salt to meliorate strong and stiff soils, and also to give moisture to dry ground; it is also a certain destruction to weeds and insects. Besides its efficacy on corn and fallow ground, its excellent qualities, in giving luxuriance and salubrity to grass lands, are peculiarly worthy the attention of the grazing and breeding of cattle."

"Soils," says an old writer, "which are subject to the grub, and must be fertilized by common dung, which is a proper nest for the mother beetle to deposit its eggs, must be well impregnated with the brine of dissolved salt, after the dung is first cut up."

The efficacy of salt in destroying noxious weeds, grubs, and insects, is well known, in all parts, but a dose sufficient to kill weeds, would also destroy the cultivated crops; therefore, great attention and caution should be taken in not applying too much when intended to fertilize the soil.

As to the quantity of salt which it would be advisable to use per acre, for the respective crops and upon the different kinds of land, will be best learned by instituting a set of experiments upon every distinct species of grain and roots. Cold, wet land requiring more, and loose, light land, though it be poor, requiring less. Four bushels to the acre, harrowed in after plowing, has been found a sufficient quantity on most soils, for corn and potatoes, but the best way of all others for ascertaining this point, would be for every one to depend upon the results of his own experiments.

To ascertain the exact quantity of salt which may be necessary for the different kinds of land, and to appreciate the benefits which result from its employment in all the various modes of culture adopted in this country, will require several long series of experiments; we would, therefore, suggest to the executive committee of our State Agricultural Society, that they offer rewards to such persons as shall give them an account of the best experiments with this mineral substance, in the different branches of farming and general agriculture.

The safest way for a farmer to adopt, is to use his salt sparingly at first, and in all cases to leave a small portion of the same land without salt, so that the real effects produced by the salt may be, by comparison, in every instance, self-evident and palpable.

That salt is an excellect manure, experience, the most satisfactory of all evidences, clearly proves.

It is stated in an English publication, that "a farmer in the county of Sussex, some years since, had a field, one part of which was very wet and rushy, and that grass produced upon it was of so sour and unpleasant a kind that the cattle would not graze upon it; he tried several methods to improve it, but to little purpose; at last having heard of the benefits of salt as a manure, he determined to try that; for which purpose he procured a quantity of rock salt, which in a random way, without any regard to the precise quantity, he threw upon the rushy ground, fencing it off from the other part of the field, the effect of which was a total disappearance of every kind of vegetation. In a short time, however, it produced the largest quantity of mushrooms ever seen upon an equal space of ground in the country. These, in the spring following, were succeeded by the most plentiful and luxuriant crop of grass, far exceeding the other part of the field in richness of its verdure and the quickness of its growth; the cattle were remarkably fond of it, and though the salt was laid on it twenty years before, this part is still superior to the rest of the field."

An interesting detail, from the Revd. E. Cartwright, will be found in the 4th Vol. of Communications to the Board of Agriculture (England), which is conclusive as to the application of salt as a manure for potatoes. It appears from this communication, that the experiment could not have been tried on a soil better adapted to give impartial results. Of ten different manures which were resorted to, most of them of known and acknowledged efficacy, one only excepted, salt was superior to them all. Its effects, when combined with soot, were extraordinary, yielding in a row two hundred and forty potatoes, whilst one hundred and fifty only were produced from the row manured with lime. It was observable also, where salt was applied, whether by itself or in combination, the roots were free from that scrubbiness which often infects potatoes, and from which none of the other beds (and there were in the field near forty more than made part of the experiments), were altogether exempt. So much for foreign experiments; now let us see what has been done in this country.

From the information which I have been enabled to collect, I am inclined to believe that salt, when sparingly applied, is valuable as a fertilizer, and useful in destroying the grub and wireworm, which often injure, and sometimes even destroy whole crops; and it has been found by experiments the past season, that the scab, or disease which has proved so disastrous to the potatoe crop in all sections of the country, has never been found upon land that had a proper dressing of salt.

Judge Hamilton, of Schoharie, informed the writer that he had found great benefit from using salt on his potatoe ground last spring. After ploughing, he caused four bushels of salt to be sown, broadcast, on the furrow, upon one acre of the field and harrowed in. Potatoes were then planted. Part of the field was not salted. Although the season was remarkably dry, the salted acre was observed to maintain a green, vigorous appearance, while the other part of the field looked sickly and stunted. On lifting them in the fall, those potatoes where salt had been applied were of good size, smooth skin, sound, and of good quality, and yielded a fair crop, while those on the unsalted part of the field, although the soil was full equal to that of the salted portion, the yield was considerable less, potatoes small, and much eaten by worms.

His neighbor had a field of potatoes on the opposite side of the road, soil similar to his own, who planted them the usual way, and the consequence was, his crop was small, inferior in quality, and most of them rotted soon after digging—they were diseased.

Dr. Bogart, who has charge of the Sailor's Snug Harbor, on Staten Island, informed the writer that he applied four bushels of packing salt to one acre of his potatoe ground, last spring, and thinks he derived great benefit from it. Though the crop was not a large one, the potatoes on the salted portion were of much greater size, skin smooth, and free from disease. The vines were more vigorous, remained green while those on land of the same quality adjoining, which was not salted, shriveled and dried prematurely; the tubers small and watery; produce less.

E. M. Stone, in a late number of the N. E. Farmer, says:—"Last spring I tried an experiment on potatoes. I planted in my garden fifty or sixty hills, placing the sets directly on the manure. To about one-half of the hills I applied a table spoonful of salt, after slightly covering the seed to prevent immediate contact. I then finished covering. The hills so treated, yielded potatoes entirely free from blemish, and of excellent quality. The produce of the residue was badly affected by rust (or scab) and worms, and was hardly worth harvesting."

Professor Morren also directs attention to the importance of salt as a means of repelling the disease. He recommends the tubers to be placed in a steep composed of 54 lbs. of lime, 7 lbs. salt, and 25 gallons water.

Mr. J. E. Teschemacher, speaking of the potatoe disease, in the N. E. Farmer, says:—"I think that salt, lime, and several chemicals will destroy the disease. I prefer salt, because when mixed in the soil, it may get into the juices, and circulate through the whole plant. Lime, or lime-water, would do the same, to a certain extent, but it is far less soluble than salt."

The following very interesting detailed experiment with salt, was communicated in the 9th Vol. and 5th No. of the Cultivator, by J. C. Mather, a very intelligent and spirited farmer of Scaghticoke. He says:—"In the spring of 1838, we broke up six acres of sward land that had been mowed a number of years, intending to plant it to corn, but observed, when plowing, that the ground was infested with worms, (the yellow cut, or wire-worms, and black grubs;) as we had mostly lost our corn crop the year previous, by having the first planting almost entirely destroyed by the corn worm, (above described,) we expected a like calamity would follow the present year, unless some preventive could be used to destroy the worms. And having frequently and unsuccessfully used all the recommended remedies to destroy the corn worms, we were induced, at the suggestion of an English laborer, to try salt. After the ground was thoroughly harrowed, five bushels of salt per acre was sowed broadcast, leaving a strip of near half an acre on each side of the field, to satisfactorily test the experiment. The whole was then planted to corn and potatoes. The corn on the part where no salt was sown was mostly eaten up by the worms, and was re-plowed and planted to potatoes. The potatoes on the whole lot were a good crop, but decidedly better where the salt was applied. I regret that we did not ascertain by measurement the actual result. There was a very perceptible difference in the appearance of the vines during the whole summer. On the part where the salt was sown, they grew larger and were of a darker green color, and continued green longer in the fall than the others."

"In the spring of 1839, we spread on a good coat of manure, and planted it all to corn, except about half an acre of the salted land, which was planted to Rohan potatoes. The Rohans were the best crop of potatoes I ever saw. Seed planted, 2½ bushels, produced over 300 bushels. The largest potatoes weighed 4¾ lbs. The corn was a heavy crop, but was not measured. The summer was very dry and hot; but the corn on the salted land did not appear to suffer at all from the drouth, while the other was considerably injured. The salted land appeared always moist, and the growth of every thing upon it was very rapid. We found great difficulty in keeping the weeds down. After three successful hoeings, we were obliged in August to give it a hand weeding. Spring of 1840, intended to have stocked the land down for meadow; but thinking it too rich for oats, planted potatoes without manure. Crop good. The effects of the salt still very apparent. Adjudged to be one third more potatoes where the land was salted."

"Spring of 1841, sowed a part of the lot to oats, the remainder to potatoes and onions, without manure. The onions were a great crop. The summer was very dry, but they did not suffer, while other crops in this neighborhood, on similar soils, were nearly destroyed by the drouth. The oats were a heavy crop, and much lodged on the salted part. The clover grew well, and produced a fine crop of fall feed. This I cannot account for, except by supposing that the salt kept the land moist, or attracted moisture from the atmosphere, as I know of no other piece of land in the town that was well seeded last year; it was almost an entire failure; and the most of the land stocked down last spring has been or will be plowed up in the spring to be seeded.

"We sowed salt the same spring on a part of our meadows. The grass was evidently improved, the result satisfactory, and we shall continue to use it on our meadows."

At a farmers' conference meeting, held at Marcellus, Onondaga county, in November last, Mr. Brown, President of the County Agricultural Society, said, "he had used salt as a manure with great benefit. He sows it broadcast upon wheat and grass at the rate of three to five bushels to the acre. On grass he would sow it in the fall—for wheat he would sow it just before the wheat is sown. He found that three bushels of salt to the acre on his wheat field, occasioned an increase of seventeen bushels of wheat to the acre over that which had no salt. The soil was a strong loam with a stiff subsoil."

Cuthbert W. Johnson, a distinguished agricultural writer, strongly recommends salt as a manure, at the rate of from ten to twenty bushels to the acre, to be sown some two or three weeks before the seed is put into the ground. He says the benefits are as follows: 1st. When used in small quantities it promotes putrefaction. 2d. By destroying grubs and weeds. 3d. As a constituent on direct food. 4th. As a stimulant to the absorbent vessels. 5th. By preventing injury from sudden transitions of temperature. 6th. By keeping the soil moist."

It would seem from all the facts I have been able to collect, that salt corrupts vegetable substances when mixed in small quantities, but preserves them when it predominates in a mass; that in dry seasons its effects are more apparent, and whether it attracts moisture from the atmosphere, or whether it acts as a stimulant or condiment, is of little consequence so long as its effects are certain.

On account of the small quantity of salt, in weight, required for manuring lands, it is no inconsiderable recommendation, because on that account it may with ease be conveyed to the most rough, steep and mountainous parts, to which the more bulky and heavy manures most in use could not be carried, but with infinite labor, and at an expense far exceeding all the advantages to be effected from it.

For a top dressing, a composition of salt and lime, 4 bushels of the former and 12 of the latter, to the acre, has been highly recommended for grass lands infested with moss, and promoting a more vigorous growth of grass. Its beneficial effects on asparagus beds is well known to gardeners, giving a deeper color and a more vigorous growth to the plants.

Salt itself is considered, by some, rather too harsh in its nature, but mixed with ashes, say six of dry ashes to ten of salt, well mixed together, which is sufficient for an acre, and spread upon the furrow and harrowed in. By being thus mixed, and one particle incorporates and mollifies the other, and if conveyed into the earth by a soapy, smooth method, will prove the real enricher the earth wants, to send forth vegetation.

Self-love and Selfishness.—The first a necessary and honorable regard to our personal interests, without monopolizing the goods and comforts which others have the same right to enjoy as ourselves. The second a desire to monopolize those things and comforts which others have a right to. Self-love cannot be too strong—but selfishness is mean and base.

EXPERIMENTS ON SOWING CORN FOR FODDER.

It is not often, in these advancing days of knowledge in farming, that we find a series of experiments conducted with more accuracy than were those which follow. I have procured them from the son of the farmer who conducted them, and the notes are the original ones, in the hand writing of the farmer himself. I wish it were more common for our farmers to make accurate memoranda of every thing they do. But to the experiments. They are are as follows.

1. On the 1st of June, 1828, S. B. sowed in a drill *bird corn*, very thick, on account of its smallness. The kernels were sown about one inch apart, or, in other words, one kernel to one inch square. The size of the bed sown, was 9½ feet by 3 feet. The produce was cut on the 25th of August, and weighed 50 pounds in the green state. The proportionate produce per acre would be 34 $^{2\,4}$ tons, green fodder.

In a month after, say about the 20th of September, the product weighed, when perfectly dry, 17½ pounds, which would give per acre about 12 tons, dry fodder. This kind of Indian corn is called *bird corn*, and half a pint contains 2400 kernels, or 307,200 to the bushel. One quart will sow 66 square feet, and it contains 9,600 kernels.

Rhode Island corn is next best, and contains 566 kernels to the half pint. One quart contains 2,264, and will sow 16 square feet.

Eight rowed corn is next, half a pint containing 580 kernels—quart, 2,320 kernels, and will sow 16 square feet.

Next is flour corn, half a pint containing 360 kernels—one quart 1,440 kernels, and will sow 10 square feet. Southern or gourd seed corn ranks the same as this exactly.

2. Friday, May 29th, 1829. Sowed 19 quarts of flour corn on 150 square feet of ground. It yielded 14 bundles of corn fodder, which weighed 58 pounds. It was cut on the 8th of Sep-

tember, and secured October 4th. Yield per acre, 7 tons, 10 cwt., 1 qr., 15 lbs.

3. Friday, May 29th, 1829. Sowed 8 quarts of southern or gourd seed corn, on 150 square feet of ground. It yielded nine bundles, which weighed 38 pounds. It was cut on the 8th of September, and secured on the 4th of October. The yield per acre was 4 tons, 18 cwt., 2 qrs., 3 lbs.

4. May 30th 1829. Sowed eight rowed white corn, on 130 square feet of ground. Gathered 12 bundles, which weighed 51 pounds. It was cut on the 8th of September, and secured on the 4th of October. Yield per acre 7 tons, 12 cwt., 2 qrs., 8 lbs.

In this experiment the quantity sown is not mentioned, but was probably the same as in the second experiment.

5. June 12th, 1830. Sowed 3 bushels of toll corn for fodder, on a piece of land 92 by 32 feet. Cut on the 1st of September. Gross weight, 1 ton, 10 cwt., 0 qr., 16 lbs. Neat weight, 579 lbs.

The weather was very dry from 12th of June to 1st of September, which is 2 months 18 days. I am confident it was not near half a crop. If it had been sown earlier it would have been better.

I will here add one thing more from the note book of this farmer, for he seems to have been rather a curious man.

May 3d, 1832. Counted the grains or kernels in a half pint of broom corn. They are 4,850, or 1,241,600 in a bushel.

Now how easy it would be for every farmer to keep a little note book, in which he could put down any thing he does, and preserve it for the benefit of others. It would produce habits of confidence in himself, and encourage such habits in others. Every boy and girl brought up on a farm, should be obliged every day to note down every thing they do, and at night to make up a full journal of the whole day's operations. By this course they would become intelligent and observing.

FALSE ESTIMATES.

The progress of improvement in any branch of art or science, is usually slow and toilsome. There seems to be a disposition in most men, to cling particularly to maxims and methods to which they have been accustomed, and to obstinately refuse to receive any thing new, even when its truth and utility are established by the strongest proofs. Such is certainly a prevailing tendency in the human mind at the present day.

The progress of agricultural knowledge and skill has conformed to these assertions I have made. And in this, as in all other pursuits, the world is divided into three classes—one consisting of the few who are ready to candidly and cautiously examine any thing new that offers advantage to them, and adopt improvements known to be such. A second, composed of the few enthusiasts, whose fancy has got the upper hand of their judgment, and who are ready to receive as true, mere shadows—to build theories upon speculative promises, and to rush madly into every innovation without even probable evidence of value;—and a third, and by far the greatest in number, consisting of the mass, who, convinced of their own consummate wisdom, inherited from their fathers, cannot be persuaded to look at an improvement, and to whom any thing is fully condemned if it has been printed in a book.

But large as this latter class is, their prejudices are less to be feared than the head-long, fiery zeal of those who are satisfied with nothing unless it is new. The former can be improved through their imitative faculties—the latter, only by accident. They may stumble upon something which is useful, but in their high ambition to become original discoverers, they neglect the opportunity to benefit by what is already known. They would be leaders, but cannot, because they have never been led.

I am reminded here of a question I asked an officer of the American Agricultural Association, formed in the city of New-

York, last winter, viz:—"Why Prof. Johnston, of Scotland, a man eminent for services rendered to agriculture, was the only prominent man omitted in their long list of foreign correspondents?" The reason given was, that he had *made no great original discoveries.* What a reason! No living man has done so much for the cause, nor will in a long time to come. If Liebig has done his thousands—Johnston has done his ten thousands. He has reduced theory to practice if nothing more, and his works will be read and honored by thousands to whom Leibig is, and ever will be, a blind guide. He has taught the farmer to think for himself, by opening up to him the laws of nature in a form he can understand.

But to return. The farmer is in most cases an imitative man. Let him be ever so much opposed to book-farming, he will do what he has seen his neighbor do successfully. Plant along side of him a man who conducts his farm upon improved principles, and although he may sneer for a while, yet it will not be long before he will begin to follow example and adopt, one by one, the improvements he has seen.

It is often said that the enthusiasts—I have a preference for the term *visionaries*—do good by their zeal. This may be true in a measure. It might be an advantage to the agricultural interest to kill off a tithe of the present race of farmers, and give their business to their sons, who, being new themselves, have not acquired a very strong prejudice against new things. But this is not the course I would recommend, neither am I inclined to give visionaries much credit for the chance good they may do. I believe that farming is to be brought to perfection by a steady course of judicious, sober improvement; not by fiery and hasty measures. The wished for result will not be arrived at by astonishing the man by the enormous effects of some new fertilizer. He may open his eyes and seem surprised, but he will at the same time thrust down his hands doggedly into his pockets, and say "I don't believe it."

It is to the first class I mentioned, more than either of the others, that agriculture is indebted for the rapid improvement it has made within a few years. They have gone on step by step, undetered by the drones, and unaffected by the heat of the visionaries, and they have actually brought to pass a great deal. And in a few years they will bring to pass much more. They will add dignity to the occupation of farming and give it not the character of a profession, but of a scientific art, if I may use such an expression.

A great deal has been said about "elevating up"—to use a sort of slang phrase—the business of farming, and placing it on a level with the liberal professions. It has always stood upon this level. In this country, of really equal rights, it is the man, not his trade or calling, that gains respect. The farmer who elevates himself, will stand upon the spot he ought to stand on. Character in a democratic people, is like water. It will seek its level. If the mind of the man is dignified, it will confer dignity on his calling; if it is low and mean and contracted, it will forever drag down the man and his character and his occupation, as if he had a mill-stone to his neck. So true is the line I learned at school—

'The mind's the standard of the man.'

No—you cannot raise farming to a place of dignity and honor unless the farmer himself does it. A man will honor or disgrace his business according as his mind is filled with his own dignity. He demands and receives respect, or he gives himself up to be disregarded and despised. This is true, throughout the whole range of trades, callings and professions in this country. The lawyer or the physician is not respected because he is one, but because he brings a dignity and respect to the profession. If he does not, he grovels down with the rest of the herd who do not respect themselves. This is the true philosophy of equal rights or rather unequal rights, and stands simply thus, it is not the calling that makes the man respectable, but the man that makes the calling respectable. I will not trouble myself with the exceptions found in the factitious merit attached sometimes to wealth. It is a miserable exception.

ELECTRICITY IN AGRICULTURE.

In the latter part of the last century, experiments were made in England, which excited no little attention at the time, on the application of electricity to the purposes of agriculture, in promoting vegetation. It was considered by some, as well established, that positive electricity hastened vegetation, and especially was influential in bringing rapidly forward the germination of seeds. Others, on the other hand, put no faith in these matters. The former class, according to their own reports, succeeded in a remarkable degree with their experiments, and produced astonishing results. But the latter class, upon repeating the experiments, uniformly failed of bringing any thing to pass, and decided that neither positive nor negative electricity has any effect in increasing vegetation.

Mr. Darwin, in his Phytologia, records a number of experiments and results, and he seems to have come to the conclusion that this fluid accelerates vegetation. He states that Mr. D'Ormey found various seeds to vegetate sooner and grow taller, and, what is vastly more remarkable, he found that silkworms, supplied with electricity, began to spin much sooner than those which were not. Perhaps if he had tried the effects of the fluid upon the egg of a hen, he would have found it to hatch some days sooner than the usual period, and domestic animals might have been brought to maturity much earlier.

After an argument of some length on this subject, Mr. Darwin concludes thus:—" A profitable application of electricity by the gardener or agricultor, to promote the growth of plants, is not yet discovered. It is nevertheless probable, that in dry seasons the erection of numerous metallic points on the surface of the ground, but a few feet high, might in the night-time contribute to precipitate the dew by facilitating the passage of the electricity from the air into the earth: and that an erection of such points higher in the air by means of wires wrapped around tall rods, like angle rods, or elevated on buildings, might frequently precipitate showers from the higher parts of the atmosphere. And lastly, that such points erected in gardens might promote a quicker vegetation of the plants in their vicinity by supplying them more abundantly with the electric ether; *if* the events of the experiments of the philosophers abovementioned are to be depended upon, which may at least be worth a further trial."

If there had been any thing in this project worthy of serious consideration, in such a country as England, where nothing that wealth can purchase to add to the productiveness of the soil is neglected, and where there are men of abundant leisure time to devote to the investigation of such subjects, this would not have been suffered to drop. But it was soon forgotten. From time to time, however, attempts have been made to revive it, but generally these attempts have amounted only to a repetition of the old experiments, and a recommendation of the same project, as that of Darwin mentioned above. And this, without any credit to the true author, but always introduced as entirely new.

A few years ago it was reported that cress seed which was sown in the morning had, by the aid of electricity, been grown large enough for dinner the same day. This seems, however, to have been the only successful experiment, and nothing more is heard of it till within two or three years past, when we are startled by the announcement of an *entirely new* agent in agriculture, viz., electricity. It is announced that by the aid of this *new* power, peas, potatoes, &c., have been made to grow with a rapidity almost equal to Jack's bean, in the nursery tale. The agricultural papers, and even the newspapers, teem with notices of this wonderful discovery, and the wonderful results.* It is not the trying these experiments I would find fault with, but with the publication of the false results of experiments not more than half tried.

* Note by the Editor.—It is only proper to state that this Journal has never given the least credit to these reported results of electricity, as will be seen by referring to page 129, Vol. 2, in the reply to Wm. Case, Esq., in relation to this very subject.

Fearful of being behind the age, many agriculturists who had turned their attention to science, added their voices to the general cry. The prospect seemed to be very fair, that with a few pointed wires about his farm, a man might rob Jove of his fires and convert them to the harmless and economical purposes of the contents of the barn-yard and pig-sty, and that the immense stores of guano must still be unused upon the desolate and barren islands of the ocean, till this new source of manure was exhausted.

It is strange to what expedients men will resort, to avoid or render null the primal curse—to escape labor. It is strange that they will try, over and over again, the same hopeless projects, to fail in the end and be laughed at. The bubble bursts at length. It is decided that there is no certain efficacy to be attributed to the electric fluid. It has indeed seemed in some cases, that an increase of the germinative and vegetative power was obtained, but in others, under the same circumstances, no extraordinary effects were produced, whilst in some, it has even seemed to retard germination in seeds.

The conclusion is, that nothing is to be expected in the premises. But there is one important lesson to be derived from the rage for electricity. In giving account of experiments, great care should be taken to detail all the circumstances connected with their trial, so that the effects of one cause may not be mistaken for those of another. It is evident from the success of some and the failure of others, that in one case causes have been at work which were not in the other. What were these causes? This the conductor of the experiment, too much absorbed in watching for the effects of electricity, has neglected to notice.

To remain forever in the field of nature, without catching a spiritual glimpse of the invisible Author, would be an irreparable loss to the soul, and our attainments would only reach a little above the sensual—the perishable: we should stop short of the possession of that crowning acquirement, rest and peace.

GUANO.

It may be, and undoubtedly is, all very well and necessary for England to import manures, and depend very much upon portable manures to fertilize her soil. But it is not so in the United States. We have large resources within our own borders, amply sufficient to furnish all the manures our farmers want for years to come.

I was sorry when guano was first imported into this country, because I believed that I could see its tendency, to make our farmers neglect their own resources, and because unless all things are favorable throughout the season, it is positively useless. And such I know has been the experience of very many in the past season. Every thing was unfavorable. In many fields, which were planted, the seed never came up, and the season was so dry that what came up received no more benefit from the guano than they would from the same quantity of pulverized stone or brick. As far as its use in this country can be estimated, it has been a very profitable speculation to the importers, and a losing game to the farmer. The following facts are deserving of consideration, and I have therefore noted them down.

1. Guano is very uncertain in its action when pure. It is a highly concentrated manure, and its beneficial use will depend on various circumstances, such as the dryness or wetness of the season, &c. In Peru the ground where it is applied is thorougly irrigated immediately after each application of the guano, and this application is made two or three times in the season. And the free application of water is essential to the procuring of the effects of the manure. But in this country we can irrigate our cornfields only when Providence sends us rain; and this supply is often very precarious, as during the past summer.

2. Guano is not permanent in the soil. If all circumstances are favorable to develop its best effects for one season, the soil has derived no permanent improvement from it, or at any rate but little. I have never seen any evidence of its remaining in the soil more than the year following its application.

3. It is liable to great adulteration. In England, vast quantities of *stuff* called guano are sold, which do not contain a particle of it, but are a vile imposition, and are said to be absolutely useless. It is a remarkable fact, that the analyses of no two samples of guano, from the same locality, agree. This would not be so strange, if the variations were immaterial, but they are really important. I do not pretend to say that these differences result in all cases from adulteration, but it is at least a good cause of suspicion, and if in England it is carried on so extensively, there is no reason why we should not fear that the same thing is done here.

4. The supply cannot be depended on. It took but a few months to sweep the island of Ichaboe as clean as a floor. The immense cliffs of guano off the coast of Peru are fast dwindling away, and the original manufacture of it by the countless flocks of birds in tropical regions, has ceased. A few more years at most and all will have disappeared, and the farmer will be obliged again to resort to his own supplies at home.

ON THE CULTIVATION OF INDIAN CORN.

In relative importance to the farmer, as food for man or beast, the corn crop stands third in the list; wheat and potatoes only exceeding it in value.

The soil best adapted to corn, is a deep sandy or gravelly loam. Clays of the lighter kinds, may, with heavy manuring, be made to produce tolerable crops, but heavy clays are wholly unfit for it.

A thick clover sod, well turned over immediately previous to planting, with as much manure, in its green state, thrown into the furrow when plowing, is by many, esteemed the best preparation. Some prefer, when the soil is not of too heavy a nature, fall plowing, and repeating it again, once or twice, in the spring. This is undoubtedly a good course, where the soil is of that tender kind, which will be pretty well rotted by the first of April, otherwise it is preferable to defer plowing until spring, and then to plow but once, and that just previous to planting, as stated above. This last method is in general preferable. In either case the utmost care should be taken to plow well, turning every thing completely under, as much of the expense, and of course profit, depends on this. A heavy roller should follow the plow, as soon after it as possible, to flatten the furrows, which is much more completely done before the ground dries than after. Harrow thoroughly, lengthwise of the furrows. Mark the rows one way, with the hoe and line, and when planting draw the line across the previously marked rows, that is, at right angles with them, and drop the seed by it. One hand will generally drop for two to cover. In this way, the rows are perfectly straight both ways. This may, to some, seem uselessly particular, but let such reflect on its advantages—more hills on an acre, greater facility for passing close to each hill with the cultivator, doing most of the work with the horse and cultivator, and in the end cheapening the whole process, and then the more workmanlike appearance of the whole after-growth.

The varieties most valuable are the Dutton, an early 12-rowed kind, and the large 8-rowed, which is not quite as early, and bears a larger stalk; also many think it not as sweet, as rich, or as heavy. Another kind, a white 8-rowed variety, by some called the Long Island corn, is perhaps a little earlier than either of the foregoing, but it is by all acknowledged to be not as valuable for fattening hogs or other animals.

In preparing the seed for planting, various steeps and methods of preparation are recommended. But little confidence is placed in the fertilizing properties of steeps of any kind; ammonia, saltpetre, copperas or guano, pure rain water, to soak and swell the seed preparatory to tarring, is all that is needed. The proper place for fertilizers, or manures, is in the soil, where the roots of the plant can reach it, after the corn begins its growth. A course thought to be better than any other is this: Soak the seed-corn from 12 to 16 hours in rain water, as hot as the hand can bear it, and set in a warm place. Then, having ready some tar and ground plaster, drain from the water about 3 quarts of the corn, and put it into a pot or iron kettle. Take about one gill of the tar, put it into a small kettle with about a pint of water. Heat this until near boiling; pour it into the corn in the first kettle, and stir it smartly until the tar is uniformly mixed with the corn, coating each grain with a kind of varnish. Now pour off the water remaining in the tarred corn, draining it as completely as possible. Throw into the corn a pint or more of plaster, and stir it until the grains are separated, and each resembles a small ball of plaster. Now it is ready for planting, and may be kept in a cellar a week if necessary, and though it may slightly sprout, it is not injured, if planted in ground freshly plowed or moist. I have been thus particular, because some who have attempted it have failed, from tarring without soaking, or perhaps from soaking too long, or in too hot water. It has been tried by me for ten years in succession, without a single failure, and under almost all circumstances. When a little accustomed to it, the labor of preparing the seed, in this way, is not as great as it seems to be. It requires care, and what does not, that is worth having? Its advantages are, perfect exemption from destruction by crows, squirrels, hens or any other animal that desires it for food; as nothing will eat it, not even hogs, when it is fed to them in this state. It will withstand the cold rains of spring much better than corn untarred, and comes up with a fine dark green color, and thrifty appearance. If it is not proof against the wire-worm, it will entirely remove the necessity of those unsightly ornaments to the corn field, the scare-crows.

The number of seeds in a hill has been previously stated. Usually about 3½ feet apart each way, is the distance. Great crops have been produced by double rows, by planting in drills, &c., but these were extraordinary cases, and for general culture the drill method is too expensive; as the cultivator can only be used one way, and consequently much remains to be done with the hoe. This good economy will avoid, and it is now generally considered best to plant in rows both ways, at about three or three feet two inches apart.

Not less than two, and often three hoeings are best. Certainly the ground should be kept clean from weeds, and loose and mellow, to admit air and moisture—clean from weeds, unless we are willing they should share the benefit of all our labors. Let the horse and cultivator go twice in a row each way, previous to each hoeing. A plow should never be used among corn; nor the hills raised above the uniform surface of the field. But let the hoe dig deeply, and mellow and loosen the earth, where the cultivator cannot reach. It is a very important matter with all hoed crops, to keep the ground light and clean; and this can be done by going over the ground often, and not without.

The method generally pursued in harvesting the crop, is to cut it up by the root as soon as most of the ears are glazed, putting from 7 to 9 rows of corn into one row of stooks, or bunches of corn, when cut up. This is undoubtedly the best course, as experiments have proved that more weight of corn is obtained in this way than by topping it, and husking on the hill. Still many old farmers prefer topping, but for no other reason than that it is more expeditiously husked. In either case, the fodder should be secured from the weather as soon as possible, by which its value is much increased. LEVI J. HOPKINS.

Troopsville, Dec. 17, 1845.

The idea of God and religion must have its roots in the very foundation of the soul.—PRESIDENT HOPKINS. This being so, does it not follow that man could have attained to a knowledge of God without a revelation? There may exist in the soul the unformed idea of God, and man might have lived and gone to the grave without the maturing of the idea. But is it not possible that without a revelation some cause might have operated by which a train of reasoning would have resulted in proof. Thus the principle of fire exists in gun-powder—but this may remain for ages unchanged, and the truth in the end may have come out from an accidental explosion. So is it not possible the idea of God may have, or could have been developed and matured by the operation of causes incident to this state of being.

SOAKING OF SEEDS IN SALINE SOLUTIONS.

BY N. S. DAVIS. M. D.

As the next number of your valuable Journal will be issued about the time our farmers and gardeners begin to prepare their seed for the soil, it may not be amiss for me to send you, on paper, a few of my observations on that subject. It is well known that during the last few years, the great benefits to be derived from soaking seeds in saline solutions, have been heralded over the country, not only by many agricultural journals, but through almost every newspaper in the land. Of course many of our farmers were induced to try the experiment, and myself among the number. The result has been precisely what I had anticipated, namely: that there is a little *truth* mixed with a great quantity of error, in all the highly laudatory statements on this subject. Last spring and summer, I prepared solutions of muriate of ammonia, muriate of soda, nitrate of soda, sulphate of soda, and nitrate of ammonia, and soaked seeds in all of them, during various periods of time, from three to sixty hours. The seeds soaked were corn, oats, peas, beans, melon seeds, cucumber seeds, &c. But to make my experiments fairly, I always soaked an equal quantity of seed in pure water, and during the same length of time as in the saline solution. Both were then planted side by side, in the same soil. In regard to the corn, peas, and beans, no possible difference could be detected, either in the time required for them to come up, or in the vigor of their growth after they were up, between those soaked in water and those in any of the saline solutions; provided the soaking was not continued beyond twelve or fourteen hours. But when the soaking was continued considerably longer than this, it seemed to do positive injury; and one instance of peas, soaked in a moderately strong solution of muriate of soda for forty-eight hours, almost entirely failed to germinate or sprout, while those soaked the same length of time in water, and were planted side by side with the others, grew vigorously. Precisely the same result was produced on the corn planted in a field by one of my neighbors, who soaked his seed in an ammoniacal solution, as long as recommended in some of the newspaper statements on this subject. Scarcely one spear in a hill ever made its appearance; although the quality of seed was known to be good before soaking. In reference to the melon seeds, there was a slight difference in favor of the saline solutions, provided the soaking was not continued more than twenty-four hours. With the oats there was a still greater difference, even when the soaking was continued ten or twelve hours longer. From my own experiments, and the results I observed from the experiments of others, the following conclusions may be safely drawn. 1st. That seeds with only a thin covering or epidermis, like wheat, rye, corn, peas, beans, &c., are no more benefited by soaking in saline solutions than in water; and that if they are soaked too long positive injury is the result. 2d. Seeds having a thick covering or husk, as oats, barley, melon seeds, &c., are benefited by soaking in proportion to the amount of the saline matter the husk is capable of retaining. But even in these cases, if the soaking is continued long enough to fully impregnate the germ itself with the solution, injury is done.

This is just what sound reason, without any experiments, would teach us. For the substance of every seed or germ is naturally composed of just such materials, and in just such proportions as are most favorable to healthy *germination*, whenever the requisite degree of heat and moisture is applied. And not only so, but all these saline solutions are antiseptics. That is, they tend to prevent decay, or change, in the particles of matter to which they are applied. But we well know that no seed can germinate or grow, until a species of decay or change in the condition of its particles commences. Hence, we contend, from reason as well as experiment, that when the substance of seeds of any kind is impregnated with such solutions, their germination or growth is actually retarded, and sometimes destroyed. But when the seed is enclosed in a husk, like oats, this husk may serve as a store-house, to retain the saline matter for the benefit of the young sprout, after the materials that nature has placed in the seed itself are exhausted; and hence, this class of seeds are materially benefited by *judicious* soaking.

The foregoing observations are not intended to apply in any degree to the important practice of simple *washing* seeds of any kind, in saline solutions, for the purpose of freeing them from *smut*, *rust*, *insects*, &c., before sowing or planting, for this is often of very great service.

EXTRACTS FROM THE JOURNALS.

ON THE POTATO DISEASE.

[Communicated to the London Lancet by Andrew Ure, M. D., F. R. S.]

The vague and contradictory statements concerning the nature of this calamitous visitation of Providence, as well as the directions for the treatment and preservation of the tubers, generally impractible and preposterous, which have recently issued in vast variety from the press, do little honor to economic chemistry. It is needless to notice all the notions and schemes which have either officially or spontaneously been projected. Only two of these deserve comment : the first, as coming from a great master in science, the second, as emanating from the Irish commissioners.

Professor Liebig imagines the essence of the disease to consist in the conversion of the albumine, a usual constituent of healthy potatoes, into caseine, a principle which, by its great instability of composition, is supposed to cause the potato to putrefy rapidly. I have subjected this opinion to the test of experiment. Perfectly sound potatoes, as also diseased ones, were sliced or grated, and separately digested in a very dilute alkaline ley at a blood heat. The infusions, when cool, being filtered and faintly acidulated with dilute acetic acid afforded respectively a like proportion of caseine-looking flakes. It would thus appear, from this mode of testing, as prescribed by M. Dumas, in the seventh volume of his "Traite de Chimie," that sound potatoes contain as much caseine as unsound.

Professor Liebig's plan of preserving diseased potatoes is founded on the above notion, and consists in cutting them into slices one quarter of an inch thick, and steeping them twenty-four or thirty-six hours in dilute sulphuric acid. On this proposal I need make no comments, as it has no chance of being practised beyond the precints of Giessen.

In the *Pharmaceutical Journal* for October last, I inserted a few observations on diseased potatoes, chiefly with the view of showing, that till the putrefactive stage commences, the potato had the same acidulous reaction as in the sound state, but that *then* a portion of ammonia made its appearance, as was proved by its alkaline action on litmus paper, and by its coming over in distillation. That brief notice was written while I was at a distance from home on professional business, and where I had no means of prosecuting my experiments. At my first period of leisure since, I resumed my inquires, and have obtained certain results which may probably be found useful, as well as interesting. Before entering into a detail of them, I shall shortly describe the constituents of sound potatoes, according to the most authentic analyses. Their average composition in one hundred parts, according to Einhof and Lampadius, is—fibrous matter, 7 ; starch, 15 ; vegetable albumen, 1 ; gum, acids, and salts, 3.5 ; water, 75. Besides these principles, Vauquelin, by his older and more minute analysis, discovered the following in minute quantities: crystallizable asparagin; an azotised substance resembling gum; a resinous matter emitting an agreeable odor when heated; an extractive matter which blackens in the air; citric acid; citrates and phosphates of potash and lime.

The fibrous matter of potatoes is not of the same species as that of woody roots, but consists of a substance analogous to starch, which swells in water, becomes transparent, dissolves for the most part in dilute sulphuric acid, and affords gum and sugar, only by the action of concentrated sulphuric acid. In some of Einhof's experiments, the gummy matter which remained after evaporating the potato juice was saccharine, but he ascribed the formation of this sugar to an alteration produced on a portion of the gum in the course of analysis. Neither he nor Lampadius, nor even Vauquelin, found sugar in sound potatoes. There can be no doubt, however, that, from several causes, potatoes may become sweet tasted indicating that part of their starch is saccharified. Thus, by exposing them to repeated alternations of temperature, a few degrees below and above that of melting ice, the formation of sugar is so much promoted, that they grow soft with the production of a syrup of so rich a nature, that it will not permit the potatoes to solidify even when cooled several degrees below 32° Fahrenheit. This curious transmutation seems to depend, at least in its origin, upon a vital reaction; for when they are frozen very rapidly, no sugar is formed either during or after their thawing; but, on the contrary, potatoes so treated afford more starch than otherwise.

The nutritious quality of potatoes resides chiefly in the starch, fibrine, and albumine; the latter being essential to the formation of blood. Boussingault rates the feeding of a cow for twenty-four hours at fifteen kilogrammes (about thirty three pounds avoirdupoise) of potatoes, and the quantity of azote in them at fifty grammes, or $\frac{1}{300}$th part of their weight. This would give $\frac{1}{75}$th part of azote in dried potatoes. Now, since these contain four times as much albumine as the moist ones do, we shall have four per cent of albumen in them, according to the above analysis, which four parts contain the whole of the azote in 100 parts of dried potatoes, amounting to $\frac{1}{75}$th, or one and one-third per cent. But 100 parts of albumen, according to Dumas and Cahours, contain 15.75 of azote, and four will therefore contain only 0.63, being about one-half the proportion of azote assigned by Boussingault. Having, in the course of my frequently recurring analysis of guano, contrived a method of determining its proportion of azote, even to $\frac{1}{100}$th of a grain, or half a milligramme, I have recently had recourse to this method in the examination of potatoes. When a portion of these, in a dry, pulverulent state, was subjected to ignition in contact with hydrate of soda and lime, 0.579 of azote were obtained from 100 parts of the potato; a number which accords well with that deduced from Dumas and Cahours' results as applied to the proportion of albumine in potatoes, an accordance which seems to justify my determination. Potato, in its ordinary moist state, will hence contain about 0.015 of azote, or one and a half parts in a thousand. To this element, and the animal principles into which it enters, the nutritive quality of potatoes is to be ascribed, while their starch and starchy fibrine afford the fuel of animal temperature.

In the diseased potatoes, a portion of the starch is transformed into sugar, and of the albumine into an acrid offensive brown substance. If such tubers as are characterized by brown spots in the interior, and a thickened brown skin, both composed of fungous fibres, be grated or sliced, and exposed to pressure, either alone or with a little tepid water, the juice obtained will be found to have a mawkish sweet taste, followed by a sense of pungency on the tip of the tongue. If some of this juice be mixed with a little of Trommer's grape-sugar test, (an alkalized solution of sulphate of copper,) this blue-colored mixture will change into a bright orange hue, slowly, in the cold, but rapidly on the application of a gentle heat, with a deposit of protoxide of copper. By means of a modification of that test, described by me in the *Pharmaceutical Journal* for July, 1842, I have ascertained the existence of about five per cent of saccharine matter in diseased potatoes; yet by the same re-agent, which is insensible to $\frac{1}{100}$ of a grain of sugar, I could observe none of it in a perfectly sound potato. After satisfying myself, in this way, as to the presence of sugar in diseased potatoes I proceeded to verify the fact by placing their expressed juice, as also their infusion in contact with a little yeast, at a fermenting heat of from 80° to 90° Fahrenheit, and watched the resulting phenomena. A fermentative action soon began, and in an hour or two became so brisk as to throw up a thick, creamy froth, like that occurring with small beer wort. At the end of thiry-six hours, the liquor having considerably diminished in specific gravity, was subjected to distillation, and yeilded alcohol equivalent to about four per cent of sugar in the potato. In order to obviate any chance of fallacy in these results, I requested Mr. Scanlan to repeat my fermentation experiments on a somewhat larger scale than mine, with diseased potatoes found in his own neighborhood, at the extremity of London, opposite to my residence. He has accordingly made several similar researches, with like results, of which I shall give the particulars of one only. Two and a half pounds of the expressed juice of such potatoes as are now used solely for feeding cattle, corresponding to three and one-third pounds of the entire tubers, were mixed with a small portion of yeast, and set to ferment in half-filled bottles. The action soon became so vigorous that the barm rose to the brim ot the bottles. At the end of thirty-six hours, the liquor, having become nearly tranquil, was distilled, and afforded 5000 water-grain measures of an alcoholic liquid, of specific gravity of 0.988, containing, by Tralle's table, eight per cent of absolute alcohol, equivalent to sixteen of sugar. 16+50=800 grains, may be regarded as the quantity of sugar indicated by this experiment in three and a half pounds of the diseased potatoes, or in 23,333 grains, being nearly three and a half per cent. In other samples I found, as above stated, results indicating considerably more sugar, the proportion being very variable, according to the state of the disease. The vinous spirit produced is by no means disagreeable in taste or flavor, and may be easily rectified into excellent alcohol, fit for every purpose of arts, manufactures, and pharmacy. Were it not for the oppressive laws of the excise, sufficient alcohol might thus be obtained this season for the uses of a temperate people, reserving an equivalent portion of grain from the whisky manufacture for their sustenance. The residual cake of the diseased potato is well adapted for feeding cattle, the morbid juices having been separated, and it may be so dried as to keep unchanged for a moderate length of time.

In all the diseased potatoes which I have examined with the microscope, the fibres of a fungus, called *botrytis* from its grape-like form, or of one called *uredo tuberosum*, may be observed ramifying round the cells which enclose the starchy corpuscles. Now these plants, however minute, are not self-generated, but must be produced by some seminal impregnation transported by the atmosphere, and peculiarly adapted to fructify upon the *solanum tuberosum*. I would hence conclude, that the potato disease is a peculiar vegeto-pestilence, diffused generally through the atmosphere, whose ravages have been favored by the sunless humudity of the last season, as the predisposing, but not as the exciting, cause. The proximate cause again, in medical language, or the essence of the morbid state, is the fungous inmate of the tuber, from seminal impregnation of the stem, which so paralyzes the vitality of the plant, that a portion of the starch and albumen becomes decomposed. This vegetable distemper, like that of the cholera, while general in its diffusion, is determined to particular localities and plants by certain predisposing causes; yet it is independent of these, having occurred in many regions where such causes did not materially operate. Whether it will recur, no human being can predict; meanwhile it reads a great and solemn lesson to the rulers of states, never better expressed than in Virgil's well-known verse:

"Disciti justitiam moniti, et non temnere divos;"

which may be translated, "Beware of obstructing the free supply of food to your people."

Many preposterous prescriptions have been obtruded on the public eye as to the best method of preserving the diseased potatoes from putrefaction. The above researches show the existence of a highly fermentable saccharine and albuminous matter in them, which becomes rapidly operative by contact with air and moisture. Care should therefore be taken to keep their skins entire, so as to exclude the atmospheric oxygen and humidity. It is well known that the sugar in ripe grapes undergoes no change while the skin is entire, but the moment this is pricked, the grapes begin to ferment, and speedily spoil. No plan is therefore more to be deprecated than that of slicing and mashing the potatoes. They should be placed in an atmosphere kept by chemical means in a state of extreme dryness, which may be easily and cheaply effected by piling them upon a bed of brush-wood, dry turf, or straw, intespersing through the pile unslaked lime coarsly bruised, and covering the pile thoroughly at the sides and on the top from the external elements. Since unslaked lime absorbs greedily one-third of its weight of moisture, it will bring the air in the spaces between the tubers into a perfectly arid state—a condition in which no decomposition of the substance can possibly take place. On the same principle, highly-polished steel articles may be kept for any length of time without tarnishing in our humid climate, provided a basin with lumps of unslaked lime be enclosed in the case or chest containing them. Slaked lime, on the contrary, being saturated with water, has no power of desiccation, but acts only by its causticity, in favoring the destruction of all vegetable and animal matter.

Activity.—I have lived, said Dr. Adam Clark, to know that the great secret of human happiness is this: Never suffer your energies to stagnate. The old adage of, Too many irons in the fire, conveys an abominable lie. You cannot have too many, poker, tongs and all: keep them agoing.

RECENT DISCOVERIES.

At a meeting of the Geological Society in London, on the 19th of November last, the following communications were read, as reported in the *Atheneum.*

1. Mr. Lyell, on the age of the newest lava current of Auvergne, and on shells found in gravel under the lava. The discovery of fossils that could determine accurately the age of these newer lava currents, is only a recent event; but during the past few years a number have been determined, distributed in several beds alternating with the lava. The author states the circumstances under which these fossils were found, and mentions the species to which they are referred. They appear in several distinct beds, alternating with lava of various dates of eruption, and include a great variety of mammalian remains, referable no doubt to different portions of the tertiary period. In conclusion, the author states that he has not yet seen sufficient reason to abandon his idea, that the Auvergne beds generally are of the Eocene period.

2. Mr. Pratt, on the geological position of the bitumen used in asphalte pavements. This bed of bitumen is of variable thickness, and spread out at the bottom of a series of sandy beds, with some alternating clays. It contains shells, altered by the bitumen, which has manifestly been injected forcibly, in a soft or liquid state. The bitumen terminates suddenly at a fault.

3. A letter was read, announcing the discovery of coal, or lignite, in the island of Formosa. Specimens of this lignite were on the table.

HEADLY'S DESCRIPTION OF THE GIRANDOLA.

The next night after the grand illumination is the Girandola, or fire-works of his holiness, and we must say that he does far better in getting up fire-works than religious ceremonies. This "Girandola" does credit to his taste and skill. It is the closing act of the magnificent farce, and all Rome turns out to see it. About half way from Corso—the Broadway of Rome—to St. Peter's, the famous marble bridge of Michæl Angelo crosses the Tiber. The castle of St. Angelo, formerly the vast and magnificent tomb of Adrian, stands at the farther end. This castle is selected for the display of the fire works. None of the spectators are permitted to cross the bridge, so that the Tiber flows between them and the exhibition. Toward evening the immense crowd begin to move in the direction of St. Angelo, and soon the whole area and every window and house top is filled with human beings. About eight the exhibition commences. The first scene in the drama represents a vast Gothic Cathedral. How this is accomplished I cannot tell. Every thing is buried in darkness, when suddenly, as if by the touch of an enchanters hand, a noble gothic cathedral of the size of an immense castle, stands in light and beauty before you. The arrangement of the silver-like lights is perfect, and as it shines on silent and still in the surrounding darkness, you can hardly believe it is not a beautiful vision. It disappears as suddenly as it came, and for a moment utter darkness settles over the gloomy castle. Yet it is but for a moment. The next instant a sheet of flame bursts from the summit with a fury perfectly appalling; white clouds of sulphurious smoke roll up the sky, accompanied with molten fragments and detonations that shake the very earth beneath you. It is the representation of a volcano in full eruption, and a most vivid one too.

Amid the spouting fire and murky smoke, and rising fragments, the cannon of the castle are discharged, out of sight, almost every second. Report follows report with stunning rapidity, and it seems for a moment as if the solid structure would shake to pieces. At length the last throb of the volcano is heard and suddenly from the base and sides and summit of the castle start innumerable rockets and serpents, and roman candles, while revolving wheels are blazing on every side. The heavens are one arch of blazing meteors—the very Tiber flows in fire, while the light falling on ten thousand upturned faces, presents a scene indescribably strange and bewildering. For a whole hour it is a constant blaze, the flashing meteors are crossing and recrossing in every direction—fiery messengers are traversing the sky overhead, and amid the incessant whizzing, and crackling, and bursting, that is perfectly deafening, come at intervals the booming of cannon.

At length the pageant is over and the gaping crowd surge back into the city. Lent is over—the last honors are done to God by the revealed representative on earth, and the church stands acquitted of all neglect of proper observances.

An excellent water-proof polish for leather, &c.—Take 3 oz. of spermaceti, and melt it in a pipkin, or other earthen vessel, over a slow fire; add thereto 6 drachms of Indian rubber, cut into slices, and these will presently dissolve. Then add tallow 8 oz., lard 2 oz., amber varnish 4 oz. Mix, and it will be fit for use immediately. The boots or other material to be treated, are to receive two or three coats with a common blacking brush, and a fine polish is the result.

OUR SOCIAL, POLITICAL AND EDUCATIONAL SYSTEM.

[Communicated ror the Quarterly Journal and Review, Cincinnati, by H. A. Kidd, Esq.]

Since the achievement of our independence, America has advanced more rapidly to prosperity and power than any nation of people of which history furnishes us information. Within half a century our population exhibits the astonishing increase of upwards of thirteen millions. This may be attributed partly to the inviting character of our climate and soil, and the numberless natural advantages which the country affords; but it is to be attributed chiefly, no doubt, to our wise system of government, our humane laws, and to the energy and enterprise of the people themselves.

In no government that exists, or that has ever existed, has there been, in its constitutional provisions, such a regard for the natural and inalienable rights of man; and inasmuch as no nation of people have prospered as ours, it may be fairly argued, that no government has been framed upon principles so well adapted to that development of the energies of a people which results in the greatest amount of social and political happiness.

Here we have no regal prerogatives, no ducal privileges, no baronial dignities; but our constitution, framed by the wise and patriotic Fathers of the Revolution, and subscribed to by the great and virtuous WASHINGTON, provides for equal liberty to all;—not the licentious liberty of the Roman empire in its decline, nor the unrestrained liberty of the Arabic and Indian tribes of the present day, but a liberty regulated by law, and just sufficiently restrained to answer the purposes of beneficent government.

Unlike the monarchies of Europe, here we enjoy that distinguishing attribute of freedom—the untrammeled expression of opinion; for ours is a government, the first, perhaps, the world has witnessed, built upon the immutable law of human nature—equal rights and privileges to all.

Both in a social and political point of view, there are no grades among our citizens. Whatever may be their individual circumstances, whatever may be their possessions, material or mental, they occupy the same general level. The dignified senator and the common laborer, aye, the president himself and the lowest of his eighteen millions of constituents, are, in the construction of our humane and equitable laws, compeers in all the privileges and immunities of men and citizens—each contributing, by his suffrages, his equal share in controling the destinies of the nation, and each alike responsible to posterity for the manner in which he discharges his duty.

As a consequence of this general responsibility, our citizens are generally intelligent, to a certain extent, as will be found to be the case in every government controlled by the people themselves. Though there are many charges to which we may be obnoxious, it certainly cannot be said of us that, as a nation, we are stupid; for, however much we may fall behind other countries in some respects, we can, in the common understanding of the people, justly claim to be far in advance of every other nation on the globe.

Nor has this general intelligence, in the affairs of government, been attended by injurious influences upon the enterprise of citizens: but it has superinduced a certain energetic, business-cast of thought which, while it leads to the acquisition of wealth, and to the attainment of those solid comforts, and to some extent, of those refinements of taste, which are well adapted to the happiness of our people in their individual and social conditions, is at the same time, contributing more, perhaps, to the permanency of our institutions, than any other one cause.

History teaches us, by the numerous illustrations which it furnishes, that tyrannies, as a general rule, never contribute to the advancement of literary enterprises, or of moral truths; fort he principles of a tyrannical government render necessary the imposition of restrictions upon thought, or the utterance of it, and the suppression of every thing which leads to the development of man's natural and legitimate spirit of freedom. There are no such restrictions imposed on us here. There is no wintry frigidity of tyranny here to blight the luxuriance of our mental or moral growth. So far from placing burthens upon the soaring spirit of freedom, or of suppressing the free development of man's nature, our government, from its organic structure, provides especially for the unrestricted exercise of mind: and a man of genius here, though born in obscurity, and clothed in the habiliments of poverty, can as loudly proclaim the great lessons of truth and wisdom, educed by the toil of study in his obscurity, and as certainly command for them the admiration of the million, as he who has been born surrounded by all the appliances of wealth and fortune, and been bred in the lap of luxurious ease. This is a distinctive feature of our political system; and one, which, with the natural energy of our people—all other obstacles being cleared away by the prudent forecast of our statesmen—must carry us to a high and glorious destiny among the nations of the earth.

Thus much has been said generally. I now inquire, have we been profited, to the fullest extent, by the advantages afforded by our peculiar frame of government? Do we, in our various relations—*social*, *political* and *educational*—observe the full development and exercise of those principles of action necessary to the highest enjoyment of civilized life? It is to be regretted that these questions cannot be answered affirmatively. To a certain extent we have been profited—resulting more as a necessary consequence from the inherent principles of our government than from any meritorious exertion on the part of our citizens themselves,—but beyond that we have not. It is true, that excellence in human institutions is rarely to be found in the infancy of a government, and can be attained only by patient persevering effort. But it occurs to me that we have not done all that we might have done, and ought to have done, in carrying ourselves forward to that high distinction, as a nation and a people, to which, sooner or later, we are destined. It is to be feared that we have lost sight of the objects of our lofty mission, and have too far neglected to profit by the advantages so lavishly spread before us.

Have we, in our *social* relations, attained to those sentiments which should characterize an age of advanced civilization? Are we, as individuals, governed by those principles of virtue, morality and honor, that prepare us for refined social enjoyment, and that fit us to become useful citizens? Sorry am I that these things are not so; for it is only necessary to cast our eye over the superfices of society, to discover a multitude of pernicious influences contaminating the sources of genuine feeling, misdirecting our aims, and restraining, if not destroying, the enjoyment which springs from a free, social intercommunication of our sentiments, of whatever nature.

This state of things is to be attributed, partly, to the utilitarian, self-aggrandizing spirit of the age; and, partly, no doubt, to the democratic, too democratic, tendency of our institutions in their effects upon individual conduct. I admire, and am an advocate of democracy, properly directed and restricted. So, also, do I admire a rich, fertile loam for a garden; but it is important, in the former, as in the latter case, that the noxious weeds produced by that very fertility should be carefully cut down, lest their poisonous influence extend to those whose growth is desired. The evils which spring from the democratic tendency of our institutions must be gotten rid of, or the numberless blessings springing from the same source, can never be realized to the fullest extent.

This utilitarian spirit, above alluded to, has, I fear, made us almost a nation of Shylocks—each seeking the substance of the other—all eager for the acquisition of lucre. Not all, perhaps;

but there are few, very few, amongst us, who are not affected, more or less, by this sordid passion—a passion which, in all matters, makes us suspicious of our fellows, corrupts the fountains of pure affection, blunts the finer feelings of the soul, and destroys, inevitably, all social enjoyment.

In this general race for the acquisition of lucre, a few, by one means or other, are successful. Those few plume themselves upon the distinction which their possessions command for them; at the same time that they are, on account of that distinction, objects of envy and hate by their less fortunate competitors. Money is omnipotent; and the wonderful influence which the possessors of it are enabled to wield, together with the profound homage universally paid to it, has resulted, to a remarkable extent, in establishing an aristocracy of wealth—a tyranny not less arbitrary in its rule than that of the most despotic czar—trampling under foot all that is of real worth in mind and morals, not conformable to its unjust exactions.

No such distinctions in society are recognized in the fundamental principles of our government. But, on the contrary, it is one of its happiest features that places every member of the community upon the same general level—leaving individual superiority to be accorded upon the only true and just rule—superior knowledge and superior virtue.

Virtue without knowledge is little better than useless; whilst knowledge without virtue is dangerous in the extreme to the peace and harmony of society; for no principle is better established, both by the theoretical teachings of philosophy and the practical illustrations of history, than that, in all the relations of life—socially as well as otherwise—transcendant genius and extensive information, uncontrolled and undirected by virtuous principle and a deep sense of moral accountability, are likely to be dangerous instead of useful to society. This brings me to the second point which I set out to consider.

In this country all are politicians. A majority of the people are so, to the extent only of forming correct opinions to guide them in the exercise of the right of suffrage; but a large proportion of them are politicians from very different considerations; with which considerations, it is feared, sentiments of patriotism have little to do. All *profess* to be patriots—such a profession is popular; and upon their popularity, they well know, depends their promotion. With them individual gain is the sole object of their endeavors; and, that accomplished, all else is despised or disregarded.

Of this class, there are to be found men of such ambitious designs, that they become desperadoes in politics; and, for the purpose of carrying out those designs, would be ready to join in measures to sever our Union, or to apply the torch to the altar of our liberties. To "rule or ruin," is their motto. Such men are dangerous members of society; and but for the conservative virtue which rests in the great body of the people, there is no telling what might be the disastrous consequences to the harmony of society, the integrity of the Union, and the permanency of our free institutions. But by the history of the past we are taught the important lesson, that public virtue may finally yield to public vice, when the latter is constantly presented in a fascinating garb, and uniformly sustained by the powers of eloquence.

There are others, who, not only profess to be, but really think themselves patriots; yet who are so lured by the spoils of office, or the glitter of fame, that, ignorantly or unconsciously, they hesitate not to do, in their public capacities, what might be, and oftentimes is, seriously detrimental to the public interests. Such persons—and there are many such, as the most superficial observer must have remarked—are little less dangerous and little more to be trusted than those who, to gain their ends, wilfully and recklessly, trample upon right, justice, law and the constitution.

Such persons—as of the two classes just designated—while they are the most dangerous enactors and administrators of law, are, at the same time, the very men who, in a democratic government, are most apt to succeed to high stations. "Republics," it is said, "are ungrateful,"—it is illustrated, as fully as otherwise, by the fact that, in republics, the intelligent and virtuous, who are ever modest and unpretending, but who are really the most capable of serving their country, are permitted to remain in the obscurity of private life; whilst the ignorant or designing and corrupt, who are ever bold and arrogant, are chosen as the makers and executors of law. Within the last few years how many examples have we had to the contrary? How many illustrations in confirmation of it.

The developments of the times are exhibiting to us the importance of chosing our rulers upon different principles. Corruption in high places admonishes us of the necessity of rigidly excluding the corrupt and vicious from a participation in the affairs of state. The pure in heart and able in mind are such only as should take charge of and represent the interests of a great nation of freemen. Let them be ambitious, if it must be; but let their ambition be such as was that of the pure patriot and eminent statesman, HAMILTON, who, when charged with being ambitious, replied that he was; but that his whole ambition was to deserve well of his country. This is a noble sentiment; and one which should never be lost sight of by those who are chosen to public stations by the suffrages of the people. When this shall be the case, then, and not till then, shall we realize the blessings of a government in all respects wisely and virtuously conducted.

In recent years the fact has again and again forced itself upon the consideration of the country, that devoted patriotism, eminent ability and faithful public services no longer furnish any guaranty of success to office; for no sooner are men thus distinguished presented to the people for their suffrages, than at them are aimed the envenomed shafts of falsehood, calumny and detraction. Ah! how many a noble heart, whose every pulsation was for the good of the country, has writhed under the influence of this corrupting *virus!* How many a lofty genius, capable of the highest statesmanship, and which was, at the same time, the glory of the country and an ornament to humanity, has fallen before those deadly shafts! Such there have been in this country as in others. They have fallen, truly; but it is consolatory to know that

"They fell, devoted and undying."

No monumental marble is necessary to perpetuate their memories; but their names shall ever be enshrined in the hearts of the pure, the just and patriotic, with those of Phocion, of Tully, of Sydney and of Hampden.

It has come to that, in this country, that it is the imperious duty of the public man, who aspires to honors and station, to imbue his mind thoroughly with the knowledge, and his heart with the principles of party intrigues and management; so that he can secure, by chicane and circumvention, that which he could not reach by fair and honorable means. Nor is moral depravity any barrier to success. If he should be

"Fit for ——, stratagems and spoils;"

ay, and, perhaps, for treason, too; or if he should be sufficiently obscure, from never having served his country; or, if he should be distinguished at all, distinguished for his very insignificance, then is he a fit individual for the highest promotion.

This is a great, a very great error in the times; and one which *must be* remedied. A high standard of morals is as necessary in politics as in our social organization; and until our politicians, in their various capacities as public servants, rigidly conform to that standard, it were useless to expect that their efforts will be attended by any very stable or beneficent results.

I have thus alluded to some of the evils growing out of the present state of our social and political systems. How can these evils be corrected? *By educating the minds of the people.* Let this but be attended to, fully and faithfully, and the object is accomplished. No corrector of abuses, whether in the body politic or in our social organization, is half so effective as the ameliorating influence of literature and science. It has been said, and truly, that "Learning ever has been, is now, and ever will be, the grand *conservative* principle of civilization, of truth, virtue, liberty, religion and good government." In no country have the minds of the people been imbued with a taste for literature and thorough scholarship, but that their feelings were liberalized, their moral sentiments elevated, and themselves better fitted for useful citizenship. No nation has ever reached an exalted state in the arts and sciences, in laws and morals, but was essentially a nation of learning.

If, then, a marked deficiency in social virtue and political morality—destructive alike of the objects of human happiness in each relation—is found to be the consequence of a want of learning among the people, is it not our imperious duty to employ the means necessary to attain this important end? But what are those means? Clearly the building up and sustaining institutions of learning. In this manner alone can the blessings of education be diffused throughout society. And to accomplish this, there must be a correspondence of action by government and people: our legislatures must liberally endow, and our citizens cordially patronize these institutions. None of the states are so poor but that even a *modicum* of their means, appropriated to this wise and beneficent purpose, would in a few years, develope itself in results alike honorable and useful. There are hundreds and thousands of our citizens, a tithe of whose ample means, directed into this channel, would procure the blessings of a liberal education to their own sons and daughters, and to those of a score of their indigent neighbors. But the public spirit, the generous and humane spirit, is wanting alike in the members of our legislatures and in our citizens. The spirit of *demagogueism* rules the former; while the spirit of *money-making* rules the latter. The former are studious of the arts, and earnest in the advocacy of measures best adapted to the sentiments and feelings of the "dear people," while the sentiments and feelings of the "dear people" are much more intent upon accumulating the goods of earth, than upon paying taxes, educating children, and enhancing the happiness of mankind. This, I deeply regret, is found to be generally true;—that there are many honorable exceptions I am proud to know. A different state of things must be brought about. The people must learn that their true interests consist, above all other things, in patronizing institutions of learning; and they must choose such legislators as will truly and faithfully represent those interests.

I speak not of the higher institutions only: the inferior class of academies and common schools are all important to be sustained for the diffusion among the people of the elements of practical education. In many of the states something has been done towards the establishment of a general school system; but in some of those states, to their own great discredit, no particular plan has been fairly tested by its operations before the plan itself was changed, or perhaps, every effort, looking to the permanent establishment of any system, wholly abandoned; whilst, in other states, a system of common schools is attempted to be sustained in utter neglect of the higher institutions. The attempt fails, of course, in every instance; for it is made upon an erroneous principle. No system of inferior schools, however judiciously framed, can exist and prosper without the beneficial aid and fostering protection of the universities and colleges; for by the latter are furnished at least nine-tenths, if not the whole, of those who are really competent to become common school-masters, conformably to an elevated standard of education. And to this end—the supplying an adequate number of teachers for the poorer classes of society, whose limited means exclude them from the direct benefits of the higher institutions—it behooves the legislatures of our states, under the weightiest obligations of patriotism and humanity, so to endow our universities and colleges as to enable them to open their doors for the education of a limited number, at least, of the poor young men of genius within their borders. There are hundreds, nay thousands such, who, thus deriving the benefits of a thorough education, are prepared, in turn, to dispense those benefits among innumerable others; and, perhaps, to become, in the progress of circumstances, in wider spheres of action, the chiefest among the benefactors of mankind.

The prejudices which exist in the community against colleges and universities are as unworthy as they are unjust. The over-scrupulous moralists and arrogant philanthropists, who contend that they are nurseries of vice, and the sources of no good, and, as such, oppose their existence, thereby but expose their ignorance and narrow-sightedness. It is true, in all our colleges and universities may be found a few turbulent, idle and unworthy members,—ten out of every hundred, perhaps,—who would certainly be as idle and turbulent out of college as in college. On their account are the remaining ninety, moral, discreet and studious young men, to be deprived of the privilege of a collegiate education, and the numberless blessings flowing from it? As well might it be contended that the running of steam boats and rail road locomotives is a great evil, and ought to be abandoned, because great loss of life is occasionally the consequence of it. As reasonably might it be contended that our freedom is an evil, because it was achieved through toil and blood. As sensibly might it be argued that the Christian religion is an evil because thousands have died martyrs in its defence.

On the contrary, institutions of learning—the college and the university—have, in all ages of the civilized world, been the houses of freedom,—the nurseries of human rights,—and in no country, or age, has that freedom been defended, or those rights advocated with so much ardor and efficiency as by the learned. So was it in Greece, when Demosthenes thundered his Philippics against the tyrant of Macedon; so was it in Rome, when Tully raised his eloquent voice in defence of the popular rights; so was it in England, when a Milton, a Hamden, and other similar spirits, employed their pens and their tongues in behalf of the violated *Magna Charta* of English liberties; so was it when Kosciusko, at the head of the flower of educated brave youths of ill-fated Poland, attempted in vain to throw off the yoke of Russian despotism; so was it in France, when La Fayette and his illustrious compatriots essayed, without success, to guide their country's helm safely through the perils of regal rule, on the one hand, and bloody Jacobinism, on the other; and so was it in our own America, when a Hancock and Adams, a Washington and Warren, in council and on the field, raised their voices and arms against British oppression. Ignorance is ever the accompaniment of despotism, as learning is that of free governments.

One of the chief impediments to the advancement of learning in this country is, it is feared, the time-serving and unmanly spirit manifested by our scholars themselves—by those whose first and great care it should be to further the good cause by every means in their power. If they, who are the recipients of the great blessings of education, yield to the utilitarian and anti-literary prejudices of the day, by whom is it expected the glorious standard of literature and science will be upheld and borne forward? If they are faithless to the high trusts reposed in them, by whom are those trusts to be executed? Not, surely, by the ignorant and vulgar—by empty-brained and soulless agrarians. There must be a waking up on this subject by our men of learning. A heavy responsibility rests upon them, imposed alike by duty and patriotism, to do all in their power—though it cost them their time, labor and substance—to advance the glorious cause of letters and sound education. It is the cause of our country, of truth, virtue and religion. Let that cause be triumphant over the land, and we shall witness a wonderful revolution, for the better, in the characters and conditions of our people, in whatever avocation they may be engaged. The arts of the demagogue will be forgotten, and our politicians—promoted to office upon the true republican principle of "honesty and capability"—will vie with each other in their efforts to effect "the greatest good to the greatest number;" our editors, who wield a more potent influence upon the destinies of the nation than any and every other class of our citizens, will be selected for their erudition and trustworthiness, and will perform their arduous duties in a faithful discharge of the weighty responsibilities resting upon them; our preachers of the gospel—casting aside the disgraceful prejudice which, except in partial instances, has so long kept them in ignorance, or bigotry worse than ignorance—will be able instructors in spiritual things, and fully competent, for the execution of the sacred trusts of their high mission, to carry forward the glorious cause of their Master; our lawyers,—thoroughly impressed with the truth of the sentiment, "*Sat cito, si sat bene*," which, through life, guided the action of one of England's most learned and distinguished judges,—will patiently, unweariedly, and in the spirit of patriotism, devote themselves to the study and practice of their noble profession; our doctors, disdaining quackery and empiricism in every shape, will give themselves up, with devoted ardor, and in the true spirit of humanity to the responsible art of soothing the distresses, and alleviating the "ills which flesh is heir to;" and our citizens, generally, while striving fairly and honestly to improve their individual circumstances, will labor, also, to advance the common welfare of their kind. Then, too, when the general and correct information is diffused among our people, they will see the folly of looking to foreign countries for our literary and scientific reading. And, in this connection, however irrelevant it may appear, I cannot withhold the expressive, that it is humiliating in the extreme, and unworthy of the land of Channing and Upham, of Bancroft and Prescott, of Halleck and Bryant, of Irving and Cooper, to look to England, or any European country, for our standard authors in philosophy, poetry, history or fiction. It is nothing less than literary suicide; and must ever have the effect, so long as this state of things continues (and continue it will until our people become more generally and correctly informed), to repress the genius and energy of our native authors.

A glorious heritage have we from the hands of our patriot ancestors—the freest and greatest republic upon which the sun has ever shone.

> "Land of the *Free!*—beneath the Heaven
>   There's not a fairer, lovlier clime;
> Nor one to which was ever given
>   A destiny more high, sublime."

When we cast our eyes over the vast expanse of our country, and behold the wonderful combination of land and water—of mountains and valleys, of oceans, seas and lakes, and behold, also, the multiplied and rapidly multiplying millions of enterprising and energetic freemen, whose habitations, stretching north, south, east and west, reach to the uttermost limits of this broad expanse, may we not, indeed, say with the poet, that to no land was ever given " a destiny more high, sublime." That destiny will surely be achieved if our mental progress should keep pace with the increase of our population; which already presents the proudest spectacle of political greatness the world ever beheld. To this end, we must build up and sustain a Literature,—unlike that of the worn-out monarchies and despotisms of Europe;—a National Literature, based upon comprehensive principles of humanity, congenial with the spirit of our institutions, and fully adequate to the energy, enterprise and varying conditions of our people.

HORTICULTURE.

[Extract from an Address delivered by David Thomas, before the Aurora Horticultural Society, Sept. 23, 1845.]

The *colors* of flowers are not more varied than their *forms*, or *manner of flowering*. The snow-drop is a *bell*, the crocus a *cup*. The tiger flower appears in *solitary* glory, the goat's beard in *countless numbers*. The English globe flower is a *hollow* ball, the globe thistle is *solid* to the centre. The *flat* blossom of the blackberry lily, contrasts with the *tube* of the trumpet flower; and the *triangular* iris with the *circular* form of the rose.

As another instance of diversity in flowers, *cleome* begins to bloom at the base of the spike, *liatris* at the top, and *dipsacus* (the teazle) in the middle, extending its blossoms upwards and downwards at the same time; and forming, as soon as the first florets have withered, two separate and receding circles.

It might be hard to say what spot of the earth's surface has furnished the most flowers for our gardens; and whether that spot is located in the eastern or western hemisphere. It is true, the Cape of Good Hope has produced an astonishing number of beautiful plants; but most of them are unavailable to us on account of the severity of our winters: and yet so bountifully has our globe been replenished, that there are more from colder regions than we can find room for in our borders. Mountains that extend far to the south, yield us plants from their cold sides or summits. Thus shrubs and trees from the elevated parts of Carolina and Georgia, are generally hardy here; and even *œnothera rosea*, from Peru, abides our coldest seasons, and becomes a weed. In this way, or on this principle, Mexico furnishes *chelone barbata*, Nepaul, the *potentilla formosa*, and the same southern range of the Himalayas, the most delicious fruit of the temperate zone—I mean the peach.

Plants conform by a kind of instinct, to the climates in which they are indigenous. Thus on the approach of heat and drouth, the tulip contracts itself into a bulb, and waits for a more congenial season to resume its growth. The *auricula*, though an evergreen, sleeps safely under the snows of the Austrian Alps, but perishes without protection in the valleys below; and the holly-leaved barberry, another evergreen from the Rocky mountains, suffers under our milder but more variable winters. We have, therefore, *tender plants* from very cold as well as from very torrid regions.

When we consider that soils of almost every peculiarity, have furnished us with plants, we cannot expect *all* these delegates to give up their predilections, and consent to grow side by side in the same border. Many, it is true, will do it, perfectly indifferent to soil, satisfied wherever their lots may be cast, and flourishing without abatement; but the wild lupin pines for its bed of sand, and "the superb lily" for its bog. The laurel, so abundant ninety miles to the south, declines in health when removed to our common soil, and eventually perishes as if it were poisoned. The rose acacia also refuses to flourish where lime abounds, unless lifted above it by engrafting on the common locust.

Peaty earth mixed with silicious sand, seems best to agree with such delicate feeders, though soils in which peat forms no considerable portion will answer in some cases. Several years ago, I procured a Chinese magnolia. It flowered once or twice, but became sickly, and its leaves lost their fine green. Being at a friend's house among the sandhills of Junius, I told him I wanted a bushel or two of the poorest soil on his farm; and got such as Indian corn might grow in with pale yellow leaves and perhaps a foot high. In the spring I removed all the earth round the magnolia, as well as I conveniently could without disturbing the roots, and applied the steril mass, three or four inches in thickness. In a month or less, the leaves resumed their fine green, and it has continued vigorous ever since.

I may remark that this barren earth acted as a manure, for the roots spread through the same ground that they did when it changed color. It is evident then, the plant was not *poisoned*, but *starved*, some element essential to its health, not having been contained in the fertile border where it stands.

When the drift or deposit of earthy matter was first left by the retreating waters, it was not properly *soil*, for it was deficient in those vegetable remains which in some places, and on some plants, produce such extraordinary effects. We may take sand, clay, lime, magnesia, and other minerals in due proportion; but we have not obtained a proper soil. The vegetable that decays on the ground, is not entirely resolved into its original elements, but a portion held together by a stronger affinity, mixes or combines with the earth. Frequently, however, it accumulates in low places, and thus forms the *muck* of our woods, and the *peat* of our bogs.

It should be remarked that *muck* and *peat* appear to differ as much as the plants that produced them. Muck (as we use the term) is chiefly formed from the leaves of deciduous trees, as the maple and basswood, while peat is derived from bog moss and other subaquatics. The former is *mild*, and an excellent manure for Indian corn—the latter is *sour*, and better adapted to plants that are not found on calcareous lands.

The farmer and the florist act from very different motives, and select very different plants, *nutriment* being the main object with one, and *beauty* with the other. From the fertile plain, and the river flat, the cereal grasses were probably derived, as well as those that constitute our pastures and meadows; and it is worthy of notice that all these delight in calcareous soils. On the contrary, the florist has taken a wider range, and chosen his favorite from every variety of soil: not only from plains and alluvions, but from the cold mountain, the rugged hill, the moist valley, the comparatively barren waste, the shady swamp, and the open marsh. To many of these plants, however, lime is deleterious; and a perfect flower garden ought to represent a diversified country in miniature: shade and sunshine; here a plant of fertile soil, there a tract of bog, near it steril earth, and yonder a bed of sand.

In arranging plants in the border, different methods have been adopted. Sometimes shrubs and the stronger perennials have occupied the middle line, while smaller sorts, and especially bulbs, have been set near them in little clumps. This arrangement, however, though very economical on account of room, prevents the necessary culture; and many kinds, such as monthly roses, large double larkspurs, or the later sorts of phlox, suffer greatly in consequence. Their beauty depends on their vigor; and their vigor on the fine tilth of the ground where they stand. It is best therefore, to leave room enough round them for the free exercise of the spade, or the hoe.

The vigor of herbaceous perennials, however, that increase by new stems rising closely round the circumference—may be materially assisted by division and transplanting every two or three years; for if neglected, the central stems, owing to the confined position of their roots, suffer from starvation, and in many instances, produce no flowers. Several species of veronica, spirœa, iris, and phlox, may be cited as examples.

Many of you must have seen, or heard of, the flowery prairies of the west; and have noticed the enthusiasm with which travelers describe them. Now could we not get such glorious flowers for our gardens? Yes—but most of them would grow dim before the superior beauty of our old flowers. I am confirmed in this opinion by what I have seen of them in their native localities; and by examining herbariums of prairie plants. How then, you may ask, is an effect, bordering so closely on the sublime, produced by such means? I answer, because they appear in masses. The greater the multitude and the wider the space, the grander the display; and though within our walls and fences, we cannot equal nature, we can imitate her, for while she presents flowers by the acre, we can do it by the square yard. The snow-drop, crocus, hyacinth, and tulip, may all be employed for this purpose; and when congregated have the most imposing effect.

The most important principle in autumnal planting, is to pack the earth firmly round the roots. Unpractised hands sometimes scrape it in loosely, smooth the surface, and leave the plant to its fate. I am describing what happened when I commenced gardening. The result was, the soil was loose, becoming like a swamp with the late autumnal rains; and when the cold set in severely, the freezing surface fastened round the stem or leaves, while the water below expanding into ice, lifted that surface with every root from its place. When it thawed, however, the earth settled away, leaving them uncovered, to wither in the wind, or perish by succeeding frosts.

Even tulips and hyacinths, are sometimes destroyed by the same cause. In this case, however, the roots having taken a strong hold of the soil, refuse to follow the leaves which are upheaved by the frost, and are separated. Probably this is the reason why such plants have frequently failed on sandy soils, but I have never known any failure of the kind, where the ground has been trodden down firmly over the bulbs.

This practice may prove useful in another respect. Bulbs are sometimes destroyed in winter by mice; but as far as my observations have extended, it has always occurred where the earth lay loosely over them. Mice have no idea of digging through a firm, compact soil.

Some shrubs whose stems are too tender to withstand our winters, conform to the habits of herbaceous perennials; and sending up new stems from the root, flower abundantly in summer. Of this kind is the champney rose, and *lagerstrœmia indica.* With a view to this result, however, they should be planted deeper than usual, that the roots may be safe from the frost.

A few herbaceous perennials, also too tender for this climate, may be planted very deeply in the border. It is true that some sorts would be smothered; but *amaryllis longifolia*, from the Cape of Good Hope, and *arum dracunlus*, from the south of Europe, submit kindly to a depth of nine or ten inches, perfectly secure in our heavy loams from frost. Other tender bulbs might be tried. Accident has shown that the tulip and crown imperial—both sufficiently hardy, however—will rise from a depth of more than one foot without injury.

But the depth may be temporarily increased by turning a sod over them late in autumn, to be removed on the return of mild weather; and in this way, I have successfully treated *polyanthus narcissus*, which is rather impatient of much cold. Many other plants from warmer climates may be protected in the same manner.

Herbaceous evergreens require a lighter covering; for as they continue sensitive through the winter, air and light should not be entirely excluded. John Lowell thought that the branches of evergreen, when used for protection, possessed a property peculiarly conservative. Green moss, or chickweed, will answer as well as the boughs of the hemlock; and treated in this way, the *auricula* abides our severest seasons in safety.

Towards the close of our long winters, we watch with eagerness for the first flowers of the spring; and derive as much pleasure from the modest snow-drop, crocus, or Siberian squill, as from the gayest production of summer. Now it would be well to remember that the bloom of these little favorites, may be hastened by shallow planting.

Permit me to mention another item, and I will detain you no longer with floriculture. Sometimes we find it convenient to transplant from the hot-bed or other place, in warm, dry weather; and we should be sorry to see the plant wither. Well, this may be easily prevented. Water it, if you please, and cover it with a garden pot, having a hole in the bottom, to operate as a chimney. The plant will remain fresh and vigorous in the hottest day in summer.

Away from cities, the comfort of families depends much on the kitchen garden. The soil ought to be dry, rich and easily pulverized. In this district, it is generally a heavy loam; and other means besides the plough, spade or hoe, should be used to subdue its stubborn nature. In all cases, it should be well drained. All surplus water, whether on the surface or below, should be led off. Every tendency to baking or poaching should be prevented. Some of you well understand the benefit of ridging the ground in the fall, so that the coming frosts may pass in between the particles of every clod, and thrust them asunder; but many persons have yet to learn that the sweepings of the blacksmith's shop, chip dirt, and the old plaster from walls and ceilings—too often thrown into the road—are excellent manures, and at the same time keep the soil loose and mellow.

Carting in sand is another labor-saving operation. It will last for ages, and prevent many a hard thrust of the spade, or stroke of the hoe. Let me suggest, however, that a stiff soil is broken most by coarse sand; and from observation, I incline to believe that one load of this kind will do as much good as several loads where the particles are very fine.

The effect of blacksmiths' cinders, when broken and applied, and burning the soil, which I have also tried to some extent, are both remarkable for loosening and fertilizing at the same time; and it may afford some encouragement to reflect that these are permanent improvements—to benefit posterity as much as ourselves. The crops from old coal pits, burnt brush heaps, or the sites of old buildings, will sufficiently illustrate these remarks.

The radish, like the watermelon, delights in sandy soil. We use sharp sand and vegetable earth in equal portions; and it is so loose that a man might easily thrust in his arm up to the elbow. A bed of this kind would yield a full and constant supply of radishes for a family—provided a seed were dropped in, whenever a root were drawn out; and such a bed would serve during a long life. A frame of boards, rising two inches above the surface, prevents the ground on the outside from intermixing.

In applying manure, one thing is important: it should be mixed with the soil most thoroughly and completely—no two particles of the one (if possible) should be without a particle of the other between them. Why do some cultivators say that fresh stable manure is injurious, especially in dry seasons? Because they apply it in a slovenly manner. In the summer of '41—the dryest for many years—I had land manured in this way, which was always moist, the plants not appearing to suffer in the least; but then it was plowed several times before planting, with six harrowings in immediate succession.

Forty-five years ago, in this neighborhood, strawberries were abundant in the open woods, and parties went several miles to gather them. In a few years, however, scarcely a plant was left by the cattle; and very little was known of this fruit, by a great part of our population, for it was rarely cultivated in gardens. Twenty years ago in Geneva, however, I sat down at the table of a friend which was garnished with two large dishes of strawberries—one white, the other red. I had never seen so fine a display; and it did me good in more ways than one; for I have often since seen my own table ornamented in a similar manner.

The cherry, plum, pear, apricot and peach, as well as the smaller fruits, deserve our attention: but I have detained you too long already to enter into particulars.

HOGS AND THEIR TRADE IN THE UNITED STATES AND EUROPE.

The immense production of hogs in the United States, and the heavy trade in them at Cincinnati, demand something more than a mere superficial view of the transactions, at one point, in order to understand the magnitude and relations of the trade. We can furnish the commercial reader with some statistical facts, which will serve as landmarks in taking a broad view of the subject.

In the year 1839 there were in the United States, in all, 26,301,293 hogs. Of this number, more than one-half of the whole were in eight states, viz.:

Tennessee,	2,926,607
Kentucky,	2,310,533
Ohio,	2,099,746
Indiana,	1,613,608
Illinois,	1,494,254
Missouri,	1,271,161
Mississippi,	1,001,201
Alabama,	1,423,873
Total,	14,150,983

The states of Virginia, New York, and North Carolina, each have more hogs than Illinois and Missouri; but we have taken the states of the west and south-west together to show the result.

Now, we want to draw two or three inferences from the number of hogs in the several states, before we compare the production with that of Europe.

1. In the first place, hogs are fatted and nearly supported on maize and Indian corn. They exist, therefore, in the several states just in proportion to the production of Indian corn. Now, Tennessee has the most, and the three states of Tennessee, Ohio, and Kentucky, far more than any other three states, of both Indian corn and hogs. The twenty-six millions of hogs in the United States can scarcely consume less than two hundred millions of bushels of corn! They are therefore, the greatest market for that article.

2. If we suppose these hogs to average 180 lbs. each, and to be worth, as they are, $3.50 per cwt., then this animal alone is, in the United States, worth *one hundred and sixty-six millions of dollars*, or three times the entire cotton crop for the year 1845. The value of swine in the state of Ohio alone, exceeds twelve millions of dollars.

3. It is important to discover how large a proportion of swine are annually killed. There are two sorts of consumption for swine. One may be called the *commercial*, and the other the *domestic* consumption. One is for family use, and the other for commerce. Almost every farmer's family kills one or more hogs. This is a constant drain on the increase. But on the other hand the increase of swine is so great, that it will exceed in one year the original stock unless checked. The main inquiry is, how large a proportion of hogs are fatted in order to supply the provisions of commerce? In the year 1845 there will have been killed at the various pork packing establishments of Ohio, about 500-000 hogs. About 150,000 of these may be set down as from other states. It is fair, therefore, to assume that commerce consumes, about 350,000 hogs in Ohio, per annum. The present stock cannot be much if any under 2,500,000. It follows, therefore, that commerce consumes near about one-sixth part of the stock on hand. We belive that in the United States, generally, this is much too high an estimate; yet the figures in the western states will show this result very nearly.

4. But suppose the total is really as great as the facts imply, then it follows—a fact of great moment to the packer—that no *safe conclusion whatever can be drawn from the number of hogs killed in one year of the real number of the stock that will be brought to market next year.* This is obvious, if the reader will reflect, that a given stock of hogs will nearly double themselves in one year, and that yet the number of hogs of commerce is only one-sixth part of the original number! This is the great source of the constant errors made in calculating the number of hogs to be brought to market, and the effects on the market. The truth is, the domestic or family consumption is the great fact, and that we cannot arrive at exactly.

We shall proceed to show the number of hogs raised proportionably in Europe and America. We have before us McGregor's Statistics, which contain a table of the agriculture and live stock of Europe for 1828. Since then the population of Europe has increased more than 10 per cent, and if we add 10 per cent to the live stock, we shall have the full amount; for this species of stock does not increase in densely populated countries equally with that of other productions.

	Swine of Europe.
Russia,	16,380 000
Austria,	6,050,000
Great Britain,	5,775,000
France,	4,950,000
Italian States,	2,860,000
Bavaria,	1,650,000

Netherlands,	1,540,000
Prussia,	1,645,160
Sweden,	1,320,000
Spain,	1,110,000
Portugal,	770,000
All other States,	2,348,000
Total,	46,278,160

To one who is acquainted with the abundance of swine, and the facility for raising them in the United States, this table must seem extraordinary. It shows that Russia, Austria, and Great Britain, having a population of 120 millions of people, have only as many swine as the United States with 20 millions!

Eight western States, with a population of 6 millions, have as many swine as Great Britain, France, Prussia, and Bavaria, with 75 millions! *The European States have not enough Indian corn to feed them upon.*

The proportion of swine between the United States and some of the European States, is thus:

United States to Prussia,	6 to 1
" " to Austria,	9 to 1
" " to Great Britain,	7 to 1
" " to France,	10 to 1
" " to Spain,	16 to 1

Russia being a thinly populated country, and having the most *mast* has the most swine; but for the converse reason, the southern states of Europe have the least. The United States have six times as many in proportion as Russia.

The same disproportion extends, but in less proportion, to other animals. If the people of Europe were a meat-eating people, they could not find a supply in their country. These animals would be killed off in half a dozen years. But they are not a meat-eating people. They live upon every species of vegetable, much as the animals do.

In Ireland they depend upon potatoes. In Scotland, in no small degree, upon oatmeal. Strange as it may seem, thousands of people in Spain and France live in a great degree on chesnuts, a food which is scarcely fit for pigs to eat. In some countries they eat rye, and in Russia they mix all the bran of grain, making a very coarse rough bread.

The pork of the western country is chiefly in demand at the Atlantic seaports, for our commercial marine, is now rapidly approaching the largest in the world. The adventurous whaleman, the hardy fisher for cod and mackerel, the thousand coasters, who sail in every bay and inlet, from Penobscot to the Rio Grande, all, more or less, eat pork. It serves both as butter and meat, with the fish and potatoes which they have constantly on hand.

The demand for American pork, is on the whole, likely to increase; because the class of people who eat it are increasing, and there is no other country to supply the demand.—*Cincinnati Inquirer.*

BEGINNING OF THE YEAR IN VARIOUS NATIONS.

The Chaldean and Egyptian years were dated from the autumnal equinox. The ecclesiastical year of the Jews began in the spring; but in civil affairs they retain the epoch of the Egyptians. The ancient Chinese reckoned from the new moon nearest the middle of Aquarius. The year of Romulus commenced in March, and that of Numa in January. The Turks and Arabs date the year from the 16th of July. Dremschid or Gremschid, king of Persia, observed, on the day of his public entry into Persepolis, that the sun entered into Aries; and in commemoration of this fortunate event, he ordered the beginning of the year to be removed from the autumnal to the vernal equinox. The Brachmen begin their year new moon in April. The Mexicans in February, when the leaves begin to grow green. Their year consists of eighteen months, having twenty days each; the last five days are spent in mirth, and no business is suffered to be done, nor even any service at the temples. The Abyssinians have five idle days at the end of their year, which commences on the 26th of August. The American Indians reckon from the first appearance of new moon at the vernal equinox. The Mahomedans begin their year the minute in which the sun enters Aries. The Venetians, Florentines, and the Pisans in Italy, begin the year at the vernal equinox. The French year, during the reign of the Merovingian race, began on the day the troops were reviewed, which was on the first day of March. Under the Carlovingians it began on Christmas day, and under the Capetians on Easter day. The ecclesiastical beginning on the first Sunday in Advent. Charles IX appointed, in 1564, that for future the civil should commence on the first of January. The Julian calendar was called from Julius Cæsar; and it is the old account of the year which was reformed by Pope Gregory in 1582, which plan was suggested by Lewis Lilio, a Calabrian astronomer. The Dutch and Protestants in Germany introduced the new style in 1700. The ancient clergy reckoned from the 25th of March; and the method was observed in Britain until the introduction of the new style, A.D. 1752, after which our year commenced on the 1st of January.

PLANTING THE CRANBERRY.

In its wild or natural state, the cranberry is found in wet situations; in boggy grounds, in damp sandy lands, and on the low margins of ponds and streams. It will live and grow in comparatively dry soils; but it will not bear fruit without its roots are immersed in water at all seasons of the year.

Soil and Situation.—The first object of the cultivator should be to select the ground for his cranberry yard. Every wet situation is not suitable. The soil must either be sand, mud, peat, or a mixture of these. There must be an abundant supply of water at all seasons of the year. If the ground is so situated that it can be flooded during the winter and spring, it is better, but it is not indispensable to success. The ground must be saturated with water, either from springs, running streams, or the drainings from high land. On the low sandy margins of ponds the water is not much affected by the season, a sufficient supply of moisture will ascend, because the little spaces between the grains of sand act as so many capillary tubes for the ascent of the water; but when the margin is compact earth or unmixed peat, the dampness will not on that principle rise to the surface. In a selection of a situation for his cranberry yard, the cultivator must observe first, whether the soil is of a loose, porous character, easily permeable to water; and second, whether there will be an abundant supply of water in the dryest seasons. If either of these two requisites is wanting, it will be useless for him to attempt the cultivation of the cranberry.

Planting and Culture.—In boggy grounds it is advisable to retain the top sod, and cover the surface with beach sand if it can be easily procured; if not, with any sand that does not contain loam or surface soil. Till recently the common method of setting out the vines was, after the bog was covered with sand, it was marked off in parallel rows, like a corn field, and sods of vines set from three to four feet apart each way. The usual method now is, to set in drills about two feet apart. The vines are separated, and only two or three upright stalks are set together, and are placed from six to twelve inches apart lengthwise of the drill. On wet barren sandy land the expense of setting out the vines is much less than on bogs.

Cuttings from any part of the stem will strike root, and may be used where it is difficult or expensive to procure a sufficient quantity with roots. Where vines cannot be procured cranberries may be sown. It is not certain but that sowing will ultimately prove the cheapest and most expeditious method. We know of but one instance where cranberries were sown. The experiment was successful, and the ground is now thickly set with vines.

The best time for setting the vines, we are unable to state. The common practice has been to set them at any time when the weather would admit, from March to November. The spring we should think was preferable for sowing.

During the first season after they are set, vines frequently put forth numerous runners four or five feet long. The next year the runners put forth upright bearing stems, which produce cranberries on the third year. The vines do not usually become so thick set as to cover the ground before the fifth year.

Manure is worse than useless, and any vegetable or animal matter that will cause fermentation is injurious. As a general rule *more barren* the surface of the soil the *better it is adapted* to the growth of the cranberry. The growth of the grasses in such situations will be feeble, while the cranberry obtaining its sustenance mainly from water and the atmosphere, grows luxuriantly and will ultimately *kill out* the *grasses* and obtain complete possession of the soil.

During the first three years it is better to pull out the grasses than to wait for the cranberry vines to overcome them. Bushes must be carefully removed as fast as they spring up, because if suffered to grow they would do great injury. No other attention is necessary, excepting that good fences must be maintained around the vines to prevent the depredations of herbaceous animals.

Profits.—One bushel of cranberries to the square rod may be considered a good crop from vines that have been set five years, though we could cite particular instances in which three and four bushels have been obtained. Raising cranberries is like every other business in life; if a man judges rightly, is prudent and industrious, he will commonly succeed; but if he depends more on good luck than on good management, in nine cases out of ten he will fail. The cranberry fever is now running high among us, and almost every man you meet exhibits some symptoms of the disease. That fortunes are suddenly to be made by all who embark in this business we do not believe; but that large profits can be obtained from vines set in good situations, such as are above described, there is no doubt. The experiment of Capt. Henry Hall, Hiram Hall, and Peter Hall of Dennis; of Capt. Edward B. Hallett and Edward Thacher, of this town, and many others that could be named, prove that the raising of cranberries in good situations is a profitable business.

We know that some of the opinions which we have given in this article will militate against the theories of a few of our friends; but we cannot help it. We have carefully examined almost every cranberry bog and yard in the county, and have carefully compared the information thus obtained, and we know that our opinions are corroborated and supported by all who have had the largest experience in the business. We do not wish to discourage any from planting vines. Far from it. We say, go ahead. All we wish is to discourage men from running blindfold into a business, respecting which all the necessary information can be so easily and so readily obtained.—*Yarmouth Register.*

INDIAN CORN.

[Communicated for the Albany Cultivator, by Lardner Vanuxum.]

Of all the crops which are raised in the middle states of the Union, none are of so much importance to the farmer as the corn plant, not only for its valuable grain, but its leaves, husks, and stalks, for fodder and manure; no plant which he cultivates being so well adapted to hold the valuable parts of the fæces and urine of the barn-yard from the pithy structure of its interior.

Corn, for success, requires a loose and rich soil, by which a rapid growth is obtained, and is thus enabled to overcome the changes incident to spring and its two ordinary and most powerful enemies, the wire-worm and the grub. The ravages of the former, are, as we all know, below the surface, appear to be proportioned to the hardiness and probable poverty of the soil, preying on the main root, effectually preventing all production of the grain, if not destroying the plant. The grub, on the contrary, cuts off the stem near the surface; its range of destruction more general as regards soil, but evidently feeding from preference upon the more feeble plants, and therefore by complying with the conditions requisite for a vigorous growth, its action is but feeble. So also when corn is planted upon a sod recently turned under, the grub finding still its accustomed food.

There is also another observation which I wish to have recorded, being important to prove, if true, or to set aside, if false. It is the belief that the tendency of the corn plant is to produce a greater yield of grain in northern climates, and less grain and more leaf and stalk in southern ones; no state in the Union producing such prodigious crops, per acre, as New-York, for example. Should this be the fact, it will lead the farmers here, and further south, not to force the plant after it has escaped its early enemies, but to reserve its strength and that of the soil, to near the time of setting; merely giving a healthy growth by moderate, and not excessive cultivation, previous to that important state of its being.

For the first years of my farming the manure was spread in the spring, upon a sod, for corn, finishing in time to plow for planting. This plan was changed, hauling out and spreading it the preceding autumn, plowing as before. This latter method appeared to be preferable, giving not only a quicker growth to the young plants, but evidently a better stand. I also noticed that the effect of the manure from remaining upon the surface for so long a period comparatively, was to make the soil loose or mellow, and to render the wire-worm and grub no longer causes of uneasiness.

The good effects of covering the ground in the autumn for the corn crop, were fully confirmed on an adjoining farm, and the knowledge thus obtained, led to the plan which at present I pursue. My neighbor commenced by hauling out the manure which was left after preparing his wheat ground, which sufficed for only about one third of it. He then proceeded to cover the remainder with straw, but did not finish more than one-half of the part which was left, leaving, therefore, a third part uncovered. The whole was plowed in the spring in time for planting. It may be satisfactory to state that the field was perfectly level, and the soil of uniform quality throughout its extent, but thin.

From the time the corn appeared above the surface to its perfecting, a marked difference was manifest between the two parts which had been covered and the part left uncovered, having examined the corn at the beginning of the growth of the corn, and at its completion. The parts which had been covered with manure and straw, stood well, being unaffected by worms. The color was very good, and produced a fair crop; nor could any difference be perceived between them, as the owner informed me, in the quantity or quality of the grain when husked, so far as the eye could determine.

On the part which had been left without manure or straw, the wire-worm was so destructive, as to require more than once re-planting. The color indicated less vigor, and the yield in grain inferior in every respect.

No experiment could be more decisive or important as regards the corn-plant, than the one related. It established two important facts. The great advantage of covering the ground in the fall of the year for corn; the other, that no difference could be perceived in the crop between the part covered with straw, and the part with manure; consequently that straw could be substituted for manure in its culture.

It has been an object of no small importance with me in farming, to attain to certainty, quantity with goodness of crops, with the least expense of labor, and to obtain from the farm all the food or manure required for the various crops to be grown. That the latter object was possible, I did not doubt, but in no way could I accomplish it so long as manure was required for both corn and wheat. Had grazing been combined with tillage, there would have been a sufficiency for both these crops, but the farm being wholly arable, there was only enough for one of them.

From being engaged in another pursuit which occupied me some years, and other causes diverting my attention from farming, it is only within eighteen months that I have been able to make an application of straw. My experience therefore, is too limited to satisfy those who require comparative statistics, but sufficiently so to induce me to believe that I shall attain my object.

The field which was planted with corn last year, was a timothy sod, of about three years old. It was covered with straw the preceding fall. The grass at the time of breaking it up, which was just before planting, looked better than it had at any preceding spring; better than I have known old sods when manured. The corn-crop equalled my expectations of it.

The same autumn, I also covered four acres of mixed grasses for pasture, leaving about half an acre uncovered by the side of it, which had been in potatoes and highly manured. The grass next year upon the covered part was the best, and better withstood the various spells of dry weather which prevailed last year.

Bristol, Pa., Jan. 6, 1846.

VEGETABLE OILS.

The present depressed condition of the cotton growing interest being occasioned solely by *over production*, it has become a matter of the first importance to have other crops pointed out and introduced which may be profitably grown by the cotton planter.

Amongst others those plants whose seeds yield oil in sufficient proportion may be introduced with profit and advantage. Unlike cotton and sugar, the require no extensive and costly buildings or machinery for their preparation for market; they are always in demand at paying prices. It seems to be universally conceded that those oleiferous seeds, *grown in a Southern clime*, are richest in oils. Ure says: "The quantity of oil furnished by seeds varies not only with the species, but in the same seed, with culture and climate;" and his tables show that *warmth of climate* is necessary to richness in oil; they are out of the way, and may even be sent off to market before the cotton picking season begins; they will form part of a rotation of crops particularly adapted to our farm practice; and the manufacture of oil is one that can be advantageously introduced amongst us—requiring no immense buildings, or other great outlay, no introduction of free and expensive operations, and the oil and oil-cake can all, or a great part of it, be consumed amongst us. It needs but a sufficient supply of seeds grown in the south, to cause the immediate establishment of oil mills throughout that section.

Should we have *war*, the price of vegetable oils will be at once enhanced; and in such an unhappy event, as war, it becomes of great importance that we have a sufficient home supply of oil, as of every other necessary of life.

The following forms part of a list of those plants which yield the ordinary unctuous oils of commerce, as given in Ure's Dictionary of the Arts, Manufactures, etc.:

Linum usitatissum et perenne—linseed oil, ...	11 to 26	pr. ct.
Canabis sativa—hemp oil, ...	14 to 25	"
Sesamum orientale—oil of sesamum or bene,.........	50	"
Cucurbita pepo and melapepo—cucumber oil,.........	15	"
Helianthus annuus and perennis—oil sunflower,.......	15	"
Brassica napus and campestris—rape seed oil, ...	33	"
Ricinus communis—castor oil, ...	62	"
Arachis hypogæa—ground nut oil, ...	00	"
Gossypium barbadense—cotton seed oil, ...	00	"
Brassica campestris oleifera—colya oil,..........	36 to 40	"
Brassica præccox—summer rape seed oil,........	30 to 36	"
Sinapis alba, nigra, etc.—mustard seed oil,......	15 to 38	"
Cucurbita pepo—pumpkin seed oil, ...	00	"
Madia sativa, ...	00	"

To these may be added, as affording abundance of oil, though from the fleshy pulp surrounding the seed, and not from the seed itself—the olive, *olea Eucopea.* There are various nuts, too, which afford a large proportion of oil, as the walnut, almond, beech, plum, cherry, apple, horse-chesnut, or buckeye, etc.

"Nuts contain about half their weight of oil; the seeds of the *brassica oleracea* and *campestris*, one-third; the variety called *colya*, in France, two-fifths; hemp seed, one-fourth; and linseed, from one-fourth to one-fifth."

"In close vessels, oils may be preserved fresh for a very long time, but with contact of air they undergo progressive changes. Certain oils thicken, and eventually dry tnto a transparent, yellowish, flacicle substance, which forms a skin upon the surface of the oil, and retards its farther alteration. Such oils are said to be *drying* or *siccative*, and are used on this account in the preparation of varnishes and painters' colors. Other oils do not grow dry, though they turn thick, become less combustible, and assume an offensive smell. They are then called *rancid.*"

"Several fat oils, mixed with one or two per cent of sulphuric acid, assume instantly a dark green or brown hue, and, when allowed to stand quietly, deposite a coloring matter, after some time. It consists in a chemical combination of the sulphuric acid with a body thus separated from the oil, which becomes, in consequence, more limpid, and burns with a brighter flame, especially after it is washed with steam, and clarified by repose or filtration. Any remaining moisture may be expelled by the heat of a water bath."

"*Oil of colya* is obtained from the seeds of *brassica campestris*, to the amount of 39 per cent of their weight. It forms an excellent lamp oil, and is much employed in France."

"*Hemp seed oil* has a disagreeable smell, and a mawkish taste. It is used extensively for making both soft soap and varnishes."

"*Linseed oil* is obtained in greatest purity by cold pressure: but by a steam heat of about 200 degrees Fah., a very good oil may be procured in large quantity. The proportion of oil usually stated by authors is 22 per cent of the weight of the seed; but Mr. Blundell informs me, that, by his plan of hydraulic pressure, he obtains from 26 to 27. When kept long in a cask partly open, it deposites masses of white stearin along with a brownish powder. The stearin is very difficult of soponification."

"*Mustard seed oil.*—The white or yellow seed affords 36 per cent of oil, and the black seed 18 per cent." It is perfectly bland, and is used in the woolen factory, for soap-making, etc.

"There are three kinds of *olive oil* in the market. The best, called virgin salad oil, is obtained by a gentle pressure in the cold: the more common sort is procured by stronger pressure, aided with the heat of boiling water; and, thirdly, an inferior kind, by boiling the olive residuum or *marc*, with water, whereby a good deal of mucilaginous oil rises and floats on the surface. The latter serves chiefly for making soaps. A still worse oil is got by allowing a mass of bruised olives to ferment before subjecting it to pressure."

"*Oil of almonds* is manufactured by agitating the kernels in bags, so as to separate their brown skins, grinding them in a mill, then enclosing them in bags, and squeezing them strongly between a series of cast iron plates, in a hydraulic press; without heat at first, and then between heated plates. The first oil is the purest, and least apt to become rancid. The volatile oil of almonds is obtained by distilling the marc or bitter almond cake, along with water."

Linseed, rape seed, and other oleiferous seeds, unless in a very few large establishments, are still treated in the old manner, in this country—by pounding in hard wooden mortars with pestles shod with iron, as in the rice mills, set in motion by a shaft driven by horse or steam power; then the triturated seed is put into woolen bags, which are wrapped up in hair cloths, and squeezed between upright wedges in press boxes, the wedges driven by a power similar to that used for driving the pestles. The cakes obtained by this first wedge pressure are thrown upon the bed of an edge mill, ground anew, and subjected to a second pressure, aided by heat now, as in the first case. These mortars and press boxes constitute what are called the old Dutch mills, and are by many preferred to the hydraulic press. Ure, speaking of the different improved mills and presses in use in England says: "Hydraulic presses have been of late years introduced into many seed mills in this country; but it is still a matter of dispute whether they, or the old Dutch oil mill, with bags of seed compressed between wedges, driven by camstamps, be the preferable: that is, afford the largest product of oil with the same expenditure of capital and power."

For grinding the seed, a mill exhibited at the Mechanics' Institute Fair, at New York, by Mr. James Bogardus, is said to be most excellently adapted.

Castor oil is obtained by pressure, after the hull has been rubbed from the bean. That obtained by cold pressure is best.

When treating of each species of oleiferous seed by itself, we will enter more particularly into its cultivation, harvesting, manufacturing of the oil, its use and that of the oil-cake, and of the value of the seed, oil and cake in market, so far as the knowledge may be needful to the grower.

There is one part of the subject requiring especial notice—it is the injustice done to the farmer by our legislators in the duties levied upon the raw material, the seeds, and upon the manufactured article, the oil.

The first in importance is FLAX SEED and FLAX.—*New Orleans Commercial Times.*

IMPORTANT FACTS FOR FARMERS.

A Question of Bread.—Men have been long investigating truths; and many important truths, as principles, are developed, without being connected with practical purposes, or bringing out facts by application.

Wheat is known to be the most nutritious of all grains, because it contains a larger quantity of gluten. But I do not know that it is generally understood, except by scientific agriculturists, that this quantity of gluten may be varied both by climate and the character of manure. Yet such is, nevertheless, a well attested fact.

1. Wheat of warm climates has more gluten, is harder, and less easy to grind. The difference between the two, in climates not very distant, may be safely calculated thus:

Warm Climate.		*Cold Climate.*	
Starch,	56. 5	Starch,	71.49
Gluten,	14.55	Gluten,	10.96
Sugar,	8.48	Sugar,	4.72
Gum,	4.90	Gum,	2.32
Bran,	2.30	Bran,	1.
Water,	12.30	Water,	10.00
	98.58		100.49

2. The gluten of wheat may be increased by the character of the manure used, thus:

Wheat, average crop,	Gluten	19. 0
" raised on soil manured with ox blood,	"	34.24
" " " " " human fæces,	"	33.94
" " " " " human urine,	"	35. 1
" " " " " horse manure,	"	13.68
" " " " " cow manure,	"	11.96

From so much of the above facts as show how far climate varies the quantity of gluten, it results that there is a great advantage in Alabama wheat over the Northern. Now what is this advantage as applied to practical purposes. I will explain.

Two pounds of Cincinnati flour were weighed out, and to it was added one quarter of a pound of yeast. Two pounds of McAlroy's (Alabama) flour weighed, and in a like manner was added one quarter of a pound of yeast—both were accurately weighed in the same scales and at the same time, and both made into loaves and baked in the same oven. The result was as follows:—The Cincinnati flour yielded a loaf weighing 3 lbs.—gain 33 per cent. McAlroy's flour yielded a loaf weighing $3\frac{1}{2}$ lbs.—gain 55 per cent.! *The gain in Alabama flour* 22 per cent.! Or, every five barrels of Alabama flour, is equal to six of Northern flour.

But, says one, the Northern flour must be the better, because look at the loaf; it is whiter and lighter. True, but let it be remembered, that this difference with respect to whiteness, is the difference in the preparation in grinding; and that of lightness, is chiefly in the absence of gluten. The qũantity of the flour may be effected by the mode of preparation and grinding; but the quantity of the several principles composing it, cannot. The same quantity of starch, gluten, &c., must be retained, whether the wheat be ground in a good or bad mill.—*Exchange paper.*

STALL FEEDING COWS.

We have recently noticed articles from English agricultural publications, which would go to prove the diminished quantity and quality of milk produced from stall-fed cows. The results are so largely at variance from anything which has fallen within our own observation, that we must be allowed to withhold our faith either in their accuracy or fairness. The conclusions reached are, that cows, which had been allowed to glean their own forage from a lean pasture, when put up in a yard where they were well supplied with fresh cut grass, gave but about two-thirds their former quantity of milk, which was of a quality so much inferior, as to yield but half the former aggregate quantity of butter. Such a result we do not question, but if so, the whole premises which gave such a conclusion have not been stated.

That there is a wide difference in the comparative value of the different kinds of grasses does not admit of a doubt, even among those of the same species. Some contain much more nutriment than others, which have grown under other circumstances of quality of soil, difference in moisture, &c. Nothing is better settled than that a crop of hay in some seasons is worth from 10 to 25 per cent more for use, pound for pound, than in others; owing to excess of moisture, imperfect elaboration of the juices, and other circumstances. To such a difference between the cut herbage, and such as was cropped by the animals in the pastures, allowing it was of the same species, must be added, the probable difference of the kinds of grass. On old pastures, there are usually a large number of valuable minor grasses, which gradually intermix with the original ones sown, and which add much to their value as food for stock. In addition to this, a highly beneficial effect on the health and thrift of animals is produced, by their being enabled to procure a sufficient variety of food. This effect is more conspicuous perhaps in the sheep than in any other quadruped. For them a frequent change of pasture is essential to thrift, unless an extended range at all times enables them to glean what is best suited to their tastes and the various demands of the animal economy. Some plants are more highly charged with fatty matters; others with resinous; some saline; others with aromatic bitter, and astringent principles. This variety, which if the animal be allowed to select from its own, and generally unerring instincts, not only yield their due proportion of nutriment, but when properly associated with others, and taken into the stomach at the proper time, their benefit is largely augmented.

This is probably the true cause of the greater yield of milk of cows while pasturing than while stalled.

The true principle of soiling consists, in our opinion, in a combination of both pasture and stall or rack feeding, and where circumstances will justify it, both should be united at the same time. An abundance of succulent grasses, clover, pea-vines, corn stalks, or vegetables in the yard, with free access to pure water, with a supply of salt, lime, ashes, and sulphur, with a daily ramble in the pasture for a few hours, where easily accessible, or if not, then as often as practicable, would undoubtedly most effectually secure the greatest quantity of rich milk.—*Am. Agriculturist.*

THE JERUSALEM ARTICHOKE—ITS VALUE AS FOOD FOR STOCK—CULTIVATION, &c.

[Communicated for the Ohio Cultivator, by THOMAS NOBLE.]

The artichoke is but very little known as a farm crop as yet, and its properties and uses are not understood or appreciated as they should he. This root possesses a strong propensity to grow. It seems to thrive on almost every kind of soil, and is less affected by the seasons than any other crop with which I am acquainted, though the better the soil, and the more favorable the season, the greater will be the product of this as well as other crops. Of its ability to withstand late frosts and severe drouth, I had the fullest proof the past season. While all other crops in this section of country were nearly destroyed by these influences, my field of artichokes stood out in bold relief, as if in defiance of the worst weather that could blow; grew on and produced a splendid crop. As a root crop, it possesses decided advantages over all others, in being more certain, and costing less in its production; while in point of value or nutriment, I believe it is not inferior to any, the opinions of some learned men to the contrary notwithstanding.

In addition to the value of the roots, the tops, when cut in season and rightly cured, furnish a large amount of fodder, (say from three to five tons per acre,) which is much relished by sheep, horses and cattle; add to these advantages, it does not require planting after the first season, and the crop may be left in the ground all winter without any danger of injury from freezing; on the contrary, the roots are benefited by the frosts of winter.

I have fed these roots to all kinds of stock, and they all seem to relish them much. The two last seasons I have fed them to my whole flock of sheep, and the effect evidently was to increase the growth of wool, and cause the ewes to yield an abundance of milk, as shown by the large fleeces and the fine, thrifty and vigorous lambs. Previous to using artichokes, I fed potatoes in the same manner, but I give the former a decided preference.

I have tried several modes of cultivating the artichoke. The plan I would recommend is, to put the ground in good order, as for potatoes or corn; then with a plow, open furrows four inches deep and three feet apart, as straight as possible, so that a plow or cultivator can work between, close to the rows. Then drop the sets ten inches apart in the furrows—if large sets are used, they can be cut into pieces of three or four eyes each, like potatoes—then cover with a plow, and smooth with a light harrow.

The after-culture to consist of a thorough harrowing about the time the first plants make their appearance, followed by two or three dressings with a cultivator on suitable intervals during the early part of summer—nothing more is necessary to ensure a good crop.

I generally leave the crop in the ground till the frost is out in the spring; I then plow the ground and gather all the roots that can be found, then plow again and gather again. When all are gathered that can be found in this way, there will be enough roots left to fill the ground with plants for a new crop. When the young plants appear above ground, all that is necessary to be done, is to go through with a cultivator and cut them up in such a manner as to leave rows as when first planted. By repeating this cultivation two or three times, the work will be done for a second crop.

It is advisable to plant artichokes where they can remain for quite a number of years, as it is difficult to eradicate the roots from the ground; and, besides, the trouble and expense of replanting is thereby avoided.

It will, of course, be necessary to manure the ground occasionally, unless it is uncommonly rich. This can easily be done immediately after gathering the crop in the spring.

Arlington Farm, Stark Co., O., Jan. 1846.

MILDEW.

Very few seem to be aware of the nature of that substance called mildew. We copy an abstract of a lecture by Professor Lindley, of England, on the subject:

Mildew is often confounded with blight, honey-dew, &c., but it is a distinct substance, and peculiar to peculiar tribes of plants. It generally appears on the leaves and stems, in the form of *red*, *white and black spots*, as a number of minute projections, or frosty incrustations, or a brownish powder, spreading more or less rapidly, till the plant is destroyed. Mildew is fungi of different kinds, and these are divided into three classes: 1st, those which grow or lie on the surface of leaves; 2d, those which are formed in the interior of the stem or leaf, and produce when ripe; and 3d, those which only attack the roots. All these seldom appear but in autumn.

The first of these fungi injure the plant by preventing its respiration. One of the most common of the fungi, which attack the common cabbage, is the *cylindrosporium concentricum*, and they have the appearance of small white patches or specks of frosty incrustation. The mildew which attacks rose-bushes, and many other flowering shrubs, is a kind of uredo, so called, from *ura*, to burn or scorch: for it gives to the plant attacked the appearance of being scorched. The fungus called *acrosporium*, *monilioides*, resembles, when magnified, a string of beads, and consists of a number of globules which, when ripe, fall, take root, and form fresh strings, or necklaces. Sometimes tufts of these appear, fixed to stalks, and are then called *aspergillus*, from their fancied resemblance to the brushes used for sprinkling holy water. The superficial mildew which infects the onion, and is fatal to that plant, is called *botrytis*, or bunch of grapes. The bean and pea have a superficial mildew (*uredo fabæ*) which spreads along their leaves like white roots curiously interlaced.

The second class of fungi which spring from the interior of the leaves and stems, are the most fatal. They appear in a sort of bag or case, supposed to be formed of the cuticle of the affected leaf. These attack the oak, pine, and other forest trees; the genus is the *æcidium*. The *æcidium pine*, found on pine trees has, when magnified, the appearance of a number of nine-pins. When ripe, it emits a bright orange-colored powder. A mildew of this kind attacks barley, and is very injurious. It is vulgarly called pepper brand. The *urego segetum*, or smut, is destructive not only to barley, but to wheat and oats. It destroys the grain, which is converted into a kind of jelly, and attacks the leaves and stems. The *puccinia graminis*, which attacks corn, is formed in the interior of the stock, and, when ripe, burst forth into clusters, like bunches of grapes, of a dark brown color. The *ergot* on rye is a well known and destructive species of mildew. It grows out of a spike of grain, like a prolonged kernel; is long, horney and cartilaginous. It originates in the centre of the stem. It affects maize, and various species of grass.

The principal fungi of the third class are two, which attack the roots of plants, and both resemble truffles. One of these (*rhizoctonia crocorum*) attacks crocuses. It is called, by the French, *la mort du safron*, and soon destroys the whole crop. The other fungus (*periola tomentosa*) is found on the potatoe, lucerne, &c. It turns the roots to a purplish hue. They are both propagated by spawn or fibres, which cling round the roots. All these fungi propagate rapidly, requiring only twenty-four hours to come to maturity. One mushroom will propagate 250,000,000. Plants, Dr. L. says, are generally most affected by superficial fungi after a long drouth. *Red plants* are said to be more liable to mildew than any other. Mr. Bauer has found that steeping grains of corn in lime-water, will cure, or at least, prevent the spread of the internal mildew. There appears, however, as yet, to be no cure for mildew in the roots, but by forming a deep trench round the infected plants, and cutting off all communication between them and the rest of the field.—*American Farmer.*

ON THE CHANGES IN COMPOSITION OF THE MILK OF A COW ACCORDING TO HER EXERCISE AND FOOD.

[Communicated to the Chemical Society of London by LYON PLAYFAIR, Ph.D., Honorary Member of the Royal Agricultural Society of England. Read 17th January, 1843.]

This paper, although published in 1843, is not so generally known as it ought to be, as it is one which is highly practical, and may be advantageously studied by every dairyman. We propose giving a full analysis of its most important facts and principles. The object of the paper is expressed in the heading, though it really takes a wider range than is indicated by its title.

The first point was to determine the usual composition of milk. Boussingault and Lebel have endeavored to show that milk is constant in its composition, when the animals are fed on matters which contain a constant quantity of nitrogen. Thus, according to the mean of eight analyses, milk is composed of

Casein, ...	3.2
Butter, ...	4.1
Sugar, ...	5.1
Ashes, ...	0.2
Water, ...	87.4—*Boussingault.*

Prof. Playfair agrees with Boussingault so far as the casein is concerned, namely, that when the nitrogen in the food is constant, the cheesy part, or the casein, will be so too; but the other ingredients will vary. The experiments of Playfair were made upon one cow, of the short horned Durham, whose condition was good.

The first experiments were merely preliminary, and were intended to determine the average quantity of milk per day. She was then pastured in a meadow about half a mile from the cow-house. The time of the experiments was in October. For five days the average morning's milk was nearly 5 quarts, and the average evening's milk a little over 4 quarts. The milk to be analyzed was taken from the pail and well stirred.

At the first experiments, the cow was kept in the meadow upon grass. The first milk analyzed was the evening milk, of which 4 quarts were obtained. Sp. gravity, 1.034. 100 parts gave

Casein, ...	5.4
Butter, ...	3.7
Sugar of milk, .	3.8
Ashes, ...	0.6
Water, ...	86.5
	100.0

This day the cow had much exercise, which occasions a consumption of oxygen, which consumes the butter.

In the morning, the cow having ate nothing, gave 4½ quarts of milk. Sp. gravity, 1032; which gave, on analysis,

Casein, ...	3.9
Butter, ...	5.6
Sugar of milk, .	3.0
Ashes, ...	0.5
Water, ...	87.0
	100.0

It will be observed that the amount of casein is less, while the butter is increased.

2d day. The cow was put into the stall, but refused to eat, and struggled much to break away and gain her liberty. She was tranquilized by giving her a companion, when she ate 28 lbs. of good hay and 2½ quarts of oat meal.

In the evening she gave 3½ quarts. Sp. gravity, 1031. On analysis it yielded

Casein, ...	4.9
Butter, ...	5.1
Sugar, ...	3.8
Ashes, ...	0.5
Water, ...	85.7
	100.0

The next morning the milk was spilled.

3d day. Cow confined in the shed; consumed 28 lbs. hay, and

2½ lbs. oat meal, and 8 lbs. of bean flour. She gave in the evening 4 quarts=10.34 lbs. It yielded

Casein, ...	5.4
Butter, ...	3.9
Sugar, ...	4.8
Ashes, ...	0.5
Water, ...	85.4
	100.0

The next morning's milk amounted to 4½ quarts. Sp. gravity, 1032, and yielded

Casein, ...	3.9
Butter, ...	4.6
Sugar, ...	4.5
Ashes, ...	0.7
Water, ...	86.3
	100.0

4th day. Cow kept in the stall; ate 24 lbs. of steamed potatoes, and 14 lbs. of hay, and 8 lbs. of bean flour. She gave in the evening 5 quarts. Sp. gravity, 1033. The milk yielded

Casein, ...	3.9
Butter, ...	6.7
Sugar, ...	4.6
Ashes, ...	0.6
Water, ...	84.2
	100.0

In the morning succeeding, she gave 4 quarts, of the specific gravity 1032, which yielded

Casein, ...	2.7
Butter, ...	4.9
Sugar, ...	5.0
Ashes, ...	0.5
Water, ...	86.9
	100.0

5th day. Cow kept as before, but ate 30 lbs. of steamed potatoes, 14 lbs. hay, and gave 5½ quarts of milk. Sp. gravity, 1030. Analysis gave

Casein, ...	3.9
Butter, ...	4.9
Sugar, ...	3.0
Ashes, ...	0.5
Water, ...	87.1

The milk in the morning amounted to $4\frac{3}{4}$ quarts. Sp. gravity, 1030, and yielded

Casein, ...	3.5
Butter, ...	4.9
Sugar, ...	3.8
Ashes, ...	0.5
Water, ...	87.3
	100.0

The food upon which the cow was fed, is composed as follows:

	Boussingault. Hay.	Oats.	*Playfair.* Beans.	*Boussingault.* Potatoes.
Carbon, . . .	38.47	41.57	38.24	12.30
Hydrogen, . . .	4.20	5.25	5.84	1.74
Oxygen, . . .	32.51	30.10	33.10	12.04
Nitrogen, . . .	1.26	1.80	5.00	0.32
Ashes, ...	7.56	3.28	3.71	1.40
Water, ...	16.00	18.00	14.11	72.20

The question which Prof. Playfair discusses at this stage of his paper is, whether the butter is derived wholly from what may be considered the free fat or oil ready formed in the vegetables consumed by the cow. This is determined in the negative, for while the whole amount of fat in the food of one day amounts only to 0.486 of a pound, the milk yielded 0.964 lbs. butter; and so in about the same proportion during the time the experiments were continued. It is supposed that the excess of butter, over that in the food is formed in the animal system by the action of oxygen on the unazotised ingredients of the food.

Another question discussed is, how it happened that the quantity of butter should vary from day to day. This is accounted for on the ground that when the cow was exercised much, either in obtaining her food, or was hurried to and from the pasture, the material which would have been converted into butter was consumed in respiration. A supposition of this kind agrees with the facts in this case, and also with the experience of all dairymen. When an animal is quiet the respirations are fewer; less food is consumed in respiration, and the animal, if not milked, fattens. Hence, cows ought never to be driven rapidly to or from pasture. We see too why soiling cows increases the amount of butter—or when they are kept in warm comfortable stables during the winter.

The conditions necessary for the production of cheese are different from those which produce butter. To make butter a rich pasture is required, but for cheese poor lands or poor pastures are the best. The travel which the cow has to perform wastes the tissues which are then converted into casein. The cow, however, must be tempted to eat much, and her pasture must be changed often. This plan for the production of cheese differs from that of soiling, where much butter is the object, when the cow is to be kept quiet and fed on rich juicy grass in the stall.

The author concludes his paper in suggesting the best methods of preserving milk. But, in the first place, how is it that milk becomes sour? The first change is by the action of oxygen on the casein, which is apt to run into putrefaction, and when a change begins in one element, analogous changes begin in the others, which results finally in the production of vinegar. Good butter cannot be made when the elements are oxidated; and in this case the casein passess into a state of putrefaction, vitiates the butter, inasmuch as butter always contains some casein. Sometimes so much as to possess the flavor of cheese. The principal object in view in the preservation of milk, says the author, and we now use his language, is

To prevent the commencement of this putrefaction. One method has been termed *scalding* the milk, and is generally used in dairies. It consists in heating the milk until the oxygen of the air acts upon the casein, and forms a pellicle on its surface. The milk should then be left to perfect repose. The pellicle excludes the air from the soluble casein. The partial oxidation by which the pellicle was produced, is effected at too high a temperature to enable the decay to pass into putrefaction. When this operation is skilfully performed, the milk remains quite good for four or five days. But there is a risk of failure in this process, and it is only adapted for small dairies.

The best method, which I have seen used in practice with much success, seems to be to induce the acetous fermentation in the milk. For this purpose, the cream or milk, being placed in a proper vessel, should be surrounded by hot water. The heat which I find to answer best is from 100° to 110°. A cloth may be thrown over the whole to retain the heat, and as the water cools, it should be removed and replenished with hot water of the above temperature. In a few hours the cream acquires the smell and taste of vinegar. The changes which I have described above ensue. In large dairies a portion of this soured cream or milk may be added to fresh cream or milk, which should be kept in a room possessing a temperature of 60°. By adding this soured cream to the fresh milk, we furnish an acid, by which the sugar of milk is converted into grape sugar. The curd then acts upon the grape sugar, and converts it into alcohol. The latter by oxidation becomes acetic acid, and thus the whole mass of milk is rendered sour, the casein coagulated, and therefore protected from immediate putrefaction. The butter made from such soured milk is quite sweet and destitute of that rank taste which distinguishes our winter from summer butter. But if incipient putrefaction has once begun in the milk, all this will be of no avail, because it is communicated to the insoluble casein. Milk perfectly fresh must therefore be used. Fresh milk soured in this way will last for many days, and give risings of cream for a considerable time. This practice, as far as I am aware, is not a general one, though it is well worthy of adoption. In summer of course no such operation is requisite, as it is done at the sacrifice of the skimmed milk. One great cause of the putrefaction in milk is the want of absolute cleanliness in the dairy. If a drop of milk fall on the table, it should be dried and washed off with care, for its putrefaction causes the evolution of a putrid gas, and this imparts its state of putrefaction to the remainder of the milk.

With respect to making butter, scientific explanations can be of little use to practical men. The theory of churning is very simple. By agitation, the globules of butter are broken, and made to unite together into a mass. The introduction of air during churning, aided by the heat at which the cream or milk is, occasions the formation of lactic or acetic acid, and this coagulates the casein, and thus assists the separation of the butter. In summer, when the heat prevents the ready coherence of the butter, a a quantity of cold spring water thrown in, after the buttermilk was formed, often effects the desired end. The temperature is thus depressed, the butter rendered solid and more coherent, while the air contained in the water aids in the formation of acid and coagulation of the casein. The only thing, in a scientific point of view, to attend to after the separation of the butter, is to free it from buttermilk or cassein. If the casein be suffered to remain, putrefaction ensues, and the butter acquires a rank putrid taste. Its separation is therefore of the first moment.

The cause of the superiority of certain foreign butter, which retains its flavor and taste for a considerable time, it more due to its freedom from casein than to any mystery in its mode of preparation.

GUANO.—A large amount of this manure has been used in England, and generally with good success. In most cases in this country it has done but little good.—*Boston Cultivator.*

The reason undoubtedly is the dryness of our climate, when the article is good; but sometimes it is bad. Labor and proper arrangements about the barns and sheds will usually secure a sufficiency of manure for every farm.

ALLUVIAL SOIL OF THE NILE.

The following report of the examination and analyses of the alluvial soil of the Nile, from Korosco, in Nubia, was read before the Academy of Natural Sciences of Philadelphia, by Walter R. Johnson, and published in the proceedings of the Society:

The specimens about to be described are the same which were on the 21st of January last presented to the Academy, by Mr. Gliddon, from Dr. Richard Lepsius of Berlin, then in Egypt, (see proceedings of the Acad. vol. 2, p. 195,) and referred to the reporter for examination.

No. I.—*Earth of the Nile taken from the summit of hillocks at thirty feet above the present level of the river about a mile above Korosco.*

This earth is partly in powder and partly in lumps. In some of the latter, distant traces of folia, or plies, marking an imperfect stratification, are to be seen. Along these seams fractures often occur. Throughout the lumps are to be observed innumerable cavities or spiracles of a tortuous form, giving the impression of having been produced by some species of vermes. Many of these are lined, and some nearly filled up with carbonate of lime. Tubes of the same material are found in a separate state, and some plane surfaces are covered with it. The whole has a light, spongy appearance, and the resemblance is strengthened by the vermicular cavities, which remind one of the white tubes often found traversing masses of common sponge. Very fine micaceous particles are distributed pretty copiously through the masses, distinctly perceptible to the eye, and clearly exhibiting their forms under the lens. To the naked eye no ferruginous appearance is discernible, but the microscope shows innumerable points of a deep red color. The mud appears to have been deposited at successive, but not very distant periods; while soft, to have been penetrated by myriads of animalculæ; then dried and baked into a solid mass, imprisoning and destroying the animals, and forming a very porous soil, which, on subsequent exposure to water, strongly impregnated with lime, received so much of the latter as to fill up many of the pores when the water came to be dried up.

Analysis. 1. The existence of roots, stems, or of any other fibrous matter was sought for in vain in this specimen, and the magnet separates from it, only minute quantities of magnetic oxide of iron.

2. Fifty grains placed in a syphon-shaped drying tube in which it was exposed to a heat of 212° for thirty minutes, and over

which, during the whole time, a current of perfectly dry air, amounting in all to 200 cubic inches, was passed, lost by this treatment 2.1 grains, or 4.2 per cent.

3. One hundred grains of the soil were boiled for ten minutes in four or five ounces of distilled water, then filtered and washed. The insoluble residuum, separated and dried, weighed 93.5 grains, and is of a reddish grey, slightly varying in color from the original soil. Deducting 4.2 from the loss, the part soluble in boiling water is 2.3 per cent. To the clear solution nitrate of silver imparted a slight milkiness, indicating the presence of chlorine. Chloride of barium, producing no turbidness, implied the absence of soluble sulphates. Oxalate of ammonia, gave evidence of a salt of lime soluble in boiling water. Phosphate of soda and ammonia gave no evidence of magnesia, and ferrocyanide of potassium, none of iron. The liquid slowly evaporated to dryness, left a residuum, which in the bottom of the porcelain basin separated into a yellowish ring of crenic acid, giving the usual impression, first of acidity and then of astringency to the taste, and a central portion of white crenate or carbonate of lime.

4. Another portion of one hundred grains was exposed in a platinum crucible to a dull red heat over a lamp, by which it lost 8.65 grains, showing the insoluble organic matter to be 2.15 per cent. The same portion afterwards exposed for fifteen minutes to a nearly white heat lost in addition 5.3 grains, and became of a light brick red color.

5. A third portion of one hundred grains finely pulverized was placed in a green glass flask. An ounce of distilled water was poured over it, and an open-mouthed tube containing chlorhydric acid was inserted, the mouth closed with a cork traversed by a small glass tube surmounted by a tube containing chloride of calcium. The whole being carefully counterpoised, the acid was by degrees decanted and allowed to act on the soil. Heat was cautiously applied near the close of the operation, bringing the liquid at length to gentle ebullition, but taking care that no pure steam entered the chloride tube. On cooling the apparatus, the air was allowed to pass through a second chloride tube attached to the first, thus avoiding the hygrometric moisture of the air. When the whole apparatus had become cool, heat was again applied, and the boiling and cooling repeated with the same precautions, until, on re-weighing, no loss was found to occur between one boiling and another. The final loss of *carbonic acid* was thus ascertained to be 5.55 per cent.

6. Having withdrawn the cork from the flask, more chlorhydric acid was added, and the boiling continued until every thing soluble had been taken up. The undissolved residuum filtered, washed, and ignited, weighing 63.55 grains. It is a powder of

a lighter grey than the original soil. Minute particles of white quartz, and some with a reddish tint, are discernible by the help of a lens.

7. The solution filtered from the above residuum was treated with sulphydric acid, to ascertain whether lead, copper, mercury, tin, antimony, or arsenic, existed in the soil. A reddish white tint, indicative of a bare trace of antimony, was all which could be procured. The liquid smelling strongly of sulphydric acid, the sulphur was separated, and then the solution was neutralized with pure ammonia.

8. Sulphydrate of ammonia was added, throwing down a copious precipitate of sulphuret of iron and alumina, which was filtered out, redissolved in chlorhydric acid, with a little nitric, and boiled to peroxidize the iron; the solution was then precipitated and boiled with pure potash, separating the iron, which being ignited, weighed in the state of peroxide 8.07 grains.

9. Having acidulated the potash liquid, it was precipitated by ammonia, and gave of ignited alumina 2.64 grains.

10. The solution, filtered from the sulphurets, was concentrated, treated with chlorhydric acid, the precipitated sulphur separated, and after neutralizing by ammonia, was precipitated with oxalate of ammonia, allowed to repose eighteen hours, then heated and filtered. The oxalate of lime thus obtained, was, after ignition, repeatedly moistened with a solution of carbonate of ammonia, and re-ignited till it ceased to gain weight. The carbonate of lime was 12.6 grains.

11. Ammonio-phosphate of soda applied to the liquid filtered from the oxalate of lime, after the same had been duly concentrated, entirely cooled and neutralized by pure ammonia, threw down ammonio-phosphate of magnesia, which, separated and ignited, gave of phosphate of magnesia, 5.15 grains, equal to 2.06 grains of magnesia, or 4.25 of bi-carbonate.

From the preceding operations we obtain the following composition of this soil, viz.:

	Per cent.
Water obtained at 212°,	4.20
Organic matter soluble in boiling water,	2.30
Insoluble organic matter,	2.15
Peroxide of iron,	8.07
Alumina,	2.64
Carbonic acid,	5.55
Magnesia,	2.06
Lime,	7.11
Insoluble silicates,	63.55
Loss,	2.37
	100.

No. II.—*Specimen of the present Soil of the Valley of Korosco, taken at a height of three feet above the Nile.*

This earth is also partly in lumps and partly in powder. The former exhibit no marks of stratification, and so far as can be observed, have no tendency to part in one direction more than in another. The texture is open and porus, but the pores are not filled as in No. 1, with any deposite of white matter, except here and there a rather light gray in the interior of the cavities. In some of the lumps, minute rootlets are seen traversing the mass in different directions. The color of this soil is considerably darker than that of No. 1, due in part no doubt to the absence of carbonate of lime. Ferruginous particles abound in this, as in the preceding specimen, but those of mica are of far less frequent occurrence.

Time has allowed me to make but a few trials to ascertain the composition of this soil, as it was believed to be of more interest to determine the relative characters of the oldest and of the most recent ones, rather than that of an intermediate period. By twice drying in the inverted syphon apparatus, and in the last instance passing over it 200 cubic inches of air, thoroughly dry, it lost 2.6 per cent. By treatment in the apparatus for separating carbonic acid, and boiling five times successively to expel the last atom of that material, using a solution of pure baryta to ascertain when the escaping air, expelled in boiling, ceased to be mixed with that acid, it was found that the amount of carbonic acid was only 1.7 per cent equivalent to 3.9 per cent of carbonate of lime. On separating the soil with the sieve, the finest portion—that passing through the gauze sieve—was found to afford decidedly more magnetic oxide of iron, than specimen No. 1.

No. III.—*Specimen of the Earth newly deposited at Korosco, the 18th of August.* 1844.

This specimen is entirely in powder, and of a color very nearly approaching that of No. 2.

Particles of mica are rather rare occurrence. A few minute fragments of straw or grass are detected, and by a gauze sieve, of which the meshes are 100 to the inch, and the spaces to the threads as $2\frac{1}{4}$ to 1 in diameter, making the open spaces $\frac{7}{1000}$ of an inch square only, 22 per cent of this earth was arrested. A quantity of very fine fibrous or downy matter was also collected by the sieve. Portions of both the coarser and the finer parts of this soil are attracted by the magnet, 4-tenths of one per cent being found in an average portion of it. On being washed, the coarser part is found to be a sand, composed of quartz, red and white, fragments of schorl, and garnets, of magnet oxide of iron, a little mica, and a few fragments of tubes, such as are seen traversing the older portions of the soil already examined. This composition indicates that this specimen has resulted from the decomposition of primitive rocks, and that their debris has been mixed with some portion of the anterior deposits along the river banks.

Analysis.

1. Dried 100 grains and found the loss, 3.7 grains.

2. Transferred the same to a well closed platinum crucible, and ignited; which caused an additional loss of 3.57 per cent. The powder having now a dull reddish gray color, was again heated, and with access of air, stirring occasionally with a platinum spatula, to facilitate the complete combustion of organic matter.

By this treatment the additional loss was .13 grain, showing the organic matter in the soil to be 3.70 per cent. To ascertain what part of the matter was soluble, a second portion of 100 grains was placed in a green glass matrass and boiled for an hour, with three ounces of a saturated solution of carbonate of ammonia; the clear liquid was decanted, and a second portion of the carbonate added, boiling as before, and in the same way a third portion was subsequently added. The solution being acidulated with acetic acid, acetate of lead was applied, producing when dried, 4.7 grains of crenate of lead, equivalent to 2.28 grains of crenic acid, and showing the insoluble organic matter to be 1.42 grains.

3. Placed the reddened powder of the first 100 grains in a matrass, and poured over it an ounce of pure water and half an ounce of pure chlorhydric acid; boiled half an hour, decanted the clear liquid, put in another ounce of water and half ounce of acid, boiled for the same length of time. decanted once more and repeated the operation—then filtered, washed carefully, ignited and weighed the residue, found it 70.2 grains, showing that 22.4 grains of matter have been dissolved by the acid.

4. The solution in chlorhydric acid, reduced to a convenient bulk, was boiled with a little nitric acid, to peroxidize the iron, by which it was changed from greenish yellow to a fine deep red color, and while still hot, precipitated with pure ammonia, boiled to condense the precipitate, filtered, washed for more than 24 hours, and until all alkaline reaction ceased.

5. The precipitate was boiled in a strong solution of caustic potash, until the clear liquid yielded with chlorhydric acid the usual indications of a sufficient excess of alkali.

6. The remaining precipitate of oxide of iron was filtered and washed for 12 hours, with hot water, separated, dried, and ignited sufficiently long to reduce the whole to the state of peroxide, which then weighed 9.18 grains.

7. The potash solution was acidulated with chlorhydric acid, and precipitated by carbonate of ammonia, yielding, after being thoroughly washed, dried and ignited, 6.55 grains of alumina.

8. The ammoniacal solution filtered from oxide of iron and alumina, was treated for phosphate of lime, and afterwards with oxalate of ammonia, and, allowing ample time to precipitate, the oxalate of lime was filtered, washed, converted into carbonate, and in that state weighed, giving 6.7 grains. Converted this, by exposure three times to a white heat, into *caustic lime*, weighing exactly 3.8 grains.

9. The liquid from which oxalate of lime had been filtered, was now with the usual precautions precipitated with ammonio-phosphate of soda, the precipitate cautiously washed, and the double phosphate ignited, giving phosphate of magnesia 5.18 grains, equivalent to 1.89 grains of *magnesia.*

10. To the liquid filtered from ammonio-phosphate of magnesia, added sulph. hydrate of ammonia, and obtained calcined precipitate from the .3 grain of oxide of manganese,

11. A third portion of 100 grains of the soil, treated for *carbonic acid* with all the precautions of boiling the liquid, and alternately cooling off ten times, until the pure baryta showed no more carbonic acid, and the successive weighings gave identical results, the quantity of that ingredient was found to be only 1-4 grains. Hence the soil is composed of

Moisture,	3.70 per ct.		
Carbonic acid,	1.40		
Organic matter,	3.70 viz:	Soluble	2.28
		Insoluble	1.42
Insoluble silicates,	70.20		
Oxide of iron,	8.76		
Alumina,	6.55		
Lime,	3.80		
Oxide of manganese,	.30		
Magnesia,	1.89		
Phosphate of lime,	.15		
	100.45		

The excess is here attributable in part to the peroxidation of the iron, which in the soil is partly in the state of magnetic oxide, and in part to the presumed slight amount of potash still adhering to the oxide and alumina.

Sand taken from the thermal spring of Okme, on the Southern frontier of the Province of Butir-el-Hagrr, on the Western bank of the Nile—where the temperature of the water is 131° *Fah.*

This sand obviously contains the debris of granitic rocks. Particles of quartz and mica are very abundant, and the magnet takes up a notable portion of magnetic oxide of iron. Particles of highly ferruginous clay are interspersed among it, resembling crumbs of bog iron ore, and leading to the supposition that the heat of the spring is occasioned by the decomposition of pyritous rocks, whose insoluble debris it brings in minute portions to the surface. The gauze sieve already mentioned retains 25 per cent of this sand including nearly all the particles of ferruginous clay. The portion which passes the sieve, resembles, in almost every particular, the sandy portion washed out of the newly deposited soil, except of course the different degree of its fineness. Both have particles of red and white quartz, both show magnetic oxide of iron, the sand of the spring in the greater abundance. It is remarked that the particles of this oxide in the portion of sand which passes the sieve, is far greater than in that which remains upon it, which we might anticipate, on the supposition that the sand is brought up by the spring. The greater specific gravity of the particles of oxide than that of the quartz, would allow larger masses of the latter than of the former to be thrown up by a current of given velocity.

Bringing together the results of the analysis of the ancient and that of the most recent soil, we find the following composition in 100 parts.

	Ancient soil.	Recent deposite.
Water,	4.20	3.70
Soluble organic matter,	2.30	2.8
Insoluble " "	2.15	1.42
Peroxide of iron,	8.07	8.76
Alumina,	2.69	6.55
Lime,	7.11	3.80
Magnesia,	2.06	1.89
Carbonic acid,	5.55	1.40
Insoluble silicates,	63.55	70.20
Loss,	2.37	
Ox. of Manganese		.30
Phosphate of lime,		.15
	100	100.45

The *loss* in the analysis of the ancient soil, is attributed in part to the combined water, which no doubt existed in the peroxide of iron, and in part to the chloride of sodium and phosphate of alumina, of which some traces were observed, but of which time did not allow me to make a minute examination, or to repeat the analysis for the purpose of an exact determination of their proportion. The most striking difference between the ancient and the modern soils is to be found in the far higher proportion of carbonic acid, lime, and magnesia in the former, and the greater abundance of alumina and of insoluble silicates in the latter. The matter soluble in water is nearly the same for both, and the oxide of iron not widely different.

GAS ILLUMINATION.

The only method of strict accuracy by which the value of an illuminating gas may be determined, is by a complete chemical analysis; but this is an operation of extreme delicacy, requiring far more adroitness in minute manipulation than is possessed by the generality of gas engineers. Results, however, of sufficient accuracy for all ordinary purposes, may be readily obtained by methods much more easily executed; namely, 1°, by a photometrical experiment; 2°, by determining the specific gravity of the gas; and 3°, by determining the quantity of oxygen required for the complete combustion of the gas, with the amount of carbonic acid produced. The first of these methods is the simplest; and the results it affords, when performed with care, are equal in value to those got by the two other methods.

The photometrical processes which I shall briefly describe are founded upon principles of extreme simplicity. Though the eye is unable to judge with precision of the relative intensity of two lights, yet it can determine with considerable accuracy when contiguous shadows of an opaque object thrown upon a screen by different lights are equally dark, or when two similar adjoining surfaces are equally illumined, provided the lights are of the same teint. If the two lights which produce these effects are equal in intensity, obviously their distance from the screen must also be equal; but if unequal, the most intense light is placed farthest from the screen. Now, as the rays of light are propagated continually in straight divergent lines, their intensity diminishes in the direct proportion of the square of their distance from their source. Taking, as a standard, the amount of light on a screen derived from a flame at the distance of one foot, then at two feet the light on the screen from the same source would be one-fourth, at three feet one-ninth, and at four feet one-sixteenth of the standard. Therefore, if two or more sources of light are so placed as to cast an equal light on the screen, their relative intensities are directly as the square of their distances from the screen. The objection to this mode is, that it does not readily admit of a fixed standard of comparison.

The method of contrasting the shadow of an opaque object formed by different lights was first employed by Lambert (*Photo-*

metria, 1760), but is commonly attributed to Count Rumford, by whom it was proposed in the *Phil. Trans.*, vol lxxxiv. The apparatus required is extremely simple, consisting merely of a smooth perpendicular surface of uniform color, and a rod for throwing the shadow. Two lights which are to be compared are so placed that, when the rod is interposed between them and the screen, the two shadows may be contiguous; and, so long as the shadows are of unequal depth, one of the lights must be advanced toward, or retired from, the screen, until an equality in depth is procured. Suppose a wax candle at the distance of two feet, and a gas jet, at the distance of two feet six inches, to produce equal shadows, then, according to the above rule, the relative intensity of the lights is as 4 to 6.25, or as 1 to 1.5625.—*Parnell's Applied Chemistry.*

AGRICULTURE AS AN ART, AND AS A SCIENCE.

[Communicated for the Western Reserve Magazine of Agriculture and Horticulture, by Professor JARED B. KIRTLAND, M. D.]

The history of agriculture as a science is brief. It can date back to no early times—the ancients knew nothing of it, and at the present day it is only partially understood. Every succeeding day is developing some principle not before known, and the practical application of others, hitherto understood only in theory.

It is scarcely a generation since Chaptal and Davy wrote upon this science, and, though learned as they were, it is now evident that they hardly entered on the threshold of the subject.

For its late rapid advancement we are principally indebted to modern chemistry, though it has been essentially aided in its progress by the discoveries that have been made in several branches of natural science, particularly botany and entomology.

The distinction between the *art* and the *science* of agriculture is strikingly manifested by the course each would take *in investigating the qualities of the soil.*

Art employs only one sense, that of sight. In such a course of investigation, if the soil be black and *mucky*, as she technically calls it, the conclusion is hastily drawn that it is rich and strong—if lighter colored, yellow, brown or red, that it has less strength. Such conclusions are guess-work after all, and trials at cultivation often prove them to be erroneous.

Science proceeds systematically in such an undertaking. She analyzes the soil, and ascertains the exact proportion of each principle it contains. The result is certain. There is no guessing in the matter.

In our experience, we have known art to commit some most egregious errors, in regard to the character of soil. On one occasion a farmer, guided by art, who despised most heartily all science and book-knowledge on agriculture, came in possession of an extensive tract of *peat-marsh.* Art at once concluded from blackness and depth of the soil, that if the bushes and surplus water could be disposed of, a most exuberant crop of Indian corn might be obtained. Accordingly the mattock, spade and scythe were put in requisition, and after much labor and expense had been employed, several acres were brought into a condition in which the farmer and his sons could drag a plow by dint of hard pulling through the surface soil, the subsoil still remaining too miry to bear up a yoke of oxen. This was cheerfully borne by the farmer, in anticipation of the crop of golden ears with which his toils were to be rewarded at the close of the season. His, alas! like too many of man's golden dreams, were never realized.

The spring was warm and propitious for his labors; the seed was planted; it vegetated and continued to grow while the vernal showers and dews were abundant and a sufficient quantity of soluble nutrition was yet unexpended on the surface of the peat. But with the approach of the scorching summer's sun, the moisture was evaporated even below the roots of the corn, and the stalks withered without attaining a height of more than two feet. Misfortunes are said not to come singly. They certainly did not in this instance; for at the time the corn was perishing, from a deficiency of nutrition, the farmer put fire to some piles of brush on the margin of the field, which communicated with the sun-dried peat. This continued to burn for several months, nearly suffocating the population of the surrounding country, and ultimately leaving extensive excavations in the marsh that have since filled with water and become the habitation of reptiles innumerable.

What more successful course, it may be asked, would the scientific farmer have taken with this steril bog.

As a *botanist*, he would have recognised the accumulation of muck to be made up, principally of a living moss—a species of *sphagnum*, which is growing from year to year.

As an *agricultural chemist*, he would have discovered by analysis that though it contains a very large proportion—from seventy to ninety per cent of three of the ultimate elements of the organized tissues that make up the structure of vegetables, to wit, carbon, hydrogen and oxygen, yet combined and organized, and under the control of the living vegetable principle (*vitality*), they are not in a condition in which other living vegetables can appropriate them to the purposes of nutrition and support.

As well might the growing corn seize upon the purslain and other noxious weeds in a living state, and employ their proximate principles for the filling out of the young ear, as derive support from this living, organized peat, until its vitality had been destroyed, and its structure undergone decomposition.

His next step would be to effect that decomposition, and in such a manner that its proximate principles would be best adapted to furnish his cultivated vegetables with nutrition.

On this point he need not be long detained, for science has already pointed out appropriate methods.

It may be accomplished either by fermentation with animal and other vegetable matter, or by the action of an alkali, or by what is preferable, a combination of the two methods, viz., fermentation in a compost heap, made up of due proportions of peat, refuse vegetables, animal matter and an alkali.

The proportions best adapted are as follows:

Peat, dug and exposed to one winter's frost, . . .	21	loads,
Fresh barn-yard product, ...	7	"
Coal, wood or peat ashes, ...	1	" or
Slaked lime, ...	½	"

Mix these ingredients intimately in a compact heap, which should then be covered with refuse hay, straw, leaves or turf. After a time, varying with the moisture and temperature of the weather, a fermentation will commence which may run so violent as to endanger the burning of the ingredients. This can, however, be avoided by turning over the heap repeatedly, or by frequent waterings.

Three weeks before using it, it should be again thoroughly forked over, and every lump broken. A slight fermentation will follow, that must not be interrupted.

The compost will then appear a black, free mass, and spread like rich garden mould. Use it weight for weight with the best barn-yard product; it will be found in a course of cropping to stand the comparison.*

Science is aware that these several materials, by the result of chemical action, will furnish in about due proportion all the proximate principles contained in the organized tissues of vegetables, to wit, carbon, hydrogen, oxygen and nitrogen—and several of their most important inorganic constituents, as potash, soda, lime, phosphorus, &c., in various combinations—also of the ill effects of furnishing any one of them in excessive or undue proportion.

Science likewise understands all the principles, brought to bear, in the changes this compost heap undergoes.

Allow that she does! says *Art;* still this business of forming compost to enrich my farm is attended with too much trouble and expense; I can never resort to such an expedient.

* See N. E. Farmer, vol. ix., p. 46.

Science replies—You have lived for a few years on the native richness of your soil, which was the accumulation of a thousand years, from the decay of animals and vegetables. It is now mostly expended, and you must either adopt a scientific mode of tilling your lands, remove to Iowa or Texas, or starve where you are. The choice is placed before you.

To the eye of a scientific agriculturist, ten acres of peat bog is a more valuable appendage to one of our northern farms than would be the same number of acres of the richest Scioto bottoms. He views these bogs as the means provided to enrich our impoverished uplands, and also foresees the day that they may furnish a portion of the fuel needed in this cold climate.

Art considers no act more meritorious than to convert them into a potatoe field.

It is painful to see the reckless haste that is made to destroy their character and value by drainage and cultivation.

We have known *Art* to commit some serious blunders in regard to the mineralogical constitution of a soil where Science could see her way clearly. Without stopping to notice the numerous avaricious reveries that Art has been thrown into at the sight of glistening mica, pyrites or blende, in the limited scope of our acquaintance, we will refer to some of her errors under this head that have a more intimate relation to agriculture.

Some years since an excitement was raised in Trumbull county, by a report that a supply of sulphate of lime (plaster of Paris) had been found in Ellsworth. Splendid crystals for a cabinet were sent to the eastern states, and a distinguished professor gave correct information in regard to their being plaster. Speculative purchases of land were made in anticipation that abundant beds of this valuable article would be discovered in the vicinity. No such beds have, however, come to light.

It appears that the earth in that township is mostly the detritus of a broken down shale which contains some marine fossils, a portion of lime and pyrites, as well as other ingredients. The sulphur of the pyrites acted upon by the air is slowly converted into sulphuric acid, which then combines with the lime and forms the sulphate of lime or plaster. The process is constantly going on at a slow rate, and beautiful crystals form in the beds of shale and clay in the course of a few years, yet they afford no indication that beds of plaster rock are in that vicinity.

Again, *Art* concludes, that if she locate in a limestone formation she is sure to obtain good lands, abounding in lime, with a soil naturally adapted to the production of wheat. In this she may be mistaken. A few years since, several farmers in the Miami Valley complained that their soil was not as good as they expected, and did not yield as large crops of wheat as their neighbors', although in the same vicinity, and in the midst of a limestone formation.

A scientific examination of the soils from several localities in the vicinity by a membe1 of the late Geological Board of Ohio,* disclosed the fact that the soils of these defective farms were made up of the detritus from a primitive region, containing hardly a vestige of lime, and composed mostly of argillaceous and silicious materials, notwithstanding the rocks beneath were carbonate of lime. At his suggestion a top dressing of lime was furnished, and the lands became fertile and productive. *Art* would never have suspected that in the midst of a limestone region the cause of sterility in the soil could be the absence of that mineral. Instances the reverse of this occasionally occur in some of the northern parts of Ohio, which are of a different geological formation, where limestone is not found in place. As an instance, certain farms in Rockport and Olmsted, along the course of Rocky river, in the county of Cuyahoga, are known to be more favorable for the production of wheat than many of the claylands in the same townships, though the soil presents no very flattering appearance to the eyes of Art.

To *Science* the cause is evident; the boulders large and small, are principally limestone, and the soil contains a large per centage of lime mixed with clay and sand. Bad tillage and a grasping system of husbandry are, however, rapidly exhausting these lands of their vegetable and animal matter, and lime alone will not render lands fertile that are deficient in these ingredients.

When *Science* shall be permitted to control the operations on these lands, understanding the matter, she will so manage as to add from time to time to the exhausted soils, carbon, hydrogen and nitrogen, by dressing with manure and plaster, turning in green crops, particularly clover, and by attention to a correct routine of crops, she will be constantly raising the condition of the soil, and at the same time obtaining productive crops in return.

Northern Ohio is becoming exhausted under the course pursued by Art. Few farms will produce half the crops at the end of twenty years' cultivation that they would when first cleared from the forests. Such results are not necessary. Under skillful and scientific management, they should yield more abundantly. We go farther and assert that even when thus exhausted, they may be reclaimed in five years by good management and placed in a better condition than when taken from the hand of nature—at the same time the cultivator may obtain annually better rewards for his labor than he that follows the exhausting course of *Art.*

At such an assertion we are aware *Art* is disposed to express

* Prof. Locke.

her doubts. *Science* has already investigated the subject, and discovered,

First, That the evil consists primarily in a deficient quantity of lime in the soil, and after a few years of bad farming, a deficiency also of animal and vegetable matter.

Second, That the only remedy is to supply the soil with those deficient materials.

Art, at once assures us that lime cannot be procured in quantities and at a price that will admit of its being employed extensively for such a purpose, and that it would be hopeless to attempt to procure animal and vegetable matter sufficient to enrich a common farm.

Science, more calculating, takes the subject under consideration. She ascertains that it would require from 100 to 200 bushels of lime to effect an essential and permanent change in the quality of one acre of our clay lands. This would cost from $25 to $50; but that from one or two bushels of Plaster of Paris, correctly employed, would answer an equally good or better purpose. This might cost seventy-five cents.

TO GUARD SHEEP FROM THE DEPREDATION OF DOGS.

The American Agriculturist recommends the active, red, sharp horned cattle of New England. First put a few active cows with their sucking calves into the pastures with the flock, with four or five three year old steers. Take a gentle dog into the field with a long light cord about his neck, the cord held in the person's hand, and then set him on the sheep. The cows will at once proceed to attack the dog in defence of their calves, and the steers will follow their example. The sheep will retreat behind them. A few exercises of this kind will be sufficient to break in the steers, when the cows may be removed from the pasture. They will then gore any dog who attempts to molest the sheep. It is well known that a sheep killing dog, like all sheep stealers, are great cowards, and will flee on the first appearance of danger.

WHAT FOOD WILL PRODUCE THE MOST WOOL.—The *Boston Cultivator* maintains that that food which contains the most albumen is the best for sheep. Hence, peas, beans, and vetches may be regarded as those substances in which the most material is found which is peculiarly adapted to the growth of wool.

MERINO SHEEP.

The Hon. William Jarvis, in a letter published in the Boston Cultivator, maintains that the Paular Merino sheep are not in existence, and that all those persons who pretend to breed this variety are either deceiving themselves or trying to deceive others. He maintains, moreover, that it is impossible to increase the weight of the merino fleece over 7 or 9 lbs. without injury to its properties. This is asserted on an experience of thirty-five years. We desire our patrons should attend to these statements; as we have some friends whom we believe have proved that they possess the Paular sheep, and we know, at any rate, that these sheep yielded a fleece much heavier than Mr. Jarvis states, and that too, equal in fineness to any Saxon in the state. It is undoubtedly true that the light fleece of the Saxon is finer than the Merino as usually bred, but take the best bred Merinos of this state and they compare well with the best imported Saxons. We have in our mind the late Mr. Groves' flock. The fibre though it may possess a greater silkiness is not after all finer than that of the best Merino, whose fleece is four times heavier.

A GOOD METHOD OF COOKING POTATOES.

Mr. Norton, in one of his letters published in the Albany Cultivator, describes the Copenhagen method of cooking potatoes for stock. The potatoes are well washed and steamed, and while still hot cut or crushed by a revolving cylinder furnished with knives. To this pulp is then added three pounds of ground malt for every one hundred pounds of mashed potatoe. This mixture, at the temperature of 150°, is then kept in motion for four or five hours, or until it has acquired a sweet taste. It is then ready for use. Its advantages are, 1. that it is richer food for milk cows than thrice the quantity of potatoes in a raw state; 2. that it is excellent food for fattening cattle and sheep, and for winter food.

EDITORIAL NOTICES.

Corn Culture and the Soaking of Seeds in Saline Solutions.—We call the attention of our readers to the article on the cultivation of corn, by Mr. Hopkins, and to the succeeding one on the advantage of soaking seeds in saline solutions, preparatory to planting or sowing, by Dr. N. S. Davis, of Binghamton. We wish them to notice the nearly exact coincidence in their views on this subject. Mr. Hopkins is a successful farmer and an accurate observer. Dr. Davis, besides being a careful experimenter, is also an acute observer, and is possessed of a mind accustomed to the process of analysis When we find two persons of their skill and judgment to agree in their views of the nature of any proposed practice, we may with safety place confidence in the results of their experience and observation.

In this conection, we take pleasure in observing the increased interest with wich the maize crop is regarded. There has been in the husbandry of this country a remarkable proneness to imitate the English. Most of our periodicals fostered this inclination. It seemed that writers and farmers never took the trouble to inquire in what respects England differed from the United States in climate. Besides they appeared to be ignorant of the fact, that the striking features in English husbandry were forced upon that country, and that it grew out of the physical condition of the country itself, and is not that husbandry which would be preferred or followed, provided it could have a choice. Let the husbandry of this country too, be such as naturally grows out of our climate, without any attempt to force upon it what is esteemed abroad, without due regard to circumstances.

The Promotion of Vegetation by Electro-Galvanic Action.—In order that our readers may understand how and to what extent electricity may be employed in promoting vegetation, it is only necessary that they should comprehend what takes place when a galvanic battery is in action. Thus, when a saline solution is submitted to it, it is decomposed; suppose it is sulphate of soda. In this, and in all instances of a similar combination, the compound will be resolved into its elements; the acid will appear at one pole of the battery and the soda at the other. The effect will be seen at two points only. If we apply the principle on a large scale, to a field for instance, with a proper combination and arrangement of plates and of the connecting parts, the effect will be just as limited as in the ordinary battery; the development of acids and bases will take place only at the poles. Now the only material which will be produced in these arrangements is an acid, or in some instances a base, as in the case of the alkalies, when in combination with an acid. But then, these materials cannot be diffused at all; they must, from the nature of the action which produces their development, be confined to the single pole. Or, again, if a pair of zinc and copper plates of a constant battery was used in cultivating pot or house plants, with the negative pole on the surface of the soil and the positive pole in the hole in the bottom of the pot, seeds, without doubt, will germinate and spring up sooner than in pots in which these arrangements are not made. The seeds are, or may be, supplied with the separated elements of the salts in the soil. Nothing is brought to the plant from abroad; and hence, the soil is only the more rapidly exhausted. It is possible, we say, to employ this form of electricity to hasten the germination of seed, and may possibly be used to a limited extent by gardners. But then the expense of the power would more than counter-balance all the benefits which can be derived from it. It is possible, and we deem this suggestion the most important we have seen, that it may be employed to revive or awaken the vitality of seeds which have been kept for a long time, or which may have been brought from foreign countries, and of which fears are entertained of their life. But applied to a field, as has been proposed, we deem the whole scheme destitute of a foundation.

Note.—It is not improbable but plants may be rendered more electro-negative than they naturally are; and hence, more active in assimilating electro-positive bodies; still, this does not alter the case, as we understand it.

The Refuse of the Wood Yard.—The best disposition which can be made of the refuse of wood yards, is first to char it, and then spread it either in the garden or meadow. Scrape up the pure vegetable matters with the dirt, and keep up a smothered fire until the whole is well charred; some portions will be burnt to ashes, the rest will remain in the form of fine coal. By pursuing this mode, the farmer gets rid of dirt and the harbor for fleas and other vermin, and obtains a valuable manure, from which he will derive a profit for years to come.

The older Fossiliferous Rocks of England.—From a recent communication from Professor Sedgwick, we are informed that he never gave up the Cambrian system; and hence, still assigns it a place among the sedimentary rocks of that country. The following is a sketch of the divisions which he would make of the protozoic formations. 1. *The Cambrian Group.* It rests on the non-fossiliferous slates, and is of immense thickness; it contains some peculiar species, but some of its species rise into the succeeding division. 2. *The Middle Group.* It includes Murchison's Lamdeilo and Caradoe rocks, and also the Wenlock series. It therefore includes all the lower and a part of the upper silurian. 3. *Upper Group.* It embraces the Lower Ludlow, Amestory Limestone, and Upper Ludlow rocks, including the Tilestone.

To cure Fresh Wounds in horses, cows or any other animal, requires only a proper defence from flies. Hence all the receipts for healing fresh cut wounds are useless. That such a wound may heal well requires merely that its edges should be brought together and maintained in contact.

A new article.—The Albany clay (tertiary), with certain additions, is about to be employed in the manufacture of knife handles. The article is extremely beautiful and resembles the finest carnelian agates, and is susceptible of a beautiful polish.

A new locality of Pyroxene.—A fine locality of *pyroxene* has been discovered in the town of Fine, in St. Lawrence county. The crystals though not perfectly smooth are yet well formed, and more than a yard in length.

On the Agency of Caloric in permanently modifying the state of aggregation of the Molecules of Bodies; *by Warren De la Rue, Esq., Mem. Chem. Soc. of London.*—The principle which is suggested by the fact that most, if not all, mineral bodies undergo a change in the arrangement of their particles, even when subjected to a moderate amount of heat, may be applied in explanation of the mode in which originally soft deposites become consolidated. An example given by the author, which was, when precipitated, an exceeding light deposit, but on being subjected to a heat between 200° and 300° Fahrenheit, it became exceeding hard and compact; and if the cake is afterwards broken up and ground, the particles still retain their hardness.

Chalk too, though in its natural state is soft and difficult to be cut into slips, yet when baked it becomes hard and ceases to crumble, and may be cut into any form we choose. So rocks, originnally soft or in a state of mud, in order to become hard, require only a moderate temperature, provided it is long continued. Hence, it is unnecessary that ranges of rocks of this country termed metamorphic, should ever have been heated to the amount which some geologists maintain. It is even unnecessary that the temperature should have been elevated since their deposit, so as to char their vegetable matters, in order to become dense, solid strata with a crystalline structure.

The Quarterly Journal of the Geological Society of London.—The Geological Society now publishes a quarterly by one of its members, subject to the seperintendence and control of the council.

It consists of two parts, the first consists of full reports of the original communications which are read before its meetings.

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Gardner's Farmers' Dictionary.—This work is now published and on sale at the bookstores, where we have had an opportunity to examine hastily its contents. The opinion which we have formed of its merits is favorable, so far as mere technicalities are concerned, or so far as it is a dictionary. But with that part of the work which relates to husbandry, or, so far as it is intended as a treatise on husbandry, we are not quite satisfied. The sources from which the work is compiled, is almost exclusively European, and the greater part of this, is English. We are sorry to see too, that some of the wood cuts are so badly executed—that of the saperda, the apple-tree insect, for instance; but we do not propose to go into a detailed analysis of its contents now, we may hereafter take it up and make a more specific examination of its merits.

AMERICAN JOURNAL OF SCIENCE is published on the 1st of January, March, May, July, September and November of each year, in Nos. of 150 pp. each, making 2 vols. a year, fully illustrated with engravings, and containing a comprehensive bulletin of scientific intelligence. Subscriptions $5 per year, single Nos. 87½ cents. Remittances to be forwarded to B. Silliman, New Haven, Conn.

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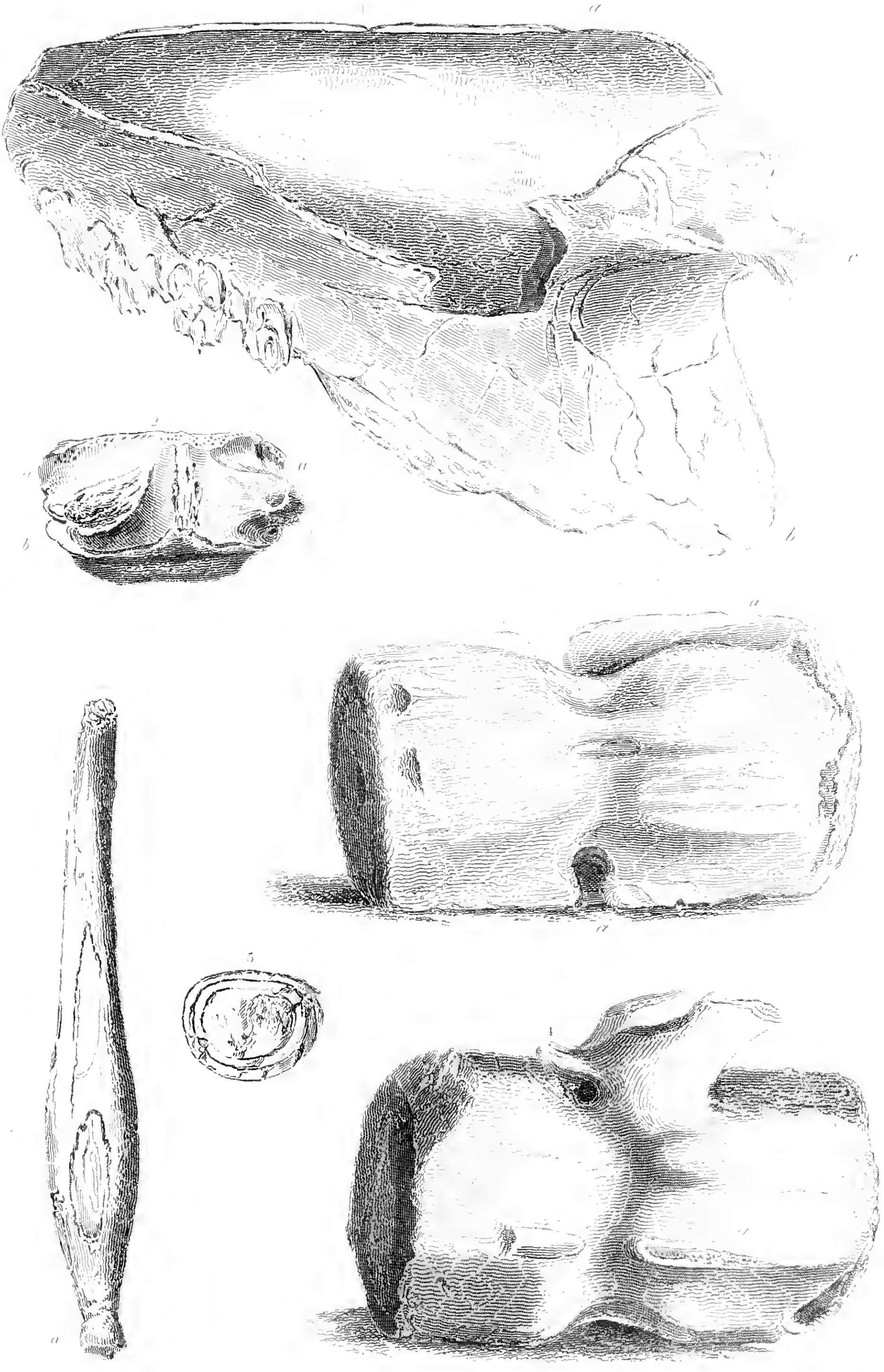
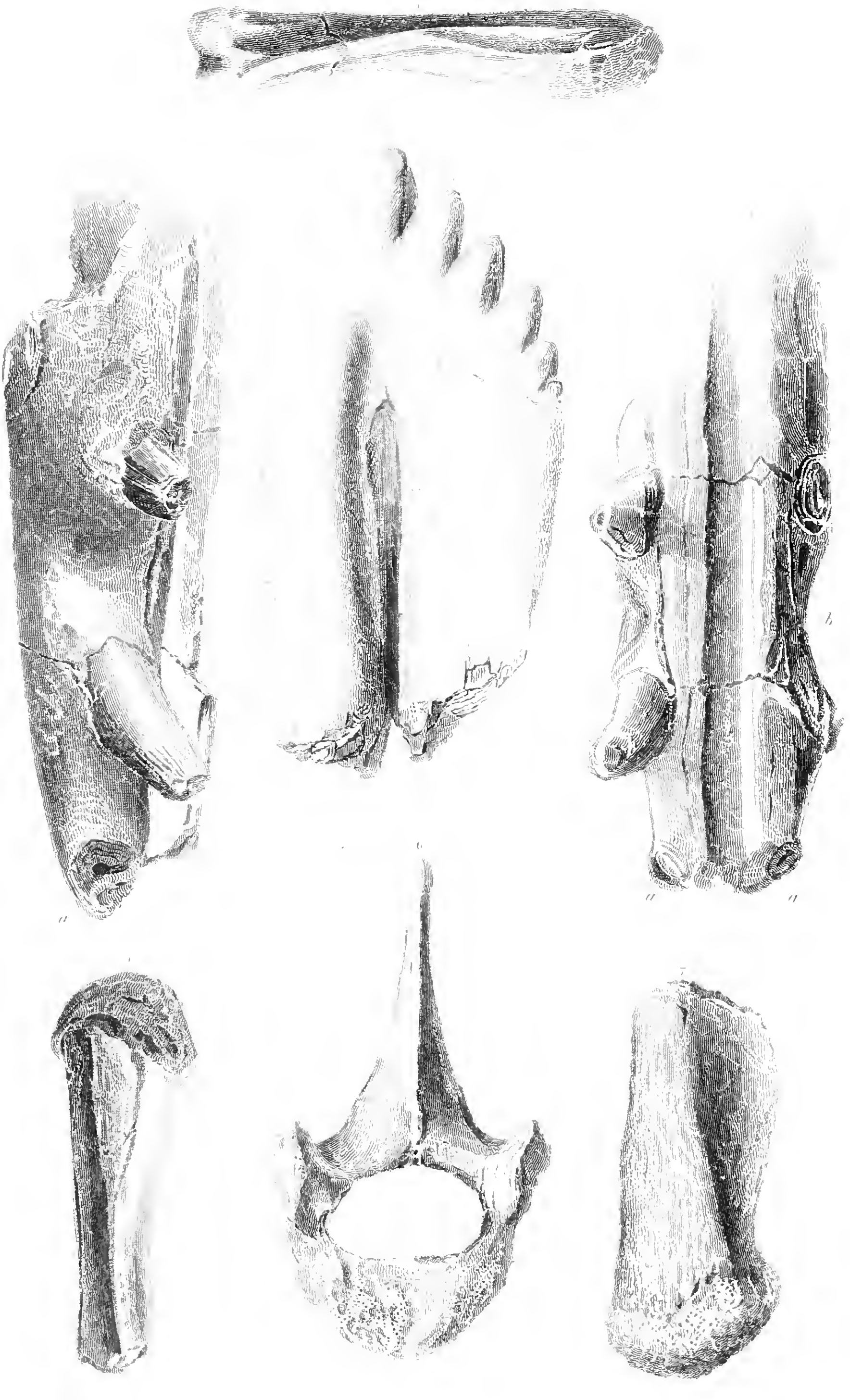
ERRATA.

In the signature pages for vol. *II*, read *III*.
Page 12, 8th line from the top, for *masses* read *mosses*.
Page 16, 3d line from the bottom, for *losses* read *bases*.
In part of the edition, in note p. 18, last line, for *presented* read *preserved*, and for *heat* read *peat*.





AMERICAN QUARTERLY JOURNAL

OF

AGRICULTURE AND SCIENCE.

APRIL, 1846.

AGRICULTURAL GEOLOGY OF ONONDAGA COUNTY.

In the New York system, the Onondaga rocks occupy a central position. Below them we find the whole of the inferior part of the system, which has been called the Champlain division, as well as the succeeding rock, the Medina sandstone. The same may be said of a very large proportion of the Clinton group. Those rocks which are above the Onondaga formation belong to the superior part of the Erie division, and the whole of that mass of shales and sandstones which form the Catskill mountains. The thickness of the inferior sedimentary masses below those of the county, cannot be less than three thousand feet, and those above rather exceed this estimate.

The base upon which the Onondaga formations repose, is the Medina sandstone; a rock which skirts the shore of Lake Ontario the whole distance from east to west. At the east, it is a harder rock than the west, and furnishes but a small proportion of the soil in the county of Oswego, but in Niagara its inferior portions are soft and marly, and must have contributed largely to the formation of the soil in the western and middle divisions of the state. Still, in Onondaga county, its effects are manifested rather in the furnishing an abundance of red or brown cobble stones, than the fine materials of which the soil is composed.

The Clinton group, which succeeds the Medina sandstones in the ascending order, is a heterogeneous mass of rocks, some of which are soft and shaly, and liable to disintegration; others are hard and sandy, and resist the action of the weather with considerable obstinacy. These, however, skirt the county only on its northeastern borders, passing through a portion of Lysander. The same remark, in regard to the group, which has been made of the Medina sandstone is true, that it has but little influence upon the soil of this county.

We now pass at once to the rocks of the county, and they merit, from their influence upon the agricultural capabilities of this part of New York, an extended description. We shall adopt the same divisions of the formations as those which have been given in the New York reports. 1. The red shale; 2. The greenish shale with hopper-form cavities, plaster beds and vermicular limestone layers; 3. The water limestone; 4. Onondaga limestone; 5. Marcellus shales; 6. Hamilton group.

1. *Red shale.* It is exceedingly soft throughout, except a few thin strata of sandstone near the top: but even these fall to pieces, and cannot be employed at all for purposes of construction. It is properly a *red marl*, and whenever it crops out, is generally covered by its own debris. Its greatest thickness is about 500 feet, and as it underlies the whole northern border of the county, it is agriculturally an important rock, and has contributed largely to the formation of the soil. Its debris, as would be expected from the nature of the rock, is argillaceous; but not excessively so. The nature of the soil is better indicated, however, by the composition of the rock itself: thus, the elements of one hundred grains of the most sandy part, and the same amount of softer kinds, we have found combined in the following proportions:

	Sandy.	*Marly.*
Silex, - - - - - -	68.25	68.86
Peroxide of iron and alumina, -	6.25	14.98
Magnesia, - - - - - -	5.75	0.40
Carbonate of lime, - - -	10.25	9.89
Phosphate of alumina and phosphate of the peroxide of iron, - -	00.00	0.14
Organic matter, - - - - -	6.00	4.50
Water, - - - - - -	1.00	6.48
	99.50	99.25

The sandy variety was taken from Canastota, in Madison county; the marly from Kirkville, in Onondaga county.

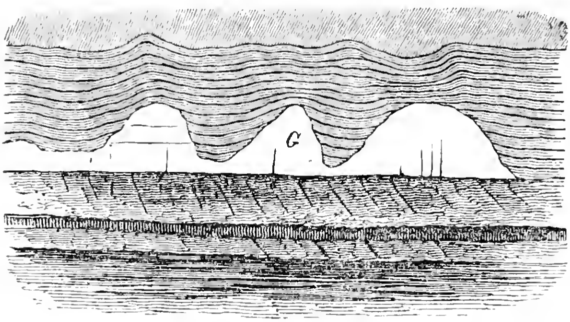
Observation and the result of analysis show, that this rock forms a valuable soil. It is instructive, however, to compare the composition of the soil with the rocks: thus, the soil of Canastota is composed of,

Water, - - - - - -	1.50
Organic matter, - - - -	2.50
Silex, - - - - - -	85.00
Peroxide of iron and alumina,	8.12
Carbonate of lime, - - - -	2.17
Magnesia, - - - - -	.12
Phosphate of alumina, - -	1.00
	100.41

We see a great loss in carbonate of lime, and a considerable change in the other constituents. The analysis shows that the soil and rock beneath do not agree in composition, and that we cannot rely upon a supply of lime even when the rock itself is highly calcareous.

A practical observation of some value is, however, suggested by these analyses; namely, that when this red marl is favorably situated, it may be spread over the soil with advantage. It will especially have a decided effect in improving wheat lands.

We pass now to the second division of the Onondaga rocks, in the ascending order, by remarking that the red rock passes into the shales which succeed, principally by a change of color; the former becomes first green, by an increase and spread of green spots, till finally the whole mass loses its red color and is merged in an invariable dirty pea green. The whole mass is decomposable in an eminent degree, and may be distinguished by the entire absence of organic remains—by the presence of hopper-form bodies—by plaster, which below is in thin beds of a columnar or fibrous structure, and above in heavy masses, which are instrumental in bending the strata, as represented in fig. 1. The



G. gypsum beds.

hopper-form masses are, however, found in the superior part of the formation, and even in the immediate vicinity of the layers which are quarried for hydraulic lime, as at Manlius square.

The lower mass, in which the thin plaster beds are exposed, is well exhibited at the deep cut and embankments in Camillus. At this place the rocks are exposed nearly deep enough to show the red marl. The junction, however, is rarely to be seen, in consequence of the great amount of debris and soil of the whole formation. The physical changes which it exhibits are those which appear in the successive stages from soft to hard rocks, and from imperfectly stratified beds to the thin, sharp, ringing layers of the hydraulic limestones.

The composition of the hopper-form masses is as follows:

Water of absorption, - -	.56
Organic matter, - - -	5.00
Silex, - - - - -	34.56
Carbonate of lime, - -	43.06
Alumina and protoxide of iron, -	13.36
Sulphate of lime, - -	1.00
Magnesia, - - - -	2.17
	99.71

The red marl and the green marly rock just described, when submitted to the action of cold water, furnish directly a quan tity of soluble matter: thus 100 grains yield in 6 oz. rain water:

	Red Marl.	*Green Marl.*
Whole soluble matter, - -	1.25	3.50
Saline, - - - -	.68	2.63
Organic acids, - - - -	.57	.87

Those rocks after they have undergone decomposition, furnish a still larger amount of saline matter, but it is composed in every instance of the same elements, among which the sulphates and chlorides are the most abundant, as shown by the following analysis:

	Debris of the Shale.
Whole amount of soluble matter, - - -	6.53
Vegetable matter, - - - - -	1.03
Saline, - - - - - - -	5.50

The latter consists of chlorides of sodium and calcium, sulphates of lime and magnesia, together with a small percentage of alumina and silex.

It can hardly be expected, however, that rocks will be composed of the same elements, but all the specimens which were examined furnished soluble matter in pure rain water without boiling, and when they decompose in dry places the debris is highly charged with the sulphates of lime, soda and magnesia; it is found collected upon the shelving rocks, and appears in the form of a gray ash.

When any of these masses, from any part lying between the bottom of the red rock and the drab-colored limestones of the hydraulic series, are ignited, they become brown, and give off the odor of burning peat: thus showing the character of the organic matter in combination with the rock. The condition in which it exists, is that of crenic and apocrenic acids, in combination with the alkaline earths. These salts are all soluble, and are obtained in a small quantity by infusion, as has been stated. When they are subjected to a red heat they are decomposed, and crenic acid appears to be changed into carbonic acid; for, when treated thus, we obtain an insoluble product which effervesces with chlorohydric acid, which in its turn furnishes a precipitate with oxalate of ammonia. It is difficult to determine the exact thickness of these green gypseous shales, on account of the great amount of debris which usually covers the rock. They are, however, over one hundred feet.

In addition to the beds of plaster, we find a singular hard rock in thin beds, which is every where perforated with small ragged holes, varying from the smallest perceptible size to that of a large pea. The layers in other respects are compact and fine grained. The masses are hardly entitled to the appellation of a rock; but were designated by the late Prof. Eaton, *vermicular lime rock.* It undergoes the same changes from frosts and atmospheric agents, as the other parts of the formation; but not so rapidly. Its color is dark from the presence of organic matter, and not from the presence of iron. It serves a mechanical purpose in its place, that of supporting the more fragile green gypseous shales or marls. It forms less than ten feet thickness when all its layers are put together. It contains a larger amount of magnesia than the other parts of the gypseous rock, as will be observed by analysis; thus, 100 parts yield:

Water, - - - - -	0.23
Organic matter, - - -	2.54
Silex, - - - - -	3.30
Carbonic acid, - - -	20.62
Alumina, - - - -	5.33
Magnesia, - - - -	4.26
Lime, - - - - -	13.76
Trace of protoxide of iron, -	50.04

The plaster beds in this formation have been well described by Mr. Vanuxem and Mr. James Hall. Their value is no where overrated. We deem it unnecessary to describe them in this place.

We now pass to the water limes, where we find a change in the mechanical condition of the layers; they are still thin, but less subject to decomposition. The process, however, goes on, as is shown in the changes of color of the weathered surfaces, the softened state of the exposed edges, and the accumulation of earth between the beds and upon the projecting parts. The rock is usually gray, sometimes dark, but when exposed it passes into a drab color. The thin layers are below, the thick above, where we find the masses which are used for hydraulic lime, of which there are two; each of which are from two to four feet thick. The firmness of some of the upper layers fits them for tolerable flag stones. The position of this upper rock is usually well indicated by a steep escarpment, where the out-cropping edges are well exposed and defined.

The composition of the water lime series, though considerable difference occurs at different places, is given by Drs. Beck and Jackson, as follows:

	Beck.		*Jackson.*
Carbonic acid, - - -	39.80	Water, - - - - -	1.182
Lime, - - - - -	25.24	Silicic acid, - - -	10.087
Magnesia, - - - -	18.80	Carbonic acid, - -	41.200
Silica and alumina, -	13.50	Sulphuric acid, - -	0.606

Peroxide of iron, - -	1.25	Lime, - - - - - -	25.087
Moisture and loss, -	1.41	Alumina, - - - - -	3.395
	———	Peroxide of iron, - -	3.274
	100.00	Magnesia, - - -	12.890
		Oxide of manganese,-	0.606
		Potash, - - - -	0.700
		Soda, - - - - - -	2.182
			———
			*100.000

One hundred grains of the powdered rock, when acted upon a few days by cold water, dissolves one grain, of which there remains after ignition .56 of a grain, leaving .44 of vegetable matter.

From the several analyses it will be observed that magnesia is a constant element in the rocks, from the red rock to the superior portion of the rocks belonging to the hydraulic lime series. In Onondaga county the series terminates in a mass about four feet thick, whose structure is remarkably concretionary, and exceedingly irregularly bedded. It is all that remains of the pentamerus limestone, which in Albany and Schoharie counties is from fifty to sixty feet thick. In Ulster county it is the rock employed for cement. Several other rocks have also thinned out towards the west, in consequence of which the Onondaga limestone reposes upon the thick bedded masses of the hydraulic limestones; excepting that sometimes the Oriskany sandstone occasionally intervenes between the latter and the former. In some places it is indicated by the presence of a thin layer of sand only, or a few small boulders; in others it is eighteen inches thick.

We pass at once to the Onondaga limestone, by which name we include all the upper part which is usually separated from the lower, and has been called the *corniferous limestone*, or limestone which bears hornstone. This rock is regarded as a pure limestone, leaving out of view, the layers and irregular masses of horn-

* Dr. Jackson's analysis of Ulster county cement stone, in the Proceedings of American Geologists and Naturalists.

stone which it incloses. It is gray, crystalline, thick-bedded or massive, and filled with organic remains. It is the well known limestone which extends in a belt from the Hudson to Lake Erie. It forms by its hardness its own terrace, which is marked upon the north by a steep escarpment formed by the out-cropping limestone, which is never entirely concealed by debris, as in the more fragile rocks above and below.

The changes which have taken place in the physical constitution of the rocks of this period, are equally as great as those which are usually called the chemical. Magnesia, for example, is no longer found as an essential element in this limestone; the silex, alumine and iron have also mostly disappeared, and we have a pure calcareous rock, which resists the action of the weather. It is, to be sure, slowly dissolved by carbonic and the organic acids, and it is broken by frosts, but the soil is no longer rapidly furnished with fine pulverulent matter. Between its beds, or in its seams, we frequently see the green impure matter which forms the shales below, but only in quantities sufficient to show that the source of those matters is not entirely exhausted. This rock is important as a limestone for furnishing pure quick lime, and also to agriculture; but not as much in this respect as the rocks below, which abound in magnesia, and such as would usually be called impure limestone.

Considered in its influences upon agriculture, we believe it is less important than has usually been considered: a limestone is always an excellent base for tillage, it seems to be softening or at least ameliorating in its influences upon the soil; a better word is *drying* perhaps; and this effect is due to the systems of open joints which always traverse the superior beds. Sometimes, however, these joints are too open, and permit the direct flow of streams into them. This is the fact with many of the New York limestones. Sometimes they furnish facilities for draining.

We may now pause a moment for the purpose of considering the mechanical condition of the particles composing the rocks which have passed under our view. From the Niagara limestone, upon which the red shale and marl reposes, up to the

Oriskany sandstone, the materials are all extremely fine; excepting a few thin bands at the superior part of the red marl, composed of coarsish sand. For seven or eight hundred feet then, this property of the deposit is rather remarkable. The fineness of the *material* of the rocks, however, is not such as to form an impalpable soil, it is still sufficiently siliceous and coarse to overcome the adhesive properties of alumine, while the fineness is such as to favor solubility. It is impossible to detect feldspar or mica by the assistance of a microscope in the red or green marls, or in either of the limestones. Their origin cannot be referred to either of the preëxisting rocks. All we can say is, that they are the fine sediments which accumulated in the deepest part of an ancient ocean, where organic beings could not probably exist, on account of the great depth of water.

The Marcellus shale succeeds the corniferous part of the Onondaga limestone. We have now a black rock, the composition of which is not greatly dissimilar to the green shales. This rock is thin bedded and fragile; and hence the out crop is usually concealed in its own debris. The rock may be known by its position. It is the first rock which contains septaria, a singular kind of concretion of a rounded form; but it often assumes some imitative shape, as that of a *turtle.* Sometimes they are globular, and sometimes rounded and flattened, like a cheese. No use has ever been made of the septaria, but there is no doubt they will form an excellent cement. Ten or twelve feet of rough black limestone belongs also to the Marcellus shales. In some places it is called *chewed rock*, from its ragged surface. This too has a composition which seems to fit it for hydraulic lime. The shales under consideration are composed of the following elements.

Water, - - - - - -	2.00
Organic matter, - - -	2.25
Silex, - - - - - -	48.12
Peroxide of iron and alumina,	10.00
Carbonate of lime, - -	36.60
Magnesia, - - - - -	1.00
	100.07

The passage from the Marcellus shales to the Hamilton group is easy, and effected by a gradual increase of angular sand, or sand which has been less washed than usual. The color is less dark, showing a diminution of carbonaceous matter. Lithologically, the Hamilton group is composed of dark colored slate and shale, with numerous beds of thin sandstone, and still shaly, or rather in that condition in which the silex or sand is rarely harsh or gritty. Some beds are brown from the presence of iron. The matter which increases in the ascending order is sand; and hence, in some of the superior beds we find sandstone well developed. We are looking at those changes for the purpose of learning the effect on the soil. Analysis and observation both show an increase in the amount of silex, the diminution of calcareous and aluminous matter, and the almost total disappearance of magnesia in the rocks. We always however get a trace of the latter, and we may without doubt expect its presence in all rocks, but in such small quantities that cultivated lands whose crops are removed must in a few years be deficient in it. On ascending to these superior rocks we find that the husbandry has changed; a grazing district has taken the place of a wheat growing one. This change, however, may not be due entirely to changes in the composition of the formations. The country has become decidedly hilly. We now find steep slopes, inclined surfaces, deep ravines, rounded hills: in fine, all the characteristics of good fields and walks for sheep and cows, for sweet grass and pure streams of water.

We deem it unnecessary to speak of the rocks which succeed the Hamilton group. We may be permitted, however, to bring up for once, considerations respecting the fossils of the rocks we have adverted to and briefly described. Beginning with the red marl and proceeding to the water lime series, we have a blank as it regards life; but in the water lime series fossiles occur, but they are very different from those which had before existed. This blank in the red and green shales mark an era in the history of organic existence. Going above the water lime series, and we are brought to another change; we leave behind all those beings which had peopled those formations, not a vestige of them go up; and so far as succeeding deposits are concerned, their places are as vacant as though they had never existed. This period passed and that of the Onondaga limestone ushered in, and we are once more introduced to new forms. If those of the water lime series or of the magnesian rocks do not altogether cease, by far the greater portion of them have passed away, and as before, the era is a new one in the annals of life. The shelving beaches are strewed with beings which the waters had never before cast up.

To reach another era we have only to follow the layers of the Onondaga limestone to that place where the black Marcellus shales first appear. Not one of all the corals or of the molusca pass beyond the limits of the limestone, and however strange it may seem these shales are equally prolific in forms which are confined to its own layers. It is not determined, however, whether some of these may not go up into the Hamilton group; as a whole they are limited to the walls of the shales, and the beings which lived in the waters from which this group was deposited, were not colonies going up from the shale.

Let us retrace our steps and see how the matter stands in review. 1. We begin with a blank in the organic world, in the era of red and green marls. 2. New forms appear in the water lime series, which constitute a second era. 3. The Onondaga limestone gives us a new platform, upon which life and tenements are built. The fourth era is that of the Marcellus shales, and lastly the Hamilton group is entitled to the place of the fifth. We believe that some of the estates of Onondaga county cover the five eras of ancient life.

We are unable to give a satisfactory account of the waters of Onondaga, though they rank among the most important in the state. They belong, as a class, to the hard waters, excepting those which originate in the most elevated parts of the county, upon the hills which are capped with the silicious rocks. The varieties of water are numerous. Among the most important are the mineral springs, the well known salines, which, as they are so well known, do not require a notice in this place. The wells which are sunk in the gypseous rocks contain both saline and vegetable matter in solution. As an example of their composition, we give the analysis of the water of Mr. Geddes' well at Fairmount. One quart evaporated slowly to dryness, the last part of the process being performed in a platinum capsule, gave

Solid matter, - - - -	8.72
Organic matter, - - -	1.44
Saline, - - - - -	7.25

The water of the hydrant company which supplies the village of Syracuse contains forty grains of saline matter to the gallon. It consists of the chlorides of sodium and calcium, sulphates of lime and alumine, with some organic matter. It is clear and transparent, but very unfit for many domestic purposes on account of hardness.

The saline matter consists of the chlorides of calcium and sodium, sulphates of lime and magnesia, carbonate of lime, silex and alumina. The organic matter gave the usual greenish precipitate, with acetate of copper; but the exact amount of crenic and apocrenic acids was not determined. These acids, however, are very abundant in the waters of this county. Those which issue from the green shales are the most highly charged, and in one or two instances small lakes, whose basins are excavated in them, are bitter. This is the fact in regard to the Green lakes near Manlius Centre; though we are not fully authorized to state this from a chemical examination of the waters, yet the incrustations upon the limbs of trees submerged in the water, contained a notable quantity of crenic acid. To detect it required only a solution of the incrustation in cold water, and the application of acetate of copper. The same acids, and by the same method, may be obtained from the tufa, which every where abounds in the vicinity of the green gypseous shales; and we may probably maintain that the lime of tufa, has been in solution by these acids. We may even extend this view of the subject, and suppose that the concreted lime upon shelving rocks and the stalactites of caverns, owe their origin in part to organic acids.

The most important part of our subject remains to be considered, to wit: the soils of the county. Every one, however, who has written upon soils finds it extremely difficult to subdivide them into suitable classes. The ordinary divisions into argillaceous, silicious and calcareous, and the different varieties of loam, are of but little real value; and calcareous soils do not exist in this state. The three varieties, the argillaceous, silicious or sandy, and the mixture of the two, constituting loam, may be found in every part of the state; but these varieties differ; the characters of the clay as well as those of the sand differ much at different places, and the same may be said of the loams; there is every gradation which can be formed by mixture. In consideration of these facts, we shall merely describe the soils according to their geological position, and we believe that in the formations of this county it will be useful: for instance, the soil of the so called gypseous rocks or green shakes, the soil of the next platform of limestones, followed by that of the Marcellus shales, and Hamilton group, are each of them distinct varieties. The advantage of this division is, that it may be extended to other parts of the state; and it has a more exact application to other places which are situated upon the same belts of rocks east and west of Onondaga, than any other divison which could be adopted. By adopting this division, we are enabled also to keep up the geographical distinctions; for we pass from below upwards, and from north to south; the soil of the red and green shales is found in its perfection only upon those rocks, that is, upon the second terrace above Lake Ontario, and are found occupying the northern part of the county; next of the limestones, and finally that of the shales, which carries us up to the highest lands of the county. In a few instances we ascend at least eight hundred feet above the Erie canal.

The soil derived from the red shale occupies necessarily the lowest position. It may be distinguished from that derived from the next tier of rocks, by its deep red or deep brown color. It is more adhesive, stiffer and argillaceous. In some places it is a brick clay, the colors of which are not always so deep as the soil derived from it. The composition of the soil, the analysis of which has already been given, indicates a soil favorable for the production of wheat. It is durable, and produces well for years. It furnishes phosphate of alumina and carbonate of lime, and a small quantity of carbonate of magnesia. For obtaining phosphate of alumina, the most approved plan was pursued. This soil has not the advantages for showing its real value as those situated upon the next terrace above; inasmuch as it is usually low, and is not naturally so well drained, and it will undoubtedly be found true, that the best thing which can be done for it is, to drain it thoroughly. An excellent fertilizing agent is usually in proximity, namely, peat, which by forming a compost with leached ashes, would improve it in many respects.

The soil of the green shales or gypseous rocks, belong strictly to the same class. They are both natural wheat bearing soils. They differ in color and tenacity; the latter, being of a light drab and less tenaceous than the former, but it has still the body required for wheat, and probably for all purposes exceeds in value any other soil in the state of New York. Analysis will show the ground upon which this opinion rests. 50 grains yield,

Water and vegetable matter, -	5.16
Silex, - - - -	36.54
Carbonate of lime, - - -	2.50
Magnesia, - - - -	1.50
Peroxide of iron and alumina, -	4.87
Phosphate of alumina, - -	0.06
	49.61

Two hundred grains when acted upon by cold water a few days, gave of

Soluble matter, - - -	1.34
Saline. - - - -	1.00
Vegetable, - - - -	0.34

Another specimen, from the vicinity of the Green lakes, in Manlius, gave of

Soluble matter, - - -	2.00
Vegetable, - - - -	0.44
Saline, - - - - -	1.56

The vegetable matter is crenic acid, in combination with lime. Soda was present in almost every instance where the test* was applied. Chlorides and sulphates are the most abundant compounds in the solution, excepting the crenic salts. At first view, the quantity of soluble matter appears to be small, yet if any one is disposed to go into a calculation of the quantity existing in an acre, extending to the depth of one foot, it will be found to amount to about twenty tons. But this is only about one-fifth or sixth of the quantity of vegetable matter which, in the process of time, will be converted into the food of plants, and which now exists in an insoluble state.

The soluble matter which we obtained from a field of G. Geddes, Esq., and which has been under cultivation for twenty-five or thirty years, and has received no barn yard manure, was

Soluble matter, - - -	1.47 grs.
Saline, - - - - -	1.18
Vegetable, - - - -	0.29

The vegetable is in the state of crenic acid, in combination with lime and magnesia. The remainder of the saline matter consisted of the chlorides of sodium and lime, and carbonates of lime and magnesia. A soil which had never been cultivated, and treated in the same way, gave

Soluble matter, - - -	1.34
Saline, - - - -	1.00
Vegetable, - - - -	0.34

The soil of the latter field was grown up to middling sized oak, chestnut, hickory, maple, butternut and bass woods, and is very frequently the case along the range upon which Mr. G's farm is situated, the soil is not deep; the rock in a crumbling state may

* Antimoniate of potash.

be reached with the plow, and in fact a large part of the soil is only partly comminuted in this field. Plowing and exposing it to air, is necessary to complete the physical and chemical changes which are necessary to bring the lands to their best state.

The following analyses show the composition of the cultivated and uncultivated fields alluded to, as above:

	Cultivated.	*Uncultivated.*
Water, - - - - - -	4.25	3.79
Organic matter, - - - -	6.67	5.24
Silicates, - - - - - -	77.50	78.25
Peroxide of iron and alumina, -	7.75	8.27
Carbonate of lime, - - -	1.25	1.15
Magnesia, - - - - -	1.10	1.20
Sulphate of lime, - - - -	0.22	0.20
	97.80	98.16

The soil along this range, embracing a belt upon an average of two miles, extending we believe through the county from east to west, is remarkably uniform in composition, and though the analyses may vary in some particulars, yet they indicate but one variety of soil. These analyses, however, are not given as complete and perfect, we are still engaged with them, and hope to add something in illustration of their composition.

The green shales, from which the soils just described owe their origin, is composed as follows:

Water of absorption, - -	0.50
Organic matter, - - -	6.00
Silex or silicates, - - -	34.56
Carbonate of lime, - -	50.06
Carbonate of magnesia, - -	2.16
Peroxide of iron and alumina,	6.38
	99.66

The inorganic salts, the sulphates of lime, magnesia and soda, which exist in these rocks, were not sought for in the specimen analyzed.

The limestone soil which has usually been considered the most productive, and the one which has been supposed to give to the soil of this region its ability to grow wheat, is, in many respects, as valuable as that of the gypseous rocks; yet, the opinion, that it is the best for wheat and other cereals is not, in our opinion, founded in fact. We believe that the presence of lime in a soil is essential for the growth of wheat, though this view is not supported by all who have spoken and written on the subject. The diversity of opinion probably depends upon the state of the lime and the state of the soil. A small per centage of lime is sufficient, provided it is in the state in which it can be assimilated by the wheat plant, and a large quantity may not exhibit an increased fertility, if it is not in this condition. We believe that lime, in order to be taken up and assimilated by the plant, must be combined with the organic acids, the crenic or apocrenic, or, if some prefer another name, the humic acid. If lime, in the state of a carbonate, is spread over the soil and there is a deficiency of vegetable matter, or for some reason or other it still remains in the condition of a carbonate, we doubt much whether its special effects appear in the crop. On the contrary, if there is a quantity, though small, of the organic salts of lime in the soil, other conditions being favorable, wheat may be grown in perfection. The value of composts with lime and spent ashes, depend, we believe, upon the formation of the organic salts. The old and worn out soils are invariably renovated by composts, the new soils do not require them, neither are the effects of composts so decidedly seen in such soils as are derived from the gypseous rocks, in consequence of the presence of the organic salts in the rocks themselves. Hence they do not wear out or become exhausted, like the soils of primary formations.

The composition of the soil upon the limestones, and in this word we include all the limestones from the top of the water limes to the Marcellus shales, is as follows:

	Pentamrus limestone.	
	Subsoil.	Surface soil.
Water, - - - - - -	1.38	2.81
Organic matter, - - - -	2.72	4.59
Silex, - - - - - - -	85.85	84.64
Peroxide of iron and alumina, -	8.57	7.28
Carbonate of lime, - - - -	0.21	0.50
Magnesia, - - - - -	0.05	0.16
	98.78	99.98*

In these analyses the composition of the soil may be considered essentially the same, although more lime and magnesia seems to exist in the surface soil. The analyses were made for the purpose of determining the quantity of lime and magnesia, and also to determine whether the limestone beneath could be depended upon for furnishing a supply of these elements. The result in this instance shows less than the circumstances would lead us to expect.

The composition of the limestones which furnish the soil in part, is as follows: .

	Onondaga limestone.	*Water lime.*
	Manlius	Manlius.
Water (*hygrometric*), - -	0.46	0.31
Organic matter, - - -	0.50	0.24
Silex, - - - - - -	1.87	1.26
Alumine and iron, - - -	0.09	1.50
Phosphate of lime, - - -	0.03	0.00
Carbonate of lime, - - -	44.50	25.82
Magnesia, - - - - -	2.00*	16.10
	49.39	55.24

In the water lime there was too much loss, and hence there was something defective in the process. The analyses, though not correct, show a wide difference in the composition of the rocks, particularly as to the quantity of magnesia. This layer of

* The analyses were made by Mr. Geo. H. Smith, a pupil in my laboratory; the want of time has prevented a reëxamination of the water lime.

the water lime series, from which the analyzed specimen was taken, is not that part of the series which is used for cement. The whole series from the Niagara limestone to the Onondaga, show that they are strictly magnesian deposits; they show too, that the magnesia predominates only in the soil below the Onondaga limestone. For cereals we regard magnesia as important as any of the inorganic matters, and observation we believe will bear us out in the position that all those soils which have magnesia are decidedly preferable to those which are destitute of it.

Two hundred grains of the soil upon the Onondaga limestone, when submitted to the action of cold water alone, dissolved 1.34 grains; of this, .68 was organic matter, and .66 saline. It was taken from a wheat field, in stubble, east of Manlius Square. It evidently produced a heavy crop.

The composition of the soil upon the water limes are represented by the following analysis. The soil had been only cultivated for a few years, and is full of the fragments of the broken underlying rocks:

Hygrometric water, - - - - - -	3.00
Vegetable or organic matter, - - -	13.00
Silex, - - - - - - - -	54.00
Protoxide of iron and alumina, - - -	9.10
Carbonate of lime, - - - - - -	15.63
Magnesia, - - - - - -	4.24
Sulphate of lime, - - - - - -	1.16
	100.13

In this sample of soil the quantity of organic matter is greater than usual. It was taken from the first terrace, formed by the thin bedded water limes at Manlius Centre, about sixty feet above the Erie canal. It is the immediate debris of the rock mixed with much undecomposed vegetable matter, and is not wholly derived fiom the rock beneath, as is often the case with the soils upon the plain below, where the gypseous shales lie beneath.

One hundred grains of the soil of the cultivated field of Mr.

Geddes, when treated for organic matter, by carbonate of ammonia, gave insoluble matter, 5.08; soluble, 2.06 (*crenic acid*).

The soils of the limestones and shales above the Onondaga limestone are usually brown when dry, those of the gypseous rocks are ash gray or greenish gray.

The Marcellus shales are less adapted to wheat than the green shales below; though they have body and consistence, and when new contain the elements essential to vegetation; but the soil is not renewed so rapidly. The turf of meadow lands is smooth, green and not liable to crack in dry seasons, and the plowed fields have sufficient looseness for maize and root cultivation, without the tightness of the ordinary clay lands. The composition of several specimens of soil of this variety has been determined.

Two hundred grains infused for a few days in six ounces of cold water, gave of

Soluble matter, - - -	1.98 grs.
Vegetable matter, - -	0.63
Saline, - - - - -	1.35

The saline is composed of the following elements:

Silex, - - - - -	.03
Alumine tinged with iron, -	.25
Chlorides of lime and magnesia,	.23
Sulphate of lime, - - -	.12
Crenate and carbonate of lime, -	.73
	1.35

It ought to be stated that usually there is a loss of organic matter during the last part of the process in evaporating the solution, as we have seldom used the water bath, and hence in carrying the evaporation sufficiently far that the whole may be dried, some portions are blackened and lost. There is, therefore, less soluble organic matter in the result than actually exists in the soil.

Another specimen of uncultivated soil, treated in the same way, gave

Soluble matter, - - - -	1.60
Vegetable, - - - - -	0.46
Saline, - - - - - -	1.15

This consisted of

Crenate of lime, - - - -	.60
Silex, - - - - -	.01
Sulphate of lime, - - - -	.40
Alumina, - - - - -	.03
Chloride of lime and magnesia, and sulphate of lime, - -	.10
	1.15

The soil by the usual plan of analysis, gave

Water, - - - - - -	5.20
Organic matter, - - - -	6.50
Silex, - - - - - -	78.25
Peroxide of iron and alumina,	7.64
Carbonate of lime, - - -	2.05
Magnesia, - - - - -	0.25
	98.89

This specimen analyzed was taken from the highest cultivated field, one and a half miles east of Manlius, towards Chitteningo.

Another specimen, taken from a field of Mr. Ellis (*corn field*), surface soil, gave

Water, - - - - - -	4.15
Organic matter, - - - -	5.06
Silex, - - - - - -	79.15
Carbonate of lime, - - -	3.00
Magnesia, - - - - -	0.50
Peroxide of iron and alumina,	7.00
	98.86

An uncultivated soil in Manlius, upon the same rock, gave

Water, - - - - -	3.00
Organic matter, - - -	5.15
Silex, - - - - -	78.00
Iron and alumina, - -	13.00
Carbonate of lime, - - -	1.00
Magnesia, - - - -	trace
	100.15

Some differences may be observed in the composition of the soils of the Marcellus shales and the green shales below the Onondaga limestone, the most important of which is due to the diminished quantity of lime and magnesia. The soil is brown, and so far, the color may be considered as an advantage. It is from two to five hundred feet above the plain where the green shales predominate. The slopes are steeper, and there is less level meadow land and more drift, for it is rather a singular fact that far more drift is lodged upon the terraces above, than on the plains below, and it is not at all difficult to detect the soil of the green shales by its peculiar color. Some districts upon the terraces are quite stony, and among the stones some large boulders, and all of primary rocks. In those districts we find the poorest soils of the county; and they are sometimes hard, stiff and wet. The hill sides when the rock is near the surface, are usually gullied, and deep ravines are not unfrequent. The facilities for draining are excellent on this account, and even draining appears unnecessary. The water of the shales contains less lime and less matter in solution. Some wells, however, sunk in them are ferruginous when the water is low, from the presence of pyrities in the rock.

Some of the sources for Manure.—Onondaga county abounds, as is well known, in plaster. The quantity, value and position of this article we need not dwell upon. The other substances which may be employed to advantage are the marls, peat and the refuse of the salt works. A remarkable bed of marl is exposed by a cut of the road about half a mile from the house of Mr. Geddes of Fairmount. It resembles a pulverulent gypsum or a gypseous clay, and it is not improbable that it was gypsum, but has been changed to a marl (*carbonate of lime*), by the decomposition of the sulphate of lime into a carbonate. This marl bed underlies several acres, and is exposed for 20 or 30 feet in depth. Two hundred grains infused in water gave

Sulphate of lime, - - -	2.98
Sulphate of magnesia, - -	0.44
Organic matter, - - -	1.50

By far the greater part of the mass is a fine brownish carbonate of lime, and in many places would be extremely valuable as a manure.

A concreted marl in the same vicinity, gave, in two hundred grains,

Soluble matter, - - -	.62
Saline, - - - -	.24
Vegetable, - - - -	.54

Some of the small streams which flow over peat and marl beds, transfer those materials to some lodging place where they accumulate in a very fine state of subdivision. This matter is worthy of attention. It consists of

Vegetable matter, - - -	50.00
Silex, - - - -	27.74
Carbonate of lime, - - -	20.00
Magnesia, - - - -	2.00
	99.74

The mechanical state in which this debris is makes it extremely valuable for a compost. The largest accumulation was near the house of Mr. Geddes, and was brought down the stream running through his estate. Peat is also extremely common, and will in time become valuable for many purposes; for agriculture and fuel.

A specimen gave the following composition:

Vegetable matter, - - -	92.18
Soluble organic matter, -	3.81
Silex, - - - - -	1.43
Alumina and iron, - -	1.75
Carbonate of lime, - - -	0.75
Potash, - - - -	0.06
Magnesia, - - - -	0.04
	100.02*

It probably represents the composition of peat as it usually occurs on the great level between Rome and Syracuse.

Another source of manure, is in the refuse of the salt works, at Syracuse and Salina. The following is the composition of the pan scale, according to the analysis of Dr. Lewis D. Beck.

Muriate of lime, - - -	11
Muriate of magnesia, - -	4
Carbonate of lime, - - -	60
Sulphate of lime,- - -	688
Muriate of soda, - - -	237
	1000

Having given the analyses of many of the soils of this county,

* Analyzed by Judge Ball, in the author's laboratory.

Note.—The method which has been followed in the analysis of limestone, etc., for obtaining the phosphates, has been to dissolve in chorohydric acid two or three hundred grains, and then precipitate the alumina, iron and phosphates with fresh hot lime water. The precipitate, after ignition, is fused with soda, when the mass is dissolved out by water, neutralized carefully with chlorohydric acid; when chloride of calcium is added to precipitate the phosporic acid; or pure nitric acid and nitrate of silver; when the phosphoric acid combines with the silver and forms phosphate of silver. Sometimes acetic acid has been employed for the solution of the precipitate by ammonia, but as acetic acid dissolves phosphate of lime, this method for detecting the phosphate appears less certain than the former. From numerous failures in searching for phosphates by all these methods, we have been led to believe that the phosphates are less common than in the soils of New England, which are derived directly from primary rocks.

it will be profitable to pass in review some of the facts which appear in these results. It will be observed, that lime and magnesia are present in all the soils of this county. Yet neither are present in that proportion which many European agriculturists consider a sufficient quantity; yet all the rocks are more or less calcareous, and some of them pure limestones. Still, even here, in the soil which they bear, there is a decided defect, provided 8 or 9 per cent is a profitable dose. Some have considered magnesia as injurious, and we believe this opinion has been maintained in England and Scotland. The conflicting views in regard to its effects seem to arise from the different effects which follow, where it is in the form of a neutral carbonate, as it exists in the rocks and soils, and those which follow from its use when applied in a caustic state, as when a magnesian limestone is employed soon after it is burned. Pure lime when exposed to the air, air slacks as it is termed, absorbs in the process both carbonic acid and water. When, however, a limestone which is magnesian is thus exposed, it remains in a caustic state for a long time, and in this condition is decidedly injurious, or so long as it is caustic. This fact, however, proves nothing against the value of magnesia in husbandry, and besides we have direct evidence that it is necessary to plants, from the fact too that it is obtained from the seeds of plants by analysis. Perhaps we should not be justified in taking the position, that the soils of the county are deficient in lime. We believe, however, that many of the farms even in the limestone district proper, will be benefitted by calcareous and magnesian composts; and in making those composts, we would recommend the use of the impure limestones, those especially which contain a large amount of magnesia. A practice might be adopted in many places of spreading the decomposing rocks and shales, which crumble when wet: all of them, judging from their composition, will be found useful. Then, again, the marls and peat are so abundant that calcareous and organic matter ought never to be suffered to diminish to a minimum, or below 5 per cent. By the practice of many of the ablest farmers, they keep a very steady per centage, in the use of clover and plaster. Such, in fact, has been done upon the farm of Mr. Geddes. Many additional remarks might still be made in regard to these analyses and the character of the soil, but so much space and time has been occupied with them that we must omit these and resume the subject on some other occasion. They will form in their present state a sure basis for agricultural improvement.

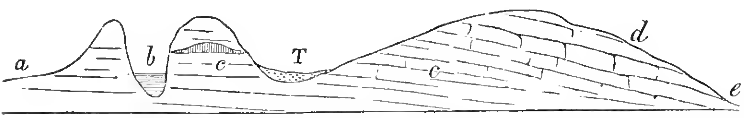
The subjects which remain for consideration relate to the topography, temperature and mean annual quantity of water which falls in this part of the state.

1. *Topography.*—Upon this subject it will be necessary to be brief. The county is divided into two parts—the plain or level, and the hilly parts. The first (which is only comparatively so), forms the part north of the Erie canal. The latter—south of it. The first is underlaid by the soft rocks, and in some places has been deeply excavated and the excavations filled up with drift, consisting of rounded stones, pebbles and sand, the ruins of primary and sedimentary rocks which exist north of the county. All the elevations in this part of the county are produced by accumulations of this kind. The rocks never rise above the general level, still they are often near the surface. The line which divides the county into two parts runs east and west near the Erie canal, and very frequently the canal runs along the base of the rocky terrace which is formed by the outcrop of the water lime series. A good illustration of this dividing line may be observed at and near Manlius Centre. The belt of country on the line of the canal adjacent to this terrace, and occupying a breadth of two or three miles is well worthy of a particular description, but we have only time and space to remark that numerous conical insulated protuberances rise up from the otherwise level country. These give a peculiar feature, which is rarely met with in other sections. They are due partially to the manner in which the soft rocks have been destroyed, some portions of which have been preserved; and upon these preserved parts, fine gravel and sand, and other materials of drift, have accumulated, so as to give them a rounded condition, as though they consisted entirely of diluvial matter. These hills though steep and rounded, like a

huge potash kettle are cultivated frequently to their tops. In some instances we find the surface in an inverted position to the one we have alluded to—conical excavations, or excavations in the shape of the inside of a potash kettle. The bottoms of those are usually perforated; the waters which flow down the inside slopes leak out and pass through the strata which form the bottom. Tufa usually accumulates upon all the slopes where water flows, and trees, leaves and twigs are every where petrified in these deposits.

These conical depressions, however, are not always perforated, they sometimes hold water, as in the case of the Green lakes, which are quite deep, as is found by soundings. Section 2 illustrates the peculiar topograpy of this part of the county.

Fig. 2.



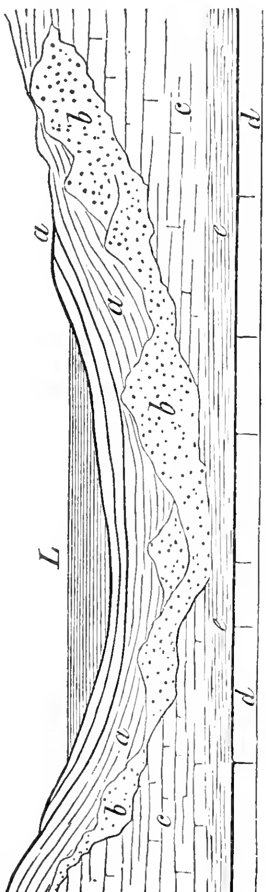
b, one of the Green lakes, which is more than 300 feet deep. *T*, tufa beds, which accumulate on the slopes of the hills. *a*, green shales. *c*, vermicular lime rock. *d*, hydrarlic limestone.

The basins which contain these small lakes may have been formed by the removal of soluble matter, in the first place, and may have been only a sink hole, but has been gradually enlarged and deepened by the instrumentality of water, as a solvent, and as a mechanical agent in breaking down and removing the soft materials of which the sides of the basin are composed.

The county south of the Erie canal rises into rounded hills. Those on a near inspection are formed by successive terraces, more or less distinct, but usually rather limited. The effects of streams upon those materials are worthy of notice, they frequently insulate a section of country of three or four miles square. The important effects which follow from this insulation is, that all the superior part is perfectly drained, and all the the surface water flows out at the low levels, or at the place where the thin bedded limestones meet the comparatively impervious shales. Here numerous springs flow out, some of which are mill streams of considerable value. The waters which flow from this plane are hard waters, but are still palatable. Those however which penetrate into the green shales and flow from them, are still more hard; and, as has been already stated, dissolve from the rock sufficient crenic acid to impart to them a bitter taste.

In the deeper excavations which have been filled or partially filled with drift, many of the brine springs are found and procured by boring. In illustration of this view we subjoin an ideal section of Onondaga lake and the subjacent formations.

Fig. 3



An east and west section across the valley of Onondaga lake. *L*, lake. *a*, impervious strata of marly clay, or marl, resting on *b*, which is a thick mass of drift between 3 and 400* feet thick, which is deposited upon and in a basin excavated in the green and red shales *c*. *d*, Niagara limestone, the superior rock of the Ontario division, which is below the sources of the brine springs of Onondaga county. The source of the brine springs being in the green and red shale, are obtained by boring through the impervious marls *a*, into the porous drift *b*, into which they flow and accumulate from the strata *c*.

* The wells are 265 feet in the drift.

The marl beds are general, but probably quite recent deposits in this county, having the same origin as the tufa; and the prevent, to a certain extent, the direct penetration of the surface water into these ancient drift beds.

The general slope of the country is towards the lake, or towards the north. The streams flowing from the higher rocks cut through their softer strata, and thereby form north and south valleys, in extent proportioned to their size. From these slopes, which are usually gentle, numerous springs issue, which often render the land wet, and hence require a drainage, the main cuts of which must run parallel with the valley.

Facts in Meteorology.—It is important in all calculations concerning the agricultural capabilities of a country, to ascertain its mean temperature, and the mean annual quantity of water which falls upon its surface. Very few contributions have been made to agricultural science in these departments of meteorology, by the journals of the day.

In this county the temperature favors vegetation, and yet we meet with extremes even here, which is due to the height of some parts of its surface.

The mean temperature of Pompey hill, the highest land in the county, for 14 years, is 44°.09. This place is found, from a series of observations, to be the coldest place in the state, being 3°.52 colder than the average of the state. The thermometer, however, does not sink so low in winter, nor do the autumnal frosts occur so early, as in the state generally. The observed temperature at Pompey for 16 years, was 42°.91. The 44°.09 being the calculated temperature, which is due from height and latitude. At Onondaga the observed temperature for 14 years, was 47°.54; making a difference of temperature in two places contiguous to each other, of 4°.63.

Onondaga Hollow is probably favorably situated for representing the average temperature of the lower and more level portions of the county; while Pompey represents that of the most elevated.

The observed temperature of Auburn (in Cayuga co.), for 15 years, was 46°.86. The temperature of Lewiston (Niagara co.), for 11 years, was 47°.92. And that of Albany for 27 years, 48°.47. We give these facts thus particularly, because we have heard it stated by a distinguished agricultural writer, that the vicinity of Buffalo was, upon an average 15° warmer than Albany; and it is evident from general expressions, that erroneous views prevail upon this subject. The heat of summer is very uniform throughout the whole state, the average of which is 92°, and only five out of fifty-five places show a difference of 3° from the mean of the state.

The summer season in Onondaga county, reckoning from the first blooming of apple trees to the first killing frost, is from 174 to 180 days. Its average for the whole state, is 174 days. Long Island is longer by 12½, and St. Lawrence is shorter by 22 days, than the average of the state.

Table 1, showing the quantity of rain which fell in each month of the year, in three important points in Onondaga county, in 1843:

	Syracuse.	*Onondaga.*	*Pompey.*
January, - - - - -	2.46	2.40	3.32
February, - - - - -	1.83	2.36	1.38
March, - - - - -	3.63	4.24	1.62
April, - - - - -	1.65	1.78	1.37
May, - - - - -	1.10	1.63	2.53
June, - - - - -	3.00	3.09	5.37
July, - - - - -	2.19	2.10	1.56
August, - - - - -	2.15	1.90	3.04
September, - - - - -	4.68	5.06	5.71
October, - - - - -	5.41	1.19	4.48
November, - - - - -	2.83	2.72	0.46
December, - - - - -	2.12	1.83	0.56
Whole amount for the year, -	35.18	33.81	31.38
Whole amount from April to October, in inches, - -	16.90	15.06	19.50

Table 2, showing the quantity of rain which fell during the years designated below, from 1826 to 1835.

Place.	1826.	1827.	1828.	1829.	1830.	1831.	1832.	1833.	1834.	1835.
Onondaga, ..	26.67	38.09	35.79	27.30	.....	.....	28.30	26.79	.....	32.43
Pompey, ...	.....	39.13	33.47	27.23	30.06	.....	26.44	30.14	.....	33.27

General average for Onondaga, - -	30.72
General average for Pompey, - -	31.36
The same years for Albany, - - -	39.91
The same years for Utica, - - -	40.11

The determination of the quantity of rain which falls at any place, is essential to those who intend to employ Liebig's patent manure, an account of which has been given in many of the agricultural journals. The base of the manure is a silicate of an alkali, whose solubility depends upon the amount of silex which enters into the combination, and this amount is adjusted to the quantity of rain which annually falls at the place; if this amount is small, its solubility is increased by an increased quantity of potash or other alkali; if it is comparatively great the silex is increased. We have our doubts, however, in the practicability of the proposed scheme, and we have been satisfied for a long time that barn yard manures and composts of peat, ashes, lime and magnesia are far the best manures which farmers in general can employ. We do not take into view here what horticulturists, or farmers located in the immediate neighborhood of large towns, can do, where there is an immense quantity of refuse matters which are produced from the various pursuits of life. But in the interior and middle counties of New York, where there are so many sources of the *raw material* for making manure, and so cheaply too, it cannot be expected that expensive manufactured manures can be profitably employed.

We have now lengthened out this article farther than we originally intended, and we ask for it considerable indulgence, for notwithstanding its great length much remains to be said to make it complete, and to adapt it to the particular locations it is designed for. Many facts which we have given have a direct application to the same geological formations which traverse central New York, but the particular applications will be better understood by a reference to the geological map which has just been widely distributed in the different parts of the state.

IRON TRADE AND MANUFACTURE.

BY RANSOM COOK.

There are few subjects on which we are more liable to err, than in making estimates and predictions in regard to the product and consumption of iron. For nearly thirty years we have thought we had almost reached the point, where our product of this article would equal its consumption in our country; and still, we find ourselves farther from it at the present time, than we have been for the last half century. That is, we are now endeavoring to import (and shall do so, if it can be obtained at a reasonable price), much more iron than at any former period; notwithstanding the many confident predictions to the contrary.

Among the documents accompanying the report of Mr. Saltonstall, to Congress, in 1842, Mr. W. Young says: "I have been an iron manufacturer in this country since 1817. I was the superintendent of the West Point foundry from its commencement in 1817 till 1831. I was president of the Ulster Iron Co. from 1831 till April, 1840." After this time we find he was connected with the Mount Savage works, in Maryland, and he is unquestionably an experienced iron master; farther on he says, "England always guards and protects every branch of trade, and encourages her own manufactures; and this policy has given her the preëminence she now possesses. Let our legislators adopt the same course, and within ten years we will send bar iron to England."

Our legislators complied, imposed all the duties asked, viz: $25 a ton on rolled bar iron—and what is the result? Why the demand increases much faster than its product, and the fulfilment of Mr. Young's prediction may be postponed until the face of our wide country shall rival the small isle of England in improvements.

In the last volume of Hunt's Merchants' Magazine, article "iron trade," we find an estimate of the amount of iron wanted for our rail roads alone; on which the mere duties, independent of the purchase money, would amount to six and a half millions dollars. True, we shall not import it this year, for we cannot obtain it. Instead of "sending bar iron to England," we find she cannot supply our demand, even with the assistance of all our own manufactures; and the greatest difficulty now encountered in the construction of rail roads, is the absolute impossibility of obtaining a ready supply of iron.

One cause of our erroneous calculations on this subject, is that of greatly over-estimating the quantity of iron produced in our country. In the U. S. census of 1840, the marshals were required to give the number of furnaces, bloomeries, forges and rolling mills, with the quantity of iron *produced* by each. In obeying these instructions, the marshals give the amount of iron produced in blast furnaces, which is pig metal; and this pig metal when taken to a foundry and melted in a cupalo furnace, is again estimated as iron produced. So if taken to a puddling furnace, where it is reduced to wrought iron, the same result follows, for it is again estimated. From the puddling furnace it goes to the rolling mill, where it is estimated for the third time, as the rolling mill is also supposed to *produce* iron. Then again, much of the Sweeds, Russian and some kinds of English iron imported, is afterwards rolled in our mills, and this too, is estimated as iron *produced* in this country. The scrap iron, both the domestic and that which is imported from abroad in large quantities, when worked over is also estimated as iron produced. The Scotch pig and our broken pot metal is subject to the same estimate, every time it is melted, which may sometimes happen twice or thrice a year.

Owing to this erroneous method of estimating the product of iron in our country, Essex county is found to produce 2,872 tons of bar iron in a year, while Rensselaer county has the credit of producing 37,000 tons of the same article. The former county *does produce iron*—the latter *works it over.* Even our cities, according to the census are large iron producers. The city of New York is there said to produce much more cast iron than the county of Essex, and New Orleans is also a producer of iron.

After our own iron has been thus estimated, at three or four times its real quantity, and is then increased by adding to it much that has been imported, we see how erroneous all calculations must be, which adopt this aggregate as the product of our country, and then compare it with our importations of the article. Such a comparison would lead many to suppose, that we should soon supply our own market at least. To approximate the truth we should ascertain the quantity of iron *produced from the ore* in this country, and then compare it with our importations for a series of 10 or 15 years. Our importations have fallen off the two last years, for the best of all reasons, because we could not obtain it, at least without paying a most exorbitant price.

But the census furnishes us with another method for estimating the amount of iron produced, which is less fallacious—we refer to the number of men employed in this branch of business. We there find that Essex county, which in this business employs more than any other county in this state, has 415 men engaged in her mines, furnaces, rolling mills and forges; while single iron establishments may be referred to in Wales, which employ 5,000 persons. And yet, we sometimes hear the owner of a small forge who cannot produce iron fast enough to supply the carts of the city of New York with linch pins, talk of exporting iron to England.

Although we see the product of iron steadily increasing in this country, we should not infer from this that we are about to supply our market with the article. Its consumption is constantly crowding upon its product; not merely in consequence of our increasing population, but owing far more to its application to new uses. Nor are these confined to rail roads, mechanical machines and agricultural implements. Its superiority for the construction of ships and canal boats has been fully demonstrated; dwellings too, are being constructed of the same material, and few now will venture to fix a limit to its use. Indeed, if the past and the present be any indication of the future, this key of the arts will meet a constantly increasing demand, until man shall cease to move onward in his grand march of improvement.

MARKET HILL AGRICULTURAL DINNER—IMPROVEMENTS IN IRISH AGRICULTURE.

BY HENRY S. RANDALL.

A great improvement is taking place in the agriculture of some districts in the north of Ireland, by a system of means novel, and not without interest, to American farmers. The incentive or impulse to these changes is given by the proprietors to the tillers of the soil, partially by a judicious distribution of bounties, calculated (and this is most wisely done) as much to appeal to the pride—the *esprit du corps*—as to the pocket of the recipient: and the spirit thus awakened is furthered and sustained, as well as guided in proper channels, by the employment of agriculturists of science and experience to counsel and encourage the tenants, to see that each is properly noticed and rewarded for his improvements,—in short, to exercise all the supervision which the tenants will *voluntarily* submit to. This is far preferable to *coertion* through leasehold stipulations.

Foremost amongst the landlords who thus wisely study their own and their tenants' interests, is the Earl of Gosford, whose large estates lie in the county of Armagh. And how favorably does this nobleman's conduct, in this particular, contrast with that of the scores of titled *absentees*, who treat the land that bore them as a conquered province, to be drained of its entire income to support the dissipations of the English and continental capitals and watering places!

Among the scientific agriculturists, who, as the employees of the landholders, have done most to improve the husbandry of the north of Ireland, incomparably first, probably, stands William Blaker, Esq., the "agriculturist" (so called) of the Gosford and some other estates. This gentleman, without claiming to have been the originator of each detail of the system of husbandry advocated by him, probably deserves the credit of uniting the the several parts—practices drawn from various local systems—into one homogeneous whole, adapted to the exigencies of the section of country which his labors are designed to benefit. And here let it be remarked, in passing, that the skill of the *adapter* is scarcely second to that of the discoverer or inventor. The same system, it is but a truism to say, will not work equally well under all circumstances. To skilfully seize upon and connect, from the great store-house of mind, or of physics, the precise materials adapted to *our own wants,* is the wisdom of the wise man—the talent of the able one.

An occasional correspondence with Mr. Blaker for several years, has kept me in some measure advised of the results of his labors. These are shown in the proceedings of the annual Market Hill agricultural meeting. But before proceeding to discuss the relative merits of the *new* and *old* husbandry, let us glance at the organization of this agricultural association, and some of its methods of doing business. Hints, not without value to *us,* may, peradventure, be gleaned from them.

I presume from all that has met my eye, that there is no initiation fee to the association—its limits being entirely territorial ones—the Earl of Gosford and (to a less extent) another landholder, a brother of Mr. Blaker's, paying all the premiums. These are mainly of a character which makes the bounty to a great extent an honorary one, such as splendid clocks, silver cups, &c. It would be the easiest thing in the word to *cant* a little on this subject by saying that *money* would be more useful to the tenant. The greatest *permanent* benefit the tenants derive from the system of rewards, would be to make him a good farmer. This would not only relieve the present wants, but, with the ordinary blessings of Providence, would guard against the future one. If a showy testimonial of his victory, like an elegant clock, or a piece of plate, will influence him more than money to such a result, then it is unquestionably better to offer him the former. That the devisers of the scheme understood well whom they had to deal with, the result shows. I certainly have never read of keener contests for agricultural superiority than those of the tenants forming this association, nor, I will add, those that interested me more. And there is another feature in this system, which *appears* to work well, and which would be incompatible with money premiums. It is this. The ownership of these clocks, etc., is not secured by one victory. *Three* are necessary to that end. The design of this, and it seems to produce that effect, is to lead to *sustained* exertions. Premiums, as commonly paid, often go to reward a more desultory effort, or "good luck." It is amusing to learn in the reports of the committees (at the Market Hill meeting), and in the published remarks of Mr. Blaker, the strong exertions of the victors of last year to maintain their superiority this. After the last whirlwind charge of the French at Waterloo—an empire staked on the "issue of a die," and *lost*—Bonaparte left not the disastrous field a more thoroughly *defeated* man, in his own estimation, than some of the losers of these clocks and cups! One brave fellow had done his utmost—but a trivial error in a nice point had robbed him of victory. I can fancy his look of pride humbled, of disappointment acutely felt but manfully borne! This was too much! Lord Gosford immediately declared he should retain his clock—and to the victor he awarded a still more expensive one! Before dismissing this part of the subject, it may be well enough to remark, however, that *all* the bounties or premiums are not paid in this way. Seeds, guano, etc., for the use of the land, are from time to time distributed to reward improvements.*

I have hitherto omitted to state the particular objects for which these premiums are paid. They are paid invariably, I believe,

* Large quantities of the seeds of such crops as it is considered important to introduce and extend, are also *lent out* to the tenants. On the Gosford and Drumbanagher estates, says Mr. Blaker, 42 bushels of turnip seed, 9 tons of clover seed, 138 bushels of vetches, and 512 bushels of grass seed were thus lent to the smaller tenants during the past season.

for the best managed farm, including all their crops, their proper rotation, their adaptation to the greatest amount or maximum of production, without unnecessary or improper exhaustion of the soil,—stocks of all kinds,—management of manures,—permanent improvements, such as draining, fences, buildings, &c.—in a word the greatest improvement to the farm and the greatest profit to the tenant. This is no doubt better both for landlord and tenant, in the circumstances in which these parties are placed towards each other, in Ireland, than to pay bounties on separate animals and crops.

The size of the farms of the great body of the Irish tenants, would strike an American farmer with surprise. Perhaps the average would not exceed ten English acres. But do these men, if they have families, get a comfortable living on these mere "patches" of land? If we may trust the assertions of Mr. Blaker, they do,—although the land is in many cases of a very inferior quality, until improved by the tenant.

The following table will give an idea of what the land supports:

Stock on ten farms, containing 98 *acres,* 3 *roods,* 28 *perches, on Lord Gosford's estate.*

No.	Contents of Farm.			No. of persons on each Farm.	Stock on Farms.					Rent of Farm.		
	a.	*r.*	*p.*		Horses.	Cows.	Heifers.	Sheep.	Pigs.	£	*s.*	*d.*
1	9	0	33	7		4			2	11	1	8
2	8	2	20	7		2	1		2	10	7	0
3	8	3	9	7		3			2	11	9	1
4	9	1	32	6		3			2	11	18	10
5	8	2	10	5		4			2	17	3	0
6	9	2	0	4	1	4	1	2	2	11	5	9
7	10	2	14	4	1	3			2	11	18	6
8	10	3	17	6	1	2			2	12	7	2
9	10	3	30	8		3			4	12	0	6
10	12	1	15	6	1	4			6	12	0	8
Total,	98	3	20	60	4	32	2	2	26	121	12	8

One-half of the above land is under flax or grain crops.

Would a single farmer with his family, in our own country, make a living off the whole 98 acres, after paying a rent of £121, 12*s.*, 8*d.* ($583 90)? Unquestionably not, under anything like ordinary circumstances. Neither could an equal amount of stock be kept on anything like the same amount of even our best lands. It will be observed that one-half of the 98 acres is under crops, very little of which reaches the stock, besides the straw: Should we let the keep of the horses, heifers, sheep, pigs, and two of the cows offset against the straw, then we should have 30 cows kept on 49 acres of land,—a cow to an acre and a fraction less than two-thirds of an acre!

Whence this difference in the acreable products of the United States and Ireland? Is it in the quality of the soil? The better class of New York lands, are decidedly superior to the 98 acres above particularized, if we may credit Mr. Blaker,—that is, before the latter were recently made over, so to speak, by the present system of culture. How then *sixty* human beings can obtain subsistence, where in this country a single family could not (over and above rent), is indeed surprising. True, things which the American farmer would consider *necessaries*—things of course—would be unapproachable luxuries to the small Irish tenant, even under the ameliorating influences of a Gosford and a Blaker.* An American farmer, thank God! can eat of meat, wheaten bread, milk and butter (tea!), and as many varieties of vegetables as he chooses, three times a day, and have a "chicken in his pot" not only "on Sunday," but on any other day in the week!

* Justice all round requires that I should copy the following statement of Mr. Blaker in relation to the holders of the ten farms given in the table. He says: "the stock that these small farmers are possessed of shows that they are by no means in penury. I have chosen those who are living along the road side, and if any one has the curiosity to visit them to-morrow, I shall have a jaunting car ready at Mr. Ringland's, at Gosford gate, to take them to their houses. No one, I expect, will conceive he is to meet with any great appearance of wealth—it is up-hill work to amass riches from a few acres of land, paying a fair rent, and rearing a young family—but I believe every one of them will be found in a thriving condition."

More than this. He can send his children to school five or six months in the year, until they are 16 or 17 years old, and can, and often does, educate them to the learned professions. Great as the difference is, however, between the expenditures—the "outgoes"—of the American and Irish farmer, it by no means explains the monstrous discrepancy between a given amount of land supporting sixty persons or only six. Nor do the highest market prices at which products are sold in Ireland explain it. Saying nothing about the *people*, the amount of *stock* kept on the land shows conclusively, as I have before stated, that such farmers as those whose farms and stock are enumerated in the foregoing table, actually obtain a much larger product per acre, than the proprietors of the best American lands. The question again arises, whence is it? This is best answered by considering the system of husbandry under which they obtain these results, the *new* system, as it is called, introduced by Mr. Blaker.

Mr. B. found these small farms imperfectly drained, notwithstanding they were cut up into various small plats or fields by numerous ditches. Mr. B. introduced furrow-draining, and urged the leveling of all the surface ditches. This resulted in a considerable saving of the land,—and the whole farm, with the exception of the enclosure about the barns, &c., is thrown into one field. The crops are then put in in "strips" across the entire farm. This of course is followed by the practice of soiling the whole stock. Mr. B. contends that two cows can be thus summered from the same land one would require if pastured. He also recommends a larger proportion of roots and other crops to be fed green, than we know anything about in this country. This is necessary where the soiling system is pursued, and it leads to an indefinite increase of manures. These manures, increased by composts, and protected from the weather, are sufficient in many instances to give a dressing to one-third of the whole farm!*

* I am sensible, on casting my eye back over this, that I have not been sufficiently full to give a complete view of the "new husbandry." I have written this from a sick-room—in the short intervals allowed from the cure of the sick—and consequently with constantly diverted attention.

Such is a bare outline of the system. How much of it would be applicable here, the good sense of each one must determine. That it has wrought a great and ameliorating change in a portion of Ireland, under the auspices of Lord Gosford and Mr. Blaker, there can be no doubt. It is rapidly extending in that country. Agriculturists (some of them tenants), tutored under the eye of Mr. Blaker, are constantly going out to take charge of other estates, thus spreading the system far and wide. Success to them! Success to the poineers in this philanthrophic work! Across the wide Atlantic, we tender them the meed of American sympathy, and American praise.

WHY THE EAST CANNOT COMPETE WITH THE WEST.

BY COL. T. J. CARMICHAEL, SING SING.

Having spent my early life in the state of Ohio, where the farmer suffered so much for want of a market, before the days of steam boats, canals, and rail roads, and witnessed the immense change which these inventions and improvements have made in the wealth and prosperity of the west, by affording a ready market for the lighter and most valuable products of the soil, I confess, I was surprised on taking up my residence on the North river, to find the farmers here trying to compete with the great west in the same products, instead of turning their attention to the more bulky and perishable articles, for which they have a good market, and against which they may defy all western competition.

Now let us try my position mathematically. And for that purpose, give a farmer on the Hudson river one hundred acres of the best arable land, at a cost of one hundred dollars per acre, and a western farmer, say in Wisconsin, the same quantity at five dollars per acre—which is a full price for arable lands in that country under improvement. Now let each farm be located within the same distance from navigation, and allow the expenses of seeding and gathering of crops to be the same, and let the whole premises east and west be put into wheat.

First the eastern farmer must manure at an expense of at least $5 per acre, and if he is very fortunate he may raise 25 bushels per acre, or 2,500 bushels in all. This is good for 500 barrels of flour. Take flour at $5 per barrel and he has $2,500. Now deduct 10 cents per barrel for transportation, $50. Now deduct the interest of cost of one hundred acres $700, and manuring $500. and you have $1,300.

Now let us look at the operations of the western farmer, who with the same labor, minus manuring, is sure of an average of thirty bushels per acre—say 3,000—which is equal to 600 barrels of flour; deduct $1 per barrel for freight, and at the same price in market he has $2,400; deduct interest on the cost of land $35, and he has $2,365; now deduct the proceeds of the eastern farm, $1,300, from that of the west, $2,365, and you have $1,365 balance in favor of the western farmer, more than the entire proceeds of the eastern farm. Our eastern farmer asks then what shall we do? Our fathers used to make fortunes in raising grain? It is answered that your fathers lived in another age of the world, and were governed by circumstances; you see the progress of the means of transportation—you see the enormous growth of the west—you feel the competition of that quarter in the lighter articles—you also see the high prices of bulky and perishable products in your market, without taking the advantage of such a state of things. By perishable products, I mean potatoes, turnips, beets, carrots, cabbage, fruit, and all other vegetables—together with fresh beef, mutton, pork, &c.

Now let us cultivate a farm on the North river, with some of these articles, all of which are about equally profitable. Suppose the same farmer should plant 50 acres in potatoes, and the same number in turnips, after manuring as for wheat. The potatoe should produce 200 bushels per acre, 10,000 bushels. These at three bushels to the barrel, are equal to 3,333 barrels, worth at least as many dollars in market, clear of freight. Now your fifty acres of turnips should yield 400 bushels per acre, 20,000 bushels, or 6,666 barrels, worth half a dollar per barrel clear of freight, $3,333; to which add the crop of potatoes $3,333, and you have $6,666. From this sum deduct manuring and interest $1,200, and the balance is $5,466 from one hundred acres.

Now instead of marketing the turnips (which are a bulky article), let us adopt the European practice of purchasing stock in the interior of the country from the breeders, and fatten it for the market. It has been demonstrated that sixty bushels of turnips, and six hundred weight of hay properly fed, will fatten ten sheep, or one cow, in the best manner for the shambles, in the space of two months. Sheep and cattle can be purchased in the interior of the country, in low condition, for half their market value when fattened. This process here, as well as abroad, will yield the farmer a liberal increase.

On my late visit to Europe, I found that they adapted their business and products to their locations. In districts at a distance from market, they raise grain and breed stock, while those more convenient turn their attention to growing vegetables and fatting stock; and it is to this practice of making two professions, viz: fatting and breeding, that I attribute most of their success. In farming, like every other business, a man should never have "too many irons in the fire at once," some of them are liable to get burned. He who turns his attention either to one branch or the other, is the most likely to come out successful in the end. Who employs a physician to perform the duties of a surgeon, or a carpenter to build a brick or stone wall? And with deference I submit to intelligent farmers, whether there is not as much difference in the modes and rules of *breeding stock* and fatting it, as in that of *raising grain* and bulbous roots?

It seems almost incredible to an American, that in many parts of Great Britain and France, the farmers pay $20 per acre rent per annum, by the hundred acres, and yet they drive a thriving business, by adapting their products to their location, and yet it seldom happens that similar articles are higher there than in the New York markets.

I am inclined to think there is a mistaken opinion very general among our farmers, that they should produce at least as much of certain crops as they consume; as well may it be held, that every farmer should doctor his family, plead his law, or preach his gospel,—when he can purchase cheaper than produce, or realize a greater income by selling one thing and buying another, why not do so.

> Men are the sport of circumstances, when
> Circumstances are the sport of men.

That farmer must play a loosing game who will not adapt his business to circumstances and location.

In connection with this subject we should not lose sight of the different breeds of stock. One is best adapted to the dairy and another to the shambles, but neither possess both properties in the highest degree. And while it is admitted that the Leicester, South Down and Cheviot sheep are the best mutton breeds, yet I see our farmers trying to compete with the west in raising Merinos for wool. The Durham it is demonstrated is the best breed for beef, on account of its size and early maturity, and we are fatting and breeding dairy cattle, though we see the great west flooding the country with butter, cheese and fine wool.

But in choosing breeds of stock in this country, I find great care must be taken; we have as much quackery in this line as in medicine. And this is one reason, I imagine, why the best are not more esteemed by our farmers; the truth is they are seldom met with in our quarter, though so many profess to have them, we are too often led astray by the *name* without having informed ourselves as to the true form or figure of these animals.

I find we labor under another difficulty of quite a serious nature. The United States has a great variety of climate, varying in many respects from that of Great Britain, in its products, the habits of the people, and modes of agriculture. These facts should be carefully considered by the American farmer; while I would give Europe all the credit for her fine breeds of stock, I must insist that, aside from fatting and breeding, very little of her system of farming is adapted to this country. And yet most of our works on agriculture are either *reprints* or *compilations* of British publications. I grant it is true in the main "that the modes and rules of culture which are successful in one place will be so in others, *provided we adapt them to the varying conditions of climate and situation,*" but this adaptation seems to be the trouble or difficulty we have to encounter, and hence the necessity of a system of our own.

But while our farmers are in the habit of reading the penny news, instead of our agricultural papers and quarterly reviews, which may cost them from one to three dollars per annum, and are loosing as many hundreds by bad management there is but little hope for improvement.

Even England never woke up to this subject, until George the III. turned farmer, and thereby made it *fashionable* in that country (one of the few good acts of his life), "necesssity is the mother of invention," and the time is not far distant when our farmers will realize the application. What gave Bakewell his local immortality and wealth, but his genius in producing an *improved breed of mutton sheep.* Have our farmers less skill in this art?

Let farmers consider that book-making in the present age, both here and abroad, has become a trade of the printer. That authors *think* much less than they *write,* and *practice* less than either. Therefore it is that their works are of so little value to the practical man.

I think our scientific friends in this country are behind the age in agriculture except so far as they borrow; for instance if we we have ever had an analysis of the *Indian corn* or *pumpkin,* I have not had the good fortune to see it. I would be happy to know the same of the *artichoke* which is being introduced in the west as a feed for sheep, but have not found either in the European tables. I find on experiment that the pumpkin is even a better feed for sheep than the turnip, when ran through the cutting machine, and every American farmer knows its utility in fatting cattle, and that it may be grown abundantly in a field of corn without injury to the crop.

I hope soon however to see the day when our practical farmers in different sections of the country will perceive the importance of *thinking* and *writing* more on their practice, with a view of seeking information and imparting knowledge to each other; by this means, and this only, we may soon establish an American system, however varied may be the climate, soil, or location.

Dec. 19th, 1845.

STRUCTURE OF GRANITIC MOUNTAINS.

The form of granitic mountains is usually conical, sometimes sharply, and sometimes obtusely conical. It is rare that they present the form of a parabola, or a perfect dome-shaped summit; such, however, is the form of the Brocken, in Switzerland. So perfect and indeed so regularly dome-shaped is this mountain, that a small house upon its summit is distinctly visible at a great distance.

All the granitic mountains of New York belong to the sharply conical class, and when seen at a distance appear like towering castles.

In structure, or in the internal arrangement of their subordinate masses, a great similarity exists. The Brocken, already referred to, is described by L. Von Buch, as being formed of parallel layers of granite arranged in parabolic curves. The explanation which is given of this singular structure, is, that it was softened by internal heat, and then blown up like a great bubble; and it is supposed to follow from this view, that the granite thus lifted up from below, cannot be considered as belonging to any kind of lava, or as a semi-fluid filling fissures from above, but that it possessed a certain consistency which in most cases was far removed from the condition of absolute fluidity; and indeed the beautiful and regular external form which the rock assumes, renders any other assumption improbable.* In our own country,

* Exposition of Von Buch's views in the Quarterly Journal of the Geol. Society of London, p. 127.

however, although the thick laminated structure prevails as in the Brocken, still the matter composing the granitic beds can be proved to have been forced in many instances through narrow fissures in some other rock; which fact seems to us to prove that there was an approach at least to a strictly fluid condition. The great granite quarries of Maine, and many of the thick granitic masses of Massachusetts, rest upon gneiss or mica slate; and it is through rents in those inferior rocks, which are sometimes not over six inches in width, that the granite has been forced in its liquid or semi-liquid state.

Another result follows from the concentric lamination of granitic mountains: the surface is always covered with immense blocks of the material. Situated as those peaks usually are, in a high, frosty region, the laminated masses break up and become dismembered by the congelation of water confined between the masses. This, together with the rapid process of disintegration which always goes on in the higher regions, separates farther and farther the dismembered rocks, so that in the end, the surface looks as if it was mechanically strewed with blocks of granite, some leaning, some upright, others upon their broad bases, but little removed from their original position; while others are poised upon a projecting point, just ready to be precipitated from their support and roll down the steep. The mountains of New York, particularly the Adirondacks, are in the state and condition we have described. The layers of granite lie parallel to the mountain sides, or nearly so, and might be mistaken for stratification by one untutored in geological principles, and thus wherever there is a flat surface where loose blocks of rock can repose, there we find the accumulations we have spoken of above. Some might entertain the view at first that those loose rocks, inasmuch as they are frequently rounded, that they belonged to the erratic block group of De La Beche; but an examination of the condition and character of the rocks and strata would soon determine the fact that the loose materials belong mostly to the rocks upon which they rest—and that they have been separated from the parent rock by the slow process of frosts and disintegration.

Hence it follows, that in the course of geological periods layer after layer has been broken up—the harder parts of some remain, while that of others has been precipitated into the lower regions. The whole process and the whole condition of things upon these granitic domes and peaks remind the agriculturist how the vast strata of debris and soil has been formed which covers the plains and hills below—the only difference is, that here the process is more rapid. The materials resulting too from this process, find a resting place only below and upon the champaign country. Here too is the source of the potash and soda of the rich alluvions, and to some considerable extent of the phosphates. The feldspar and mica of the granite and the phosphate of lime, common in primary rocks, are transferred from a bleak and solitary region to the mild and beautiful valleys, where they become of the highest use to the husbandman.

It is by the processes which we have here described that uncultivable waste lands and deserts are made subservient to the wants of man. In themselves, they appear to the unreflecting as wastes, valueless to the world, which mar its beauty, and deforming the face of nature, and diminishing the value of domains, and to which opprobrious epithets have been with some show of truth and justness applied. But the intelligent and reflecting see in all these arrangements the highest evidence of wisdom and utility. It is in the high towering cliffs, the sharp, high peaks or domes, that most of the fertile agents are prepared, when they are detached from their combinations and brought into an available state. It is here that Nature unlocks her storehouse of potash and soda—here phosphate of lime and other inorganic matters, which are essential to the existence it would seem of life, are to be found. The tempests and storms which sweep over these wastes conspire to the same end. The violence of nature must be exerted, the lightning must flash upon the summits, the waves must beat upon the cliff, the frost must rend the rocks, the searching vapors must penetrate the masses, before they will yield their treasures. Where could all these processes be conducted so safely, so effectually, without endangering the interests of man—or where could they be exerted at all, except in high places, and in the remote and sometimes inaccessible fields of snow?

ON THE SPONTANEOUS CHANGES WHICH ORGANIZED MATTER UNDERGOES WHEN EXPOSED TO THE ACTION OF CHEMICAL AND PHYSICAL FORCES.

We have had so many occasions for speaking of the organic acids and other products derived from organic matter, that we deem it necessary to say a few words upon these products. The woody tissues of dead plants give origin to a class of bodies which were formerly known under the name of *Ulmine*, but which are now known to consist of several distinct substances, differing both in composition and in their properties. To form ulmine it is only necessary that wood should be exposed in contact with air and moisture. Under these circumstances, however, both ulmic and ulmic acid is formed. Their names imply that they were derived from the woody tissues of the elm. The latter is insoluble in water or alcohol, but is soluble in alkaline solutions, and in its natural state contains ammonia, which may be expelled by caustic potash, when the acid itself is decomposed. The formation of these bodies during the decay of wood results from the absorption of oxygen and the evolution of carbonic acid and water. They are both brown uncrystalizable bodies, and resemble vegetable extracts.

The theory of the formation of these bodies, is analagous to that of fermentation; for it is necessary in order they may be formed, that an azotized substance should be present, which being first decomposed communicates the action to the woody fibre, and the albuminous juices which exist in the vessels act as a ferment. This view is supported by the fact that any process or method which prevents fermentation in any instance, prevents also the decay of wood; for, notwithstanding wood is exposed to the action of oxygen and water for a long time, its rotting is prevented when it is saturated with corrosive sublimate or pyroligneous acid, as these combine with the albumen of the juices and render them insoluble, and the wood will be protected from decomposition. When the roots, leaves, &c., are left upon and in the soil, they are converted into a substance which partly by their power of absorbing oxygen are converted into a substance which contributes powerfully to the growth of the succeeding race of plants, and thereby constitute the essential element of every fertile soil. Turf or peat, as it is usually called in this country, contains humous and humic acids; the latter is remarkable for its strong attraction for ammonia, so much so, that it is with difficulty that it is separated from it by any reagent whatever.

It is found in the black turf which is submerged beneath water, and from its strong attraction for ammonia is an important element in the formation of composts. Two other bodies differing from the preceding are also found in the organic matter of soils, viz., *crenic and apocrenic acids.* Their name simply implies that they were obtained, or derived from, a *fountain* or spring. These are azotized acids, and are also the products of animal as well as vegetable matter. They are known to exist in the softer rocks as the polishing slate of Germany, and from the fact that it contains animal matter, it has been used for food in times of scarcity. We have obtained the same acids from a much older system of rocks in New York, as may be seen from the articles in this and the preceding number.

Crenic acid is described in books as a pale yellow gummy mass, of an astringent taste, and slightly bitter, very soluble both in alcohol and water. Exposure to the air converts it into *apocrenic acid,* which is brown and also astringent, but is much less soluble in alcohol or water than crenic acid.

The composition of crenic acid is represented by the formula, N. C. 14, H. 16, O. 12, and apocrenic acid by N. 6, C. 28, H. 14, O. 6, from which it will appear that the latter contains more nitrogen than the former. Now, manures have been proved to be valuable in the direct ratio of the quantity of nitrogen they contain; hence these substances possess from their composition an intrinsic value over and above those which are destitute of it.

As it regards the power which plants possess for obtaining nitrogen, it is proper to remark that they differ extremely, one class, for instance, being placed at one extreme of a scale and another at the other extreme: thus clover, or trefoil, possesses the power of taking it from the atmosphere, or from a source independent of the soil, and hence it will grow in sand destitute in a great measure of organic matter. Plants of this family or kind belong to one of the extremes in which the power of absorption is the greatest. But wheat is entirely destitute of this power, and if sown where it cannot obtain its nitrogen from the soil by its roots, it produces no seed, and the quantity found in the plant is less than that which the seed originally contained. From this fact, we see the adaptation of the trefoil to the cultivation of wheat, from the ability which it has of obtaining a supply of nitrogenous matter, where wheat could not in consequence of its peculiar organization. We are particular in stating this fact here, because we have too frequently heard it asserted that wheat derived 97 parts of its substance from the atmosphere, whereas it does not derive any part of it directly from this source, but all from the soil. It is hardly necessary to say, that it is a subject of great practical importance, and it is essential that correct views are disseminated among agriculturists. It is true, however, that a correct practice of farmers has sometimes gone ahead of correct theory, and has served to sustain them in it, though theory may have been wrong.

Another interesting point, though it relates to the vegetable physiology, rather than the nature of the process of decay, is worthy of a passing notice in this connection—it is the mode or process of forming woody fibres, or the relation of starch to lignine. Starch exists in grains made up of concentric layers, or layers one within another, like the coats of an onion. To form starch, it only requires water and carbon; its formula being C. 12, H. 10, O. 10. Now, in a living tissue, carbon being absorbed and carried into it, an equal volume of oxygen is given off or exhaled;* the carbon is assimilated by the vital power of the plant,

* Kane's Elements of Chemistry, by Draper, p. 652.

and with the elements of water produces a substance partially organized in structure, the starch globule. The transition of the starch globule into lignine or woody fibre is supposed to be effected in virtue of mere chemical affinity; the outer layer of a starch globule, of which we have spoken, increases in density by condensation of the outer layer, and also by the absorption of a portion of the water of the inner coats, a cell is formed. To form a fibre we have only to bring together a continuous row of starch globules which, coalescing in part, form a continuous tube or fibre. The lignine or fibre thus produced is represented by the formula C. 12, H. 8, O. 8. Starch then, is considered the first product of the assimilation of carbon and water, and is in structure and composition adapted for a change into wood. When, however, starch is formed in seeds, or in other parts of plants, it is readily converted into gum and sugar by contact with albuminous or fermentative principles; it then loses its organized characters.

Now, lignine is converted into ulmine in the absence of vitality in the organized tissues, by changes which are opposite to, or contrary to those which have just been described in the conversion of starch into woody fibre. Here oxygen is absorbed from the air, and carbon is carried off in the form of carbonic acid, and a quantity of its hydrogen as water, and the constitution of lignine is destroyed.

These changes are analagous to, and perhaps identical with those which convert organized matters into manures, the substances being actually oxygenated; and here too, practice is not at fault; it is well known that composts must be turned over, and exposed more or less to the atmosphere; and the experienced farmer knows too, that it is possible to carry these changes too far, for if the matters become too much oxidated they are comparatively spoiled. We see some of the effects in heaps of manure from the horse-stable, which are often burnt. Like the cooking of food, there is a point where the process must stop if the greatest amount of nutricious matter is to be obtained, and the great desideratum in husbandry is to know how to promote the process and carry it to the precise point required, and there stop it. This is secured by conducting the process slowly, if hastened it will most surely be overdone. All plants derive their nitrogen more or less from the soil, and the nitrogen here is always combined with other elements. This important substance forms one of the elements of crenic and apocrenic acids. In the presence of strong bases, such as lime, magnesia, &c., these combine and form salts in part. These, as well as the free acids which may be absorbed by plants, are slowly decomposed and the elements both of carbonic acid and ammonia are assimilated, and they thus supply carbon, nitrogen and water. Showers of rain carry down to the soil also ammonia to the roots of plants. Clay and porous bodies also absorb it, but clay sometimes seems to be too compact to perform this office, and hence burning has been resorted to, by which its porosity is increased, and its combined matters rendered more soluble.*

We have only to remark, in conclusion, that all soils which are intended to produce the cereals must contain the organic matter we have described in this article, and however well weeds and innutricious matter may be found growing upon soils destitute of them, we may assure the farmer that maize and wheat will not reach maturity and produce grain unless they exist in the soil.

THE WORK OF FAITH AND HOPE.

Every body knows that the mind exercises a controlling influence upon the body, and yet in some cases there are many persons where this influence is most clearly manifested, who are very slow to acknowledge that certain effects are really due to, and only produced by this influence. The truth itself is of great practical importance, and may be applied either for good or bad.

* The theory in regard to the importance of ammonia was long ago taught by the late Professor Eaton; and it was a part of his regular course in his lectures on practical chemistry to illustrate the absorption of ammonia by carbon and other porous bodies, and make a direct application of these facts to illustrate the mode by which ammonia was obtained from the atmosphere by the rootlets of plants.

An elderly physician of great experience was waited upon by a person residing at a distance whose purpose was to consult him in regard to his health. He had imbibed the impression that his disease was the consumption, and if so, there was no remedy for him, and he wished the doctor to be plain and frank and tell him distinctly whether his case was one of that disease or not. Accordingly the doctor, after investigating his case, expressed his fear that it was possible that such was the fact; and yet that it had not advanced so far but that it was proper to entertain strong hopes that it might be cured. Upon this result, the patient expressed no surprise, but told the doctor that he had no hopes that anything could cure him, when he immediately left, returned home on foot many miles, took to his room and bed, and died in ten days. This example illustrates what influence the mind may exert on special occasions upon the body.

A gentleman who had distinguished himself in science in one of the middle States, had been known to say that he did not wish to live beyond the age of forty. This gentleman died at the time he wished. This case is one which is less clear than the preceding; but still few will doubt that where a feeling exists its influence will be felt more or less by the corporeal system. Many examples of the same kind are upon record, which go to show the same unfavorable influence upon life.

But there are many cases of a very different nature from those we have given, which clearly illustrate, and very forcibly too, the influence of the feelings upon the different organs. The most common is the sense of shame, which causes a blush upon the cheek; an unexpected knock upon the door to cause the heart to throb and the lips to turn pale; a sudden fright to blanch the hair in a night, and a cause of sudden joy or grief to paralyze the whole frame, when it sinks down in death.

There is, then, a reciprocating influence between the spirit and the body, between the mental and corporeal parts of the frame. How much life is shortened, or how much it is lengthened by this reciprocity of influence, no one can tell. The turbulent vicissitudes, the weighty cares of life, the domestic joys or troubles, either weigh down prematurely the power of the spirit and bring the body to the grave before its time; or, it is buoyed up and carried joyfully along in peace beyond the ordinary period allotted to the happy individual.

A great many cases illustrating the power of the mind over the body are given in the 2d Vol. of the Medico Chirurgical Review for 1842. We propose extracting some of them for the benefit of our readers.

"A gentleman who had constantly witnessed the sufferings of a friend afflicted with stricture of the œsophagus, had so great an impression upon his nervous system, that after some time he experienced a similar difficulty in swallowing, and ultimately died of the spasmodic impediment, produced by merely thinking of another's pain."

A lady accidentally swallowed a plum stone, and no doubt but it passed into the stomach at the time; but she persisted in believing that it stuck in her throat; appropriate remedies were tried, and the feeling after a long time subsided; but from this date her health declined, dropsy made its appearance, and she died. A gentleman of intellectual habits, and not mixing much in society, was afflicted for twenty-five or thirty years with a violent tearing cough. The paroxisms would last for nearly half an hour. When, however, he was occupied or in conversation with friends, or at church, it never came upon him—remedies did no good, and the only antidotes were agreeable sensations, either from social company, or by mental occupation.

The cases upon record, however, are too numerous to be noticed here; a few more shall suffice, and these shall relate to the influences of faith and hope. All know how hope lightens care, supports and sustains the spirit, imparts energy and perseverance to the man, and finally brings him off a triumphant conqueror.

Bruce, the hero of Scotland, was sustained in his deepest trials and darkest hours by having watched the effort of a spider to carry its thread from one point of the wall to another—after many failures it suceeeded—Bruce took courage by its succeess.

During the siege of Bredain, 1625, the garrison was upon the point of capitulating on account of the ravages of the scurvy. The Prince of Orange introduced a few vials of sham medicine which were said to be an infallible specific for the disease. It was given in drops, and produced a wonderful effect.

Park tells us in his travels that one day in his journey through the burning desert, he laid himself down, exhausted with privations, as he supposed, to die. He saw at that moment a flower which reared its head above the waste. What, thought he, will that Providence which has watched over this humble plant not care for me who has been taught to regard Him as a heavenly Father? His drooping spirit rose at the thought, his strength returned, and from that hour his soul was fortified against despondency—"Behold the lilies of the field."

Dr. Beddoes, who was a thoughtful and ingenious man, imagined that the nitrous oxide gas might be a specific for paralysis. He selected a patient for trial, and gave the details to be performed by young Davy, afterwards the celebrated Sir Humphrey Davy. The young chemist wished to ascertain the actual temperature of the patient, placed a thermometer under his tongue. Being ignorant of the nature of the operation to which he was to be subjected in the experiment, and having imbibed the highest hopes and expectations from his enthusiastic physician, supposed when the thermometer was inserted under his tongue that the experiment was in full blast, at once exclaimed that he felt the influence of the remedy through his whole body. Davy was too intelligent to lose the hint. He desired the patient to renew his visit on the following day, when the same ceremony was performed with like results. The patient was dismissed cured in a fortnight.

An amusing anecdote, it is said, used to be related by the celebrated Dr. Gregory in his lectures. A pupil laboring under fever and very restless, was told that an opiate had been prescribed; but the student understood that the prescription was a purgative. On the next visit the physician inquired whether the opiate had procured sleep. "Opiate!" exclaimed the patient, "I understood that it was a purgative, and most nobly has it operated, and I feel all the better for it."

The preservative influence of faith and hope has been illustrated in a thousand instances. How often have physicians and nurses escaped the pestilence, where hundreds were attacked who felt nothing of the sustaining influence of these emotions. But if hope thus sustains and fortifies against disease, fear, the opposite, unhinges the doors to that central fortress, the heart, and lets in the consumer which wastes and destroys. The physical effects of both passions are exceeding striking. In hope, the pulse literally beats high; in fear, it flags and labors in its office, and its palsy is witnessed in the paleness of the face, the blanching of the lip, and the falling of the jaw and relaxation of the muscles. A sense of danger, however, sometimes rouses the latent energies, and gives the dormant limbs activity and power. It is related that an officer in the Indian army was confined by asthma. He could only breathe with difficulty in the erect posture. A party of Mahrattas broke into the camp; the asthmatic sprung out, mounted his horse, and used his sword with great effect. A lady affected with hysterical semi-paralysis had been confined to her bed for years, when it happened that a fire broke out in the house, the hitherto helpless creature rose up, rushed out of the room, and reached the street ere she was sensible what she had done.

The gout has more than once been cured by strong mental emotions. An officer on board of a ship was cured instantaneously of the gout by an alarm of fire. An old man, suffering and helpless under the annual paroxysm of this disease, was instantly cured by his son driving the shaft of his wagon through the window of his room.

Long and continued anxiety ends either in organic disease of the heart, or in insanity. The embarrassment of debt, and even an inordinate love of wealth, leads to insanity. In the foregoing illustrations of mental influence on the body, the book has been open before us, and we have taken such cases as seemed to illustrate our subject. The greater part of the article, however, is intended more for the physician than general reader, and we have omitted at least three-fourths of the chapter. The influence of the emotion of the passions on the body ought to be understood by all. The excitation of hope and the consoling power of faith are often the surest grounds of success to the physician in many of the severest ills of his patients. The patient laboring under organic lesions, may be sustained and cured when supported by hope and faith. The hypochondriac and hysterical are cured when these emotions find a place in their hearts, whether they have been touched by the Mesmerist, swallowed the little pill of homœopathy, or wrapped in the wet sheet of Priessnitz. Something done upon which to hang a hope, even though it is only a thermometer under the tongue, and the heart's strength and the nervous spark gives new life to the pallid frame.

NOTES ON NATURAL HISTORY.

BY JAMES EIGHTS, M. D.

"Water, entering into its solid state, expands, as is well known; therefore all those portions of rock which thus become heaved out of their original places by the formation of ice during the night, will if their centres of gravity permit, fall when the heat of the succeeding day liquifies the ice."—*De la Beche on Degradation of Mountains.*

Repeatedly have I, in the spring and fall seasons of the year, while leisurely sailing along the palisadoes on the Hudson river, had my attention attracted to the destructive effects produced by this powerful agent, upon the trap rocks, of which they are composed: and oft-times, during the greater part of a long southern summer, which I spent among the numerous islands, and lands situated in the arctic sea, did I have occasion to remark the rapid destruction of the heavy clusters of basalt columns which here and there arose from amid the everlasting snows by which they were surrounded. From these masses of basalt the falling fragments were to be heard at rapidly repeated intervals, throughout the course of the long summer day, a fact most readily to be accounted for, when we take into consideration the ever-changing temperature of these high southern regions. In many places, the energetic influences of this powerful agent were peculiarly striking, extensive masses of the rocks had been completely converted into huge disintegrated heaps of ruin, contributing in no small degree to the dreary and desolate effect, which everywhere presented itself to the sight. The average time of the fall of these fragments may be computed at about once in every ten minutes, so that its destroying energy at this place, may be duly appreciated.

"Not only does sulphur thus occur among rocks, but it is also disseminated throughout the ocean, sulphate of soda being one of the salts constantly present in all analyses of sea water. M. Eichwald states that sulphate of magnesia is a common salt in the waters of the Caspian sea."—*De la Beche.*

While at Bonavista, one of the Cape de Verde Islands, where salt is extensively manufactured by solar evaporation from the sea, I made an excursion to the works. Their method is, during gales of wind and high tides to admit water from the sea to float over depressed plains, or basins, where for a time it is exposed to the influence of a tropical sun; after a deposition of the salt, the superfluous water is drawn off into pits prepared for its reception. In these pits, and in the vicinity of these salt-pans, large masses of beautiful transparent crystals of *sulphate of lime* are formed, embracing not only fragments of the trap which form the hills and rocky portions of the island, but likewise, in some abundance, the recent species of shells which inhabit the neighboring sea.

De la Beche considers it very doubtful if a shark could continue long to exist beneath considerable depths. This, in a great measure, may be true, but circumstances sometimes occur, which would induce us to believe them capable of a much longer duration in this situation than has been generally imagined.

While leaning over the vessel's side, during a most perfect calm, in the tropical sea, situated about midway between the two continents, I discovered the appearance of a fish far down in the depths below, lazily working its way upward toward the place where I was standing; indeed, so distant was it, that it seemed no larger than an ordinarily sized shad. A baited hook secured to a line, was immediately let down until within a few inches of its nose. This it unhesitatingly received, the attachment of the hook appearing but little to incommode the serenity of its movements, so that in a short time it reached the surface of the sea. A bowline was now sent down so as to surround the body of the fish, when, without difficulty, it was speedily hoisted upon deck. It proved to be a *shark* of a peculiar species, measuring nearly twelve feet in length. The upper caudal fin was much elongated, and tapering; the dorsal and pectoral ones of a clean white, differing from the general color of the animal, which was of a deep greenish-blue. The beautiful little pilot fish was its companion until its arrival at the surface, when it immediately left and placed itself beneath the counters of the ship. Two specimens of remora, or sucking fish, adhered to its back until it reached the deck. On dissecting this shark, the stomach was found to be entirely empty, not the slightest vestige of any thing like food could be discovered. Pieces of the intestines, and likewise of the flesh, when placed on the hand, produced a sensation nearly equal to that of ice. Previous to this, we had oft-times remarked the sudden appearance of one or more of this species whenever the wind subsided and the sea became calm, and was greatly at a loss to account for it, until the circumstances attending the capture of this individual satisfactorily proved to us, that they came from beneath, and were inhabitants of the deep sea, never having observed them when the surface was in the slightest degree agitated into waves.

"M. Pouillet has observed that the gas in the swimming-bladders of fish brought up from the depths of about 3,300 feet, and therefore under a pressure equal to about 100 atmospheres, increases so considerably in volume that all muscular effort being unable to restrain it, it forces the bladder, stomach, and other neighboring parts outside the throat into the form of a baloon-shaped mass."—*De la Beche on marine animal life.*

This curious fact I had frequent opportunities of observing, when on the banks of Brazil and along the Patagonian coast a few years since. In water, sixty-two fathoms deep, we caught an immense quantity of fish belonging to the genus Gadites, which at these places inhabit the bottom of the sea; on reaching the surface, they almost invariably presented the appearance here stated. Such of them as had disengaged themselves from the hook, were in a short time seen floating at the surface, being unable again to descend in consequence of their swimming-bladders being thus greatly distended, and, with the neighboring parts, protruding far beyond their throats.

Observations on the open sea and in high southern latitudes have perfectly satisfied me that fish do not abound in either places, and are only to be found in the greatest abundance on soundings and along shores, in regions comparatively moderate. In sailing from the American coast to that of Africa, and from thence again to a high southern latitude, we found them extremely limited both as to genera and species. The flying fish we were daily in the habit of seeing as they arose from the bows of the ship in their flight over the sea. The parrot fish, whose beautiful and evanescent hues in dyeing have so often been the theme of admiration, were comparatively scarce. The shark, with its inseparable companions, the pilot and sucking fish, only during calms; a small species of file fish but once, and two of scomber completes the list.

The bonita and the albicore, the two species of the last named genus, were exceedingly common in the tropical seas. When we reached the sixth degree of north latitũde we fell in with an immense shoal of them, which day and night kept perfect time with the vessel's speed, until our arrival at a corresponding latitude south; beyond which, we saw them no more. The appearance of these fish during the night exhibits a most interesting and beautiful spectacle. The friction of their bodies in gliding through the waves but a few feet beneath the surface, cause the surrounding waters to emit a brilliancy of phosphorescence, to such a degree, that the vessel seems to be richly imbedded in a mass of liquid flame—not unaptly resembling a multitude of meteors pursuing their varied courses through the night.

A circumstance occurred which satisfactorily proved to us that this individual shoal never left us during the whole distance, but accompanied us as an escort to the very boundaries of their domain. When first discovered, the seamen were daily in the habit of striking them with the grains from the bows of the ship: one of them having been struck, was brought to the surface, when the iron losing its hold, it escaped, bearing on its side a large ragged wound, which easily distinguished it from its comrades in the sea. As long as they remained in company, this individual continued daily to be seen and recognized by the sailors as the "gentleman with the patch."

When moored at the South Shetlands, we were constantly in the habit of suspending lines around with baited hooks over the vessel's side, but in no instance did we find them in the slightest degree molested, and the only fish that we saw during our stay of several weeks was a small species of herring that fell from the beak of an alarmed sea-bird, on being fired at in its flight.

DESCRIPTION OF SOME OF THE BONES OF THE ZEUGLODON CETOIDES OF PROF. OWEN.

There is no word in the English language which so appropriately expresses the true character of certain phenomena and events, or whose import conveys to our minds so much of the profound and deep, as *mystery.* The first impression as it regards its meaning perhaps is, that it can be applied only to those events and phenomena whose causes are so far removed from our means of investigation, that they are above and beyond our reach. We believe, however, that this is not strictly true, and experience seems to justify the assertion, that many phenomena still remain invested with the deep and profound, though the causes of their occurrence may have been placed before the understanding in the clearest light.

It is true, that there are somethings which are mysterious so long only as their causes are hidden from us; the tricks of jugglers, for instance, may be so regarded, but these are not the phenomena which we have in view, neither are they ever of that kind, which move the deeper feelings of the soul; they merely excite a temporary surprise.

The phenomena and events, over which hang a deep and profound mystery, and which stand farthest advanced in the fore ground, are those which belong to the natural world. Some of these stand out more prominently than others, but none more so than those which are connected with the extinction of life in the vast period of geologic time. These we apprehend will never in time be less mysterious than they are now, for they are as much so as they were a half a century ago, when the facts were then becoming established, or, in the intermediate time when they began to be incorporated into the common beliefs of scientific men; and now, that they seem about to become a part of the common stock of knowledge they still maintain all that they ever possessed of the profound and mysterious. How much this feeling has been deepened by circumstances we cannot say. If the low and the humble had only been involved in the catastrophes of which we speak we might have felt less interest in the events. When, however, it was discovered that the high as well as the low, the great as well as the powerful, had been subjected to the same law, men were more conscious of the magnitude and importance of the facts, and began to study with deeper feelings the phenomena connected with them.

But the interest of these phenomena do not rest alone, nor so much, on the place which the beings themselves occupy in the scale of existence, as on the design and end of such an ordinance. The phenomena themselves when viewed with all the light which can be concentrated upon them, prove that they cannot have happened through what is termed accident; but, rather that they belong to a series of changes and revolutions by which important ends were to be secured. It is this fact which invests the extinction of life with its great and unparalleled interest, and which throws over the whole series of changes connected with it, an inscrutable mystery. It is the fact, that they belong to and are a part of the system of changes in time, and that they constitute a part of the history of life and organization; or, we may regard them as a part of the drama of which some of the scenes have been already acted, and like those which are now passing before us, its grand design and moral comes out only with the winding up of the piece. A higher reason perhaps than those indicated above is contained in the fact, that man is an actor in this drama, and is connected directly or indirectly with the scenes which came and passed off the stage before his time. We are sustained in this view when we consider that all the events and phenomena *in time* have followed one another in order, and that they belong together and constitute one system, not many; a grand unity, which, though consisting of many parts, yet together make but one whole or entire piece.

The matter stands thus; species high and low, the powerful and feeble, have ceased to be, and are not now the occupants of time in the line of their posterity. Their extinction is a part of a system by which important ends are to be secured. Man belongs to the same system, and is made an actor in the drama. It is in the combined particulars that we find so much mystery, and which we believe would still invest the events and phenomena, if the ends and designs were disclosed. But these are not, and have not yet been proposed even in hypothesis; and they are so far from being specifically accounted for, that they stand merely as facts; and though it may not be true to say that nothing has been done towards their developement, still the phenomena and events, though belonging to one system, are such that their relations to those in time, those in which man participates, that they yet remain veiled in mystery.

With these general remarks we shall proceed to the subject which we have taken some pains and incurred some expense to illustrate. We have already alluded to the extinction of animals, and though numerous remains of them are found in the sedimentary rocks of this country, yet but few specimens of the larger kind have been found which were so perfect that the preserved parts could be p' t together so as to form complete skeletons, except in a few instances of the great American mastodon. Great quantities of fossil bones, however, have been discovered in Alabama, belonging to the Zeuglodon, which is a most remarkable animal, and which has been pronounced by Prof. Owen "as one of the most extraordinary of mammalia, which the revolutions of the globe have blotted out of the number of existing beings." Undoubtedly, if sufficient care had been taken to preserve and collect these bones together, several complete skeletons might have been constructed, and its true position in the scale of being have been determined, together with the relations which it held to the general species composing the present fauna. As one of the most perfect of these skeletons has fallen into our possession, we propose on this occasion to describe some of the most important individual parts, of which we have prepared accurate drawings. It will be remembered, however, that this subject was taken up in the third number of this Journal, for 1845. In this paper our design contemplated only a description of the teeth, as we found by investigation that Mr. Owen, who had been supplied with a few specimens of the bones of this animal, and among them a few teeth, had fallen inadvertently into an error in regard to their structure, or rather form, not however from want of skill or knowledge, but in consequence of the imperfection of the specimens themselves. No man living knows more of the relations of the parts belonging to organized beings than the gentleman we have named.

The parts of the skeleton described and figured are the anterior and posterior extremities of the lower jaw, two caudal and one cervical vertebræ, humerus, tibia, rib, and a tooth.

Anterior portion of the Lower Jaw.—Pl. II., fig. 2. The portion contains three teeth, the terminal teeth are both broken close to their sockets; fig. 4, *a*, shows a wide space which exists between the two remaining canine teeth, between which there is a fossa *b*, for the reception of the superior canine; the superior tooth when the mouth was closed, shut upon the outside of the lower jaw. A deep groove passes longitudinally along the centre of the jaw, $1\frac{1}{8}$ inches deep, and $1\frac{1}{4}$ wide. This portion of the jaw is 15 inches long, and 4 inches thick at the largest end. The shape of this piece proves that the Zeuglodon had a very long narrow snout, and comparatively high; and in this respect is unlike the aligator of this country, which is rather broad and flat. Fig. 2, side view; fig. 4, front view.

Fig. 1. *Tibia?*—This bone seems to be a tibia, with the large end broken and lost. Lower articulating surface, as would be expected, oblique and flattened towards the tarsal extremity; length, 14 inches; breadth, at the flattened part, $3\frac{3}{4}$. It has a ridge posteriorly, for the insertion of muscles. Although this bone is broken, and its head missing, there are two perfect heads of the humeri among the bones, which judging from their *size* would be considered applicable to this bone; their broken surfaces do not, however, fit each other, and the form of this long bone seems to indicate that it is a tibia rather than a humerus. This is particularly indicated by the sharp and tolerably high ridge along its posterior part.

Humerus.—Figs. 5, 7. This a short thick bone, flattened at the inferior part; lower articulating surface broken and absent. Length of the remaining part, $13\frac{1}{4}$ inches; diameter of the flattened part, 5 inches; diameter at the head, 6 inches. The head of this bone when inserted into the acetabulum is evidently far too small, and there can be no doubt that it is a humerus, rather than the femur; and, besides, the parallelism of the head with the shaft of the bone very clearly designates the position it occupies in the skeleton.

Cervical Vertebræ.—Fig. 6. The cervical bones are broken; they were enveloped but partially in the matrix, and hence have been exposed to injury; transverse diameter of the body, 6 inches; perpendicular $3\frac{1}{2}$ inches, and rather sharply rounded. Length of the spinous process, 7 inches. Diameter of the spinal canal, 2 inches; transverse diameter of the spinal canal, $3\frac{1}{2}$ inches. This process is rather attenuated, slender and high in proportion to the thickness of the vertebræ. It is evident from the number and size of those vertebræ that the Zeuglodon was furnished with a long slender neck, and in this respect exhibits one of the extremes among the cetacea.

Tooth.—Fig. 3. This is the natural size of the tooth, and is perfect in all respects. The drawing conveys a perfect idea of its shape and character. The serratures are sharp, and seem never to have been used. Indeed, all the teeth of this animal exhibit a perfect condition, which belongs only to teeth whose office is merely that of seizing and holding its prey; or else, the teeth of a young animal. The crowns are never worn by mastication.

Base of the Lower Jaw.—Plate I., fig. 1.* This is perhaps one of the most interesting bones in the collection. Its height at the coronoid process is 10 inches, and the whole length of the piece 17 inches. *a*, large surface is a mere cast, as the part at *a* has the form of the hollow portion. *b*, coronoid process. *c*, condyle, which in comparison with the size of the jaw is quite small. Outer surface convex; inner, concave. The four back teeth in the jaw remain, of which the anterior one is not represented in the engraving. In consequence of the exfoliation of the convex part of this bone, the jaw tapers more rapidly than natural.

Small Caudal Vertebra.—Fig. 2. The body has the usual form of a vertebra, but there are no transverse or spinous processes, not even rudiments of them. The superior face supports two processes, one on each side, which stand upward, backward and outward, having a wide space between them. Their length must have been one and a half to two inches. About three-fourths of an inch remains. Transverse diameter, $3\frac{1}{2}$; perpendicular diameter, $2\frac{3}{4}$; length measured over the superior margin $2\frac{1}{4}$, at the inferior 2 inches. A bony rough ridge runs longitudinally between

* The engraver not being an anatomist has turned the upper edge down.

the processes, as seen in the figure. There appears to be two articulating surfaces at *a*, the base of the processes. The articulating surfaces of the body have a shallow conical depression at the centre, but adjacent to the margin they are slightly convex.

Rib.—Fig. 4. The shape and structure of the rib is quite remarkable. The bone figured is 2 feet long, but a piece is broken from the sternal portion. Diameter of the articulating surface $1\frac{1}{2}$ inches. Transverse diameter of the enlarged part $3\frac{1}{2}$ inches; perpendicular, $2\frac{5}{8}$ inches. Fig. 5 exhibits a cross section showing the concentric laminæ, and the excentric form of the section.

Large Caudal Vertebræ.—Figs. 3 and 4. Form cylindrical, slightly concave in the centre, convex towards their margin. Constricted in the middle with three depressions, *a*, *a*. Fig. 4, shows the base of a broad thin transverse process. Length of the bone 14 inches. Transverse diameter $8\frac{7}{8}$ inches; perpendicular $7\frac{7}{8}$ inches. The entire length of the transverse process of a lumbar vertebra is 5 inches.

Geological position of the Zeuglodon.—In the former account which we gave of the remains of this animal, we stated that they were found in the superior part of the secondary deposits, in beds which might be considered superior to the true chalk. This opinion was founded on the fact that some of the fossils which were associated with these remains were considered as secondary,—viz., the Authophyllum atlanticum, Phagiostoma dumosum, Nummulites, &c. Mr. Lyell, however, states in a letter to Mr. B. Silliman, Jr., which is given in a postcript to the March number of the Journal of Science, that the formation is Eocene, or in the oldest of the tertiary deposits. 1. I have visited, to use his own words, in the letter referred to, some of the principal localities where the bones of the gigantic Cetacean (*the Zeuglodon*) have been discovered, in Clarke county, Ala., in the fork of the rivers Alabama and Tombeckbee, and find the geological position of the bones to be every where the same, namely, in a white tertiary limestone of the Eocene period, corresponding in age to that of the Santee river, in South Carolina, or of Bucks county, in Georgia, or that of the upper part of the celebrated bluff of Claiborne in Alabama.

2. The beds in which the remains of the Zeuglodon occur are above the level of those Claiborne deposits, so well studied and described by Mr. Conrad, in 1832–3, as containing several hundred perfectly preserved species of lower tertiary shells.

3. Part of the head of the Zeuglodon and vertebræ, extending to a length of 30 feet, were procured by Mr. Koch, in 1845, at a place which I visited four and a half miles southwest from Clarksville, Ala., in company with Mr. Picket, who assisted in the exhumation made by Mr. Koch. But the main body of the vertebræ (as I learn from the same gentleman and other persons), which entered into the skeleton exhibited in the United States in 1845, under the name of Hydrarchos, were procured in Washington county, Ala., fifteen miles distant, in a direct line from the place where the head was discovered."

Only a few remarks will be offered in conclusion in regard to this animal. When first discovered it was placed by the late Dr. Harlan with the lizards. Subsequently Mr. Owen, to whom specimens of the bones were referred, ascertained that it belonged to another order of animals, namely, the *mammalia,* and that it occupied a position among the cetacea.

In which of the subdivisions of this order it most naturally belonged could not be determined. The teeth, however, as now brought out will undoubtedly aid in establishing its alliances more closely than heretofore. It may perhaps be still regarded as a cetacean of the most distant type. The length of its neck, the form of the teeth, the shape of the pelvis and scapula, and four extremities, which are clearly in the form of paddles, certainly remove it far outwards from the centre of the group, and places it nearer the seals than lamanatin or dugong. One remarkable fact in regard to the teeth is, their extreme irregularity, no two seem to be alike. This will be seen by comparing the tooth on plate 2, with those in a former number of the Journal, and in fact the forms of the teeth are not all given now. The canine seem to pass into the molars by gradation, becoming flattened, and with the fags still united, though deeply groved. This change goes on till the perfect molar is formed, when these also vary greatly in their crowns, &c.

The tympanic bones were found imbedded in the matrix in which some of the others were covered which resemble the Cetacean, only they are much smaller than those of the sperm whale. They are only three inches long, and one and a half to two inches thick.

[To be continued.]

DROWNING.

The cause of death by drowning, is the exclusion of air from the lungs, and not the inhalation of water, as some suppose. If persons then who may happen to be thrown into the water, will preserve presence of mind they may be often rescued from this perilous position, though they are unable to swim. We may put confidence in this assertion, because the body, when the lungs are only partially inflated with air, is specifically lighter than water. A person then, who would avail himself of this fact, must suffer his whole body with his arms to be immersed; and, at the same time, throw his head back, so as to bring his nose and mouth upwards. In this position he may float for a long time provided he does not struggle, and thereby exhaust his strength unnecessarily. If he but raises one arm above the water his face will sink beneath the surface of the water, hence the proper way is to remain perfectly calm, and let the body float in the position designated. It is, however, important, when a person is conscious that he is about to be submerged, to take two or three as deep inspirations as possible, after having first expelled all the air possible in his lungs; as thereby a new and larger stock of respirable matter is secured, by which respiration may be suspended with safety a longer period than it could be without this precaution.

NEW PUBLICATIONS.

EUROPEAN AGRICULTURE AND RURAL ECONOMY FROM PERSONAL OBSERVATION.

[By Henry Coleman, of the United States of America. To be completed in 10 numbers.]

"For, in all things whatever, the mind is the most valuable and the most important; and in this scale the whole of agriculture is in a natural and just order: the beast is an informing principle to the plow and cart, the laborer is as reason to the beast, and the farmer is as a thinking and presiding principle to the laborer."—Burke.

The first instalment of Mr. Henry Coleman's European Agriculture and Rural Economy has been issued from the press, and received in this country. This instalment comes to us in five numbers of nearly 100 pages each, making in all 492 pages. About the same quantity of matter we suppose remains to be issued. The complete work will then consist of 2 vols., 8 vo., of one thousand pages, with ten beautiful steel plate engravings of cattle, sheep and horses, together with the necessary wood cuts for the illustration of English implements of husbandry. Thus far the mechanical execution of this work is every thing which we had a right to expect, and of which none will find the least fault. It is excellent. Mr. Coleman's habits and great love of beauty and neatness necessarily resulted in what we have said of the mechanical execution of the work. Then again, the style, the composition, figures of speech, illustrations of ideas, are all in keeping and in harmony with the pages of the work.

No man ever went out from this country to obtain agricultural knowledge who took such a task upon himself (we might say responsibility, perhaps, but we rather say *task*), as Mr. Coleman; inasmuch as the execution of it required that he should do something or find out something by which money would be put into the pockets of his subscribers; or, if this expression is too vulgar, we will modify the expression and say, that he should at least provide for them a rich intellectual feast. It may be that both was expected, and if so, certainly his task was quite as great as that of an editor of a periodical.

Essentially, and to all intents and purposes, Mr. Coleman was constituted a delegate to Europe, to observe modes and methods of agriculture by personal inspection, and to report thereupon to his numerous friends and to the agricultural profession in America.

The subjects of enquiry of course were very numerous, and Mr. Coleman it seems was, in the outset, fully aware of what was before him, as we find a long list of subjects which he proposes to investigate in his preface to the first volume. Thus we find the following list of subjects of inquiry, viz: the soil, and their relations to the different crops; manures and their applications; implements of husbandry; the great operations of agriculture, such as plowing, sowing, cultivating and cleaning; harvesting and preparing the crops for use or market; draining, irrigation, fencing; forest trees, grasses, cereals; live stock, poultry, dairy; cultivation of silk, flax, hemp, hops, teasels, madder, woad, mustard, chicory, olives, grapes, figs, wool, honey, wine, oil, sugar; horticulture, rural architecture, conservatories, greenhouses; markets, fairs; farming accounts; agricultural labor, societies, manures, shows, schools, education, literature; the condition of the rural population; benefit clubs, mutual assurance associations, cow clubs, friendly associations; rural life, morals, manners, and customs! A tolerably wide field for one man to work in! A prodigious range of inquiry, which when spread out into volumes would make quite a respectable Encyclopedia.

Some of the topics which Mr. C. enumerates, and upon which he has favored us with his observations, we propose to lay before our readers.

The first general title which strikes our eye, is English agriculture, Mr. C. remarks:

"The condition of practical agriculture in Great Britain, as far as I have had opportunity of observing it, must be pronounced highly improved. Many parts of the country present an order, exactness and neatness of cultivation, greatly to be admired; but a sky is seldom without clouds, and there are parts of England where the appearance is anything but laudable, and where there are few and very equivocal evidences of skill, industry or thrift. We are often told in America, that England is only a large garden, in which art and skill and labor have smoothed all the rough places, filled up the hollow places, and brought every thing into a beautiful and systematic harmony, and into the highest degree of productiveness, This is not wholly true; indeed, though there are many farms to be altogether admired for the degree of perfection to which their cultivation has been carried, yet there are not a few places where the indications of neglect and indolence and unskillfulness are but too apparent; and where, in an obvious contest for victory between the cultivated plant and the weeds, the latter triumph from their superiority both in force and numbers. I shall, however, most cheerfully admit that English farming, taken as a whole, is characterized by a neatness, exactness, thoroughness seldom seen in my own country. An American landing in Liverpool, is at once struck with the amount of labor every where expended; the docks, and the public buildings, and the lofty and magnificent warehouses astonish him by the substantial and permanent character of their structure. The railways, likewise, with deep excavations, their bridges of solid masonry, their splendid viaducts, their immense tunnels, extending in some cases more than two miles in length, and their depôts and station houses covering acres of ground with their iron pillars and their roofs, also of iron, exhibiting a sort of tracery or net work of the strongest as well as most beautiful description, indicate a most profuse expenditure of labor, and are evidently made to endure. He is still more overpowered with amazement, when coming to London, he passes up or down the river Thames, and contemplates the several great bridges, among the most splendid objects which are to be seen in England, two of which are of iron and three of stone, spanning this great thoroughfare of commerce with their beautiful arches, and made as if, as far as human presumption can go, they would bid defiance to the decay and ravages of time. If to this he adds (as, indeed, how can he help doing it?) a visit to the Thames Tunnel—a secure, a dry, a brilliant, and even a gay passage under the bed of the stream, where the tides of the ocean daily roll their waves, and the mighty barks of commerce and war float in all their majesty and pride over his head, exhibiting the perfection of engineering, and a strength of construction and finish, which leaves not a doubt of its security and endurance—he perceives an expense of labor, which disdains all the the limited calculations of a young and comparatively poor country. He remarks a thoroughness of workmanship which is most admirable, and which indicates a boldness and bravery of enterprise, taking into its calculations not merely years but centuries to come. We have in America a common saying in respect to many things which we undertake, that, "this will do for the present," which does not seem to me to be known in England; and we have a variety of cheap, insubstantial, slight-o'-hand ways of doing many things, sometimes vulgarly denominated "making shifts to do," which we ascribe to what we call Yankee cleverness, of which certainly no signs are to be seen here. In front of my lodgings, in London, near Charing Cross, is now in the process of erection the Nelson monument, a Corinthian column of stone, more than one hundred and fifty feet in height, surmounted by a statue of that distinguished man, one of the idols of the British nation, whose name is regarded as the brightest gem in her naval diadem. Now I have been credibly informed that the staging alone, which is a wooden frame, constructed indeed with admirable art, and put together with remarkable skill and strength, cost not less than four thousand pounds sterling, or about twenty thousand dollars. I mention these as examples of the manner in which things are done here; and add, that agricultural operations and improvements are in general conducted and finished in the same thorough and substantial manner.

"The walls enclosing many of the noblemen's parks in England, which comprehend hundreds, and in some cases, thousands of acres, are brick walls, of ten and twelve feet in height, running for miles and miles. The walls round many of the farms in Scotland, called there "dykes," made of the stone of the country, and laid in lime and capped with flat stones resting vertically upon their edges, are finished pieces of masonry. The improvements at the Duke of Portland's, at Welbeck, Nottinghamshire, in his arrangements for draining and irrigating, at his pleasure, from three to five hundred acres of land, without doubt one of the most skilful and magnificent agricultural improvements ever made, are executed in the most finished and permanent manner; the embankments, the channels, the sluices, the dams, the gates, being constructed, in all cases where it would be most useful and proper, of stone or iron. These are only samples of the style in which things are done here. The important operations of embanking and of draining, especially under the new system of draining and subsoiling, are executed most thoroughly. The farm houses and farm buildings are of brick or stone, and all calculated to endure.

"I cannot recommend, without considerable qualifications, these expensive ways of doing things to my own countrymen. We have not the means—the capital for accomplishing them; but we might gather from them a useful lesson; for, in general, we err by an opposite extreme. We build too slightly—we do not execute our improvements thoroughly—we have little capital to expend, when, of course, no substantial improvements can be effected; and labor, with us, is with more difficulty obtained, with far more difficulty managed, and requires to be much more highly paid than here. I hope I shall be pardoned for adding, as my deliberate conviction, that we are too shy of investing money in improvements of this nature, however secure, because they do not yield so large a per centage as many other investments somewhat more questionable in a moral view, and vastly more so in respect to the security which they offer.

"There are circumstances in the condition of things here, which certainly warrant a much more liberal expenditure in improvements than would be eligible with us. Here exist the right of primogeniture and the law of entail, so that an estate remains in the same family for centuries; and a man is comparatively sure that the improvements which he makes will be enjoyed by his children's children. Things are entirely different with us—houses in our cities are continually changing hands, and are scarcely occupied by one life; and in the country, even in staid New England, few estates are in the hands of the third or fourth generation in the direct line of descent. I shall not at all discuss the comparative advantages, expediency or propriety of one or the other system. I leave those inferences to others—my business is with the fact as it is; and, like short leases, it has an obvious tendency to hinder or discourage improvements of a substantial and permant character, involving a large expense."

We have extracted the whole of this section except the first paragraph, for particular reasons, which will appear in the course of our criticism of Mr. Coleman's work. The subject which follows is English capital. In this section we are informed of the immense wealth of the English nobility, an illustration of which is furnished in the magnitude of the enterprises which are undertaken. A certain nobleman contracts with a master builder for the erection of four thousand substantial houses, of good size for occupation. So it appears, on inquiry, that acres of land, blocks of buildings, vast squares of elegant mañsions, in the very centre of this vast metropolis, are owned by individuals. Even confectioners, dealers in sugar plumbs, have returned yearly incomes which exceed one hundred and fifty thousand dollars, more than six times the salary of the President of the United States. The rent which some farmers pay exceeds thirty-five thousand dollars. These undoubtedly are strong cases but even admitted, we are satisfied that the wealth of England is immense.

General appearance of the country.—We are always anxious to know how a country looks. Upon this subject Mr. C. contrasts our new country with old England, whose lands have been under cultivation and produced sustenance for man since the time of Julius Cæsar and long before. The American traveler who expects then to see girdled trees, charred stumps, smoking brush heaps, or new black lands, in the first stage of taming and subjugation, will be disappointed. It is true there are moors and fens, and heaths, but upon the latter a man may cast his eye and perhaps survey at a glance thousands of acres without a standing tree or a fence to intercept the range of vision, yet the general aspect of the country is smooth, closely shorn and shaven. Smooth carpeted lawns, with perhaps clumps of trees, with castles and turrets in the distance, is the kind of scenery which costrasts so strongly with ours. Cultivation there is clean, like a man washed, shaved and dressed for the Sabbath. A fact, however, which Mr. Coleman states, and what we should by no means expect in a country so rich, and yet so full of laborers, is that in England and Scotland there are full 10,000,000 of acres in heath or moor, and all susceptible of being brought into productive cultivation. This high cultivation, however, which is generally observed, this excessive neatness of the fields, this exact and measured culture is not only beautiful, but, in the long run, Mr. C. considers more economical than American slovenliness. Does it take more time to lay over the turf evenly and smoothly like the plaits in a shirt ruffle, than to hackle it with interrupted short furrows, here gouging out a hole and there letting the plow slide upon the top? Certainly not. Mr. Coleman is right, and his hint to his countrymen ought not to be lost. But alas, we learn after all that there are some Americans in England, there are stone heaps which have lain for half a century, and unsightly rubbish to boot, on farms, which it would seem must have been in the hands of some easy quiet Jonathan rather than under the thorough management of an English farmer.

We pass over several chapters in succession and proceed to take up the one on agricultural population. What is the character of the agricultural population of England? How does it differ from our own? It appears from Mr. Coleman's notes, that the population is divided into three casts or classes. The *landlord*, the *tenant*, and the *laborer*. The landlord is the owner of the soil. He is the nobleman and gentleman, and is looked up to with great deference. His lands often consist of wide territories, and in truth is divided into farms of from 3 to 8 and even 1200 acres in some instances. They are rented to farmers who pay from five shillings the five pounds per acre, according to circumstances. The rents are paid semi-annually, in money, though sometimes in kind.

The rent is estimated at a third of its products; but sometimes a different rule is followed, which is, after paying the expense of cultivation and the usual assessments, the balance is divided equally between the landlord and tenant. But frequently no rule is followed, and each party makes the best bargain he can for himself.

To us, Americans, it undoubtedly becomes a question whether a country is benefitted by this great preponderance of landed possessions in the *few*. It appears, however, whatever may be the case, good or evil to the country, that great liberality prevails with the landlords in the expenditures for the improvement of their estates, and that every necessary aid is rendered to the tenant in these investments. A drawback upon the profits of the tenant, however, exists in the taxes, which in many cases amount to a sum equal to the rent of the land. The tithes amount to one-tenth of every article produced, and are not now taken in kind, but in money. The poor rates are heavy, and are paid by the tenants.

2. *The farmers.*—The farmers are not like the farmers in the United States; the latter labor with their own hands, the former with the hands of others. They are described as a substantial body of men, who are well informed, and even live in a style of elegance and ease. They are indeed men of capital, as they

must be, otherwise they could not manage an estate which calls for heavy expenditures. It seems that the amount of capital required for managing an estate, is double or treble the amount of rent; which cannot be set down at much less than $50 per acre. In respect to capital, then, there is a wide difference between an English and American farmer. Two hands and a willing soul, as our friend of the Genesee Farmer would say, is all the capital which is really required on this side the Atlantic to plow or graze a farm. But with this small American capital, the farmer is unable to wait for a market, and hence sometimes labors under the disadvantages of strong and imperious necessity.

3. *Agricultural laborers*—We have said that this division of men in agriculture is much like a *cast;* for it appears that the lines of demarkation between them are strictly drawn—the individual moves in his own orbit, in which birth and education has cast him.

The agricultural laborer, unlike the American, is in a low condition; the greatest hardships they suffer seems to be in wanting food. His outward man is better off than the inward, especially the *stomach.* Here, then, is a class whose great business must be to scrape up enough to satisfy the cravings of appetite; for the expectations of competency, can scarcely ever cheer the vision of the poor laborer; if it does, it is a dream when the man slumbers, for in his wakeful moments the barrier is seen to be too high to be scaled, the chains too strongly riveted to be cast off.

Another feature in the condition of the laborer, is the division of labor. A plowman is always a plowman, a ditcher is but a ditcher, and a shepherd tends his flocks only, and neither plows nor ditches. The effect is self-evident, the business is mechanically well done, and the landlords and tenants reap the benefit, while the individual from his limited capacity is bound forever to move in the little orbit in which he was originally cast. But after all these are drawbacks; although mechanical excellence may be secured, he becomes a plodder, slow in his movements, with a stiff gait and a laborious movement of his nether extremities.

One of the best examples, an instance of success as it would be termed, in this sphere, is given by Mr. Coleman, which we consider well worthy of particular notice.

"I visited one laborer's cottage, to which I was carried by the farmer himself, who was desirous of shewing me, as he said, one of the best examples, within his knowledge, of that condition of life. The house, though very small, was extremely neat and tidy; the Bible lay upon the shelf without an unbroken cobweb upon its covers; the dressers were covered with an unusual quantity of crockery, sufficient to furnish a table for a large party—a kind of accumulation which, I was told, was very common; and their pardonable vanity runs in this way, as, in higher conditions of life, we see the same passion exhibiting itself in the accumulation of family plate. The man and woman were laborers, greatly esteemed for their good conduct, and had both of them been in the service more than forty years. I asked them if, in the course of that time, they had not been able to lay by some small store of money to make them comfortable in their old age? I could not have surprised them more by any question which I could have proposed. They replied that it had been a constant struggle for them to sustain themselves, but any surplus was beyond their reach. I cannot help thinking that the condition is a hard one in which incessant and faithful labor, for so many years, will not enable the frugal and industrious to make some small provision for the period of helplessness and decay, in a country where the accumulations of wealth in some hands, growing out of this same labor, are enormous."

We should be glad to follow Mr. Coleman still further in his account of the condition of the laboring class in England, and especially go into a minute statement of the wages which they receive, and of the allotment system which is designed to ameliorate their condition, but we must refer the reader to the work itself for information upon these subjects. We may say without fear of contradiction, that the evils which attend English husbandry, when taken in connection with entails, patents and mortmains are sufficiently great to stifle any complaints of our condition, though princely fortunes here were as distant as the polar star.

In the second part, several subjects practically important to farmers in this country are discussed with ability. First, the quantity of seed proper to be sown is one of great interest. The quantity which may be profitably sown can be determined with some exactness; and yet, to do this the land must be in a certain condition—for while one would profitably receive two bushels another would be overstocked and the seed lost, at least in part. Mr. Coleman remarks truly, that there may be an excess, or there may be too little seed sown; in either case there is a loss. The experience of a distinguished farmer seems to go to prove that one bushel is sufficient; which, if true, would save the country not less than 10,628,056 bushels; this result is founded upon a calculation that the common practice is to sow 2½ bushels to the acre. In this practice nearly one-tenth of the produce is consumed in seed; whereas, if less quantity was sown, more room would be given to tiller out, and the result would be an increase of four hundred fold. The proportions of seed which the farmer already referred to, proposes, are as follows:

Of rye 1½ bushel,	Of oats 8 pecks.
Of tares 1½ bushel.	Of barley 7 pecks.
Of mangel wurtzel 6 lbs.	Of wheat 3 pecks.
Of swedes 1 quart.	Of peas 8 pecks.
Of turnips 1 quart.	Of beans 8 pecks.
Of Cabbages 1 quart every three feet.	

The argument for the small quantity of seed rests on the more perfect developement of ears, and the greater size and perfection of kernels. When a large quantity of seed is sown, the space for the crop is too little when it has attained its size, and there is a want of both air and food, and hence an imperfect development of both ear and seed.

Another subject brought to our notice, is *spade cultivation.* One thing appears to be established, namely, that land under this culture is better prepared for all crops than when they are plowed; but, in order that profit may be reaped, it is essential that labor should be cheap; hence, in this country where labor is dear, this mode of cultivation must be limited to the garden, or at least greatly confined. Where too, there is a ready cash market, from 8 to 10 acres can without doubt be cultivated with profit, especially if put down to roots, and the miscellaneous products which are always called for in cities, such as celery, cabbage, potatoes, beans, peas, carrots, etc.

The actual improvements in English agriculture.—By what method has the husbandry of England been improved and brought to the present high condition of the art? 1. By draining, irrigation and warping. 2. By attention to live stock and vegetables. 3. By improved agricultural instruments. 4. By the aids and facilities which steam power gives in bringing the market to every man's door, and by driving machinery for thrashing grain, etc. 5. Increased production. 6. By the energy, activity and enlightened labors of the agricultural societies. Especially have these societies improved the English agriculture in giving a right direction to farm labor, and in exciting inquiry upon proper subjects, and devising the best means for securing important and feasible ends.

One subject more and we shall dismiss part second of the European Agriculture. It relates to agricultural education and model farms, and schools for the improvement of the Irish. The accomplishment of several important objects are proposed by the establishment of this institution. 1. To promote the cause of education, and extend its benefits far and wide, and particularly into those fields which are so far removed from intellectual light that scarce a ray ever reaches them. 2. To raise up and qualify teachers or school masters. 3. To furnish opportunities to the young to acquire skill and knowledge in practical husbandry and the details of farming. The model farm and school is located at Glasnevin, three miles from Dublin, and has connected with it fifty-two acres of land, the whole of which is under cultivation, and a perfect system of rotation of crops. The master of the school rents the land at five pounds per acre; this, together with the taxes and expenses, carry it up to eight pounds per acre. Twelve poor boys, or lads, live with him and devote six hours per day in labor, in addition to which the master receives eight shillings per week. The time, when not employed in labor, is devoted to the study of the most useful branches of education, such as arithmetic, geography, natural philosophy, and agriculture, in all its scientific and practical details. Enterprises of this kind need no commendation; the good and happy influences which they must exert in a thousand ways can never be told or reckoned up.

The subject of agricultural schools is carried far into the part third; indeed, it may be considered as occupying the whole ground. For details in regard to the working of the numerous schools, their objects, plans, &c., we must refer our readers to the work itself. We must not, however, pass by the plan of an agricultural institution for the United States, which Mr. Coleman recommends to the consideration of its citizens. We give Mr. C.'s views upon this subject in his own language.

"First, then, in every system of agricultural education, there should be an institution for the thorough indoctrination of the pupil in natural science, and in mechanical physiology, so far as it can be made to bear upon agriculture. I have already treated fully of what, on this topic, should be taught in an institution of this nature.

"Secondly, there should be a model farm, which should be accessible to the pupils, and where they might see an example of the best management, and the best practices in husbandry. It is obvious, however, that a single farm can present, excepting on a small scale, only a single kind of farming; and that it would be hardly possible to find a single locality presenting any considerable, or very instructive specimen of the different kinds of farming, such as arable, grazing, stock-breeding, stall-feeding, sheep-raising and dairying. But the particular and careful observation even of one kind of well-conducted farming would qualify a pupil for understanding and receiving information on every other, whenever it came in his way, or wherever it might be attainable. Stall-feeding is intimately connected and often associated with arable farming, and dairying with grazing. The management of live stock, whether for work, for fatting, or for dairying, might, in a small degree, be exemplified on every well-managed farm. Such an appendage as this to a school of practical instruction, where the pupils might see and have explained to them, the very best modes of husbandry, must be of the highest benefit. To these should be added an experimental farm. This need not be extensive, and it might be connected with the model farm; indeed, the model farm might itself be, to a degree, an experimental farm. It may be said that the premiums offered by agricultural societies, for various experiments in husbandry, are sufficient to meet the public wants in this case. I admit that they have in this way rendered immense benefits to the public; but there are still wanted various trials and tests of soils, manures, grasses, plants, implements, modes of cultivation, modes of feeding, breeding, dairying,—and on the effects of temperature, moisture, heat, frost, light and electricity,—which common farmers can scarcely be expected to undertake, or, if undertaken, to follow out with that exactness which is most desirable, in order to render the results of such experiments worthy of confidence, and lessons for general application.

"Connected with the whole should be most extensive gardens—first, for purposes of botanical instruction, giving the pupils an opportunity of becoming acquainted with all the principal plants, grasses, forest-trees, fruit-trees and weeds, which enter into their cultivation, to the advantage or injury of the farmer; and next, for making them thoroughly acquainted (a knowledge highly important to them) with the cultivation of all the varieties of vegetables and fruits which may be required for use, profit or luxury."

"Let us suppose that it were proposed to establish such an institution in the western part of New York. Certainly no location could, in respect to the external circumstance of soil, climate, access, society and markets, be more favorable. A farm of five hundred acres might be taken, on favorable terms, on a long lease. I would under no circumstances suffer the number of pupils to exceed one hundred, and perhaps it might be expedient to restrict the number much more. Some good-sized hall or building would be requisite for public meetings, lectures or recitation-rooms, and for a museum, library and chemical-laboratory; but I would erect no college building for the residence of the pupils. They should either lodge in the neighborhood, with such farmers as would be willing to receive them, or other persons who might be disposed to provide for them; or otherwise, I would erect small farm-houses on the place, sufficient to supply the needful accommodations; but in no case should more than fifteen or twenty be lodged in one place; and, whether on the farm or not, the lodging-houses for the pupils should be under the constant inspection or regulation of the governors or instructors of the institution. One or two instructors should be employed constantly for teaching the main branches of education, and a competent farmer should be employed to manage the agricultural department, and to give the necessary practical instruction. Beyond this, no resident instructors will be required,—but regular and full courses of lectures, and experiments in geology, mineralogy, botany, comparative anatomy, the veterinary art and chemistry, by competent professors of these sciences, who might be employed for these objects annually, without the necessity and expense of constant residence,—as is now frequently done at our medical schools. In this way, the best talents in the community might be commanded, and at a reasonable expense.

"I would require, in the next place, that the pupils should be placed in a condition of perfect equality, and that a certain amount of labor should be made compulsory on all, at such a rate of wages as should be deemed just, according to the ability of the pupil, and the nature of the work done. An account should be kept for every pupil, and another by every pupil, of the labor performed by him, which should be passed to his credit. The farm account should be kept with faithful exactness, and be always open to the inspection of the pupils; and after the deduction of the rent, and the necessary burdens and expenses, and some amount kept as a reserve or accumulating fund for the benefit of the institution, the remainder should be divided among the pupils according to the labor performed

"Their board and lodging should be settled for by themselves, without any interference on the part of the directors of the institution, beyond keeping the charges within a stipulated price; and the keepers of the boarding houses should be required to purchase at reasonable rates, from the farm, whatever supplies they might require, which the farm would yield. A tax should be levied upon the students for the payment of all the instructors and lecturers, and the use of the library, and chemical and philosophical apparatus; and likewise to meet any extraordinary experiments made upon the farm, with a view to the instruction of the school. Whether it would be advisable for every pupil to have an allotment for himself, either for the purpose of experiment or for the profit, and in aid of his subsistence, would be worth considering; remembering always how important it is to give to every man an immediate interest in the result of his labors."

We have now given Mr. Coleman's views of an agricultural institution at large, and though differences of opinion must necessarily exist in regard to details and the minutiæ in the arrangements and plans, still, few we believe will dissent from the main features which the proposed plan presents to us. We are not fully satisfied, that model and experimental farms are so essential to an agricultural education, while so many good farmers are ready to communicate the results of their practice and to exhibit the actual details of their plans to all who are disposed to examine their proceedings. The great desiderata to be secured in an agricultural education are, first, knowledge in regard to the adaptation of soils, and how they may be brought into the condition to bear the crops which are the most profitable to raise. Those of course will differ in different places; even a soil which would bear good wheat might be, from location, more profitably devoted to potatoes, meadow or grass, corn, etc. 2. In what way labor may be most profitably directed, and how the proper ends and objects of labor may be secured, and how much labor may be expended with profit in securing a certain end, for after all a thing which is desirable may cost too much; and, furthermore, how much labor per day an hired laborer ought to perform. Now these are points which neither algebra nor natural history, nor chemistry, will teach a man, they must be obtained in the practical working of a private or public establishment; and for acquiring these items of information we should prefer a private establishment; and however small these items may appear in the eyes of some, they will be found essential and necessary to the man who is intending to get his living and support from a farm. It is, however, principally at a public institution that the several branches of science must be acquired, it is only here, that facilities are afforded by which progress can be made, and by which much time may be saved.

The fourth part of European Agriculture is devoted principally to the different markets, including those for stock, cattle, grain and meat markets.

"The English farmers have great advantages in their markets and exchanges; and in this matter, to a certain extent, we ought to follow them. I do not say these markets are an unmixed good; but the benefits arising from them, I am convinced, greatly preponderate over the evils; and, taking advantage of the long experience of others, some of these evils we may either remedy or avoid. It would prove highly beneficial to our farmers if they could have certain established markets for the sale of their produce when it is ready for sale; if prices could be fairly adjusted and equalized; and especially if the markets could be for cash; and that credit, in all cases excepting for very short periods, could be abolished. It would be equally useful to them to know where they could buy as well as where they could sell; for they often want lean or store stock for fattening, a change of seed for sowing, horses for farm service, young stock for grazing, and cows for dairy use.

"With the exception of three or four of our large towns,—as Boston, New York, and Philadelphia,—we have no established cattle market in the country; and markets such as Brighton near Boston, and the Bull's Head near Albany, are almost exclusively for the sale of fat cattle, sheep, and swine. Our farmers sell, as they can, to agents or purchasers travelling through the country, and buy as they can, and where, by chance, after taking, in many cases, long and expensive journeys, they may find the stock which they need. In frequent cases, stock, both cattle and swine, are driven through the country and sold to those who wish to purchase as accident may direct. A wool fair or market, is not to my knowledge, held in this country; nor a corn or grain market.* In the purchase of wool, agents scour the the country, and in general the farmers are quite at their mercy. In respect to grain, the farmer carries his wheat, or other grain, to the miller, or the trader, and must make the best bargain that he can. In such case, in the first place, there is no competition; and no possibility of calculating the quantities on hand for sale; and no mode of fixing any general or equal price; and, indeed, no certanity to the farmer of finding any market at all. These evils might be remedied, and a change effected, to the great advantage of buyers and sellers, by the adoption of a system of weekly or periodical markets, which prevails through England and Scotland. Here are wool fairs, for the sale of wool, of which samples are exhibited; and corn and grain markets, wheat, barley, oats, rye, beans, and peas, samples of which are exhibited, are sold; and markets for the sale of fat cattle, and markets for the sale of lean cattle, and markets for the sale of horses, and markets for the sale of sheep and lambs, and markets for the sale of cheese and butter; these markets sometimes uniting several objects, or otherwise limited to some single object."

"The great market for cattle, in England, perhaps the greatest in the world, is at Smithfield, in London. This market is principally for fat cattle and sheep, and for cows. It is held weekly, in the centre, and in one of the most crowded parts, of this great metropolis. Monday is the day of general sale for fat cattle and sheep; Tuesday for hay and straw; Thursday is again a day of sale for hay and straw; and Friday for cattle, sheep, swine, and

* Howard Street, in Baltimore, affords the only place in the United States resembling an exclusive market for the sale of grain or flour; and this is only attended by individual purchasers, and is not a meeting of farmers, grain dealers and millers, coming together on particular days in the week, and at a particular hour in the day, to exhibit samples, to collect and impart information respecting the grain prospects of the year, to discuss prices, and to afford to all parties the advantages of comparison and competition.

particularly for the sale of milch cows, and at 2 o'clock for scrub horses and asses. This day is not so large a market as Monday, and embraces the cattle that were left over on the Monday's market.

"The market opens at daylight, at all seasons of the year, and closes at 3 o'clock in the afternoon, at which time every thing sold or unsold must be removed. The sheep and swine are enclosed in pens, railed in with wood, and containing seldom more than fifteen sheep in a pen. The cattle, as far as the accommodations will admit, are tied, by the horns or neck, to long railings, which extend on the outside of the market place, and likewise down the centre of the area. Between the rows of animals tied to these rails and facing each other, there is a passage-way; and there are, likewise, open spaces behind them and between them, so as to enable the purchasers to see the stock."

We are unable to give only a fact or two in regard to markets; the whole statement, however, is very interesting and important, and many suggestions or considerations come up in regard to improvements which might be effected by enterprising individuals in our own country.

Another subject is discussed in this part of the European Agriculture, namely, the corn duty. A great change has taken place in the policy of the English government since Mr. Coleman's remarks were penned. Our author, under this head, however, discusses the policy of tariff and free trade at some length, and gives the arguments for and against duties for protection. We give the arguments in Mr. C.'s own language.

"1. Arguments for Protection.—The protectionists, who are opposed to the introduction of foreign grain, mantain that a free competition in their own market by supplies from abroad would so reduce the price of grain as to render its cultivation not merely profitless, but ruinous; and that the result would be to throw much land out of cultivation, and consequently deprive the laborer of his present resources; and though the price of bread were reduced, yet such would be the scarcity of employment, and the reduction of his wages, that he would be without the means of paying even a reduced price.

"2. Arguments against Protection.—The opponents of restrictions in the introduction of foreign grain maintain, on the other hand, that from the necessities of the case, the land will continue to be cultivated; that the introduction of foreign grain will induce the farmer to cultivate more land, to introduce improvements in cultivation, to bring into productive condition much land which is now waste and profitless, and thus increasing the amount of his crops by a more skilful cultivation, this excess will be very much more than an equivalent for any diminution of price. The saving of the expenses of transportation, incident to the importation of grain, from abroad, must be considered, in its very nature, as virtually a considerable protection to the English farmer."

The subject matter of the corn law is pursued under the heads, Moral view of the question, Patriotism and philanthrophy, Proper ends of national policy, Bread regarded in a peculiar light, Peculiar condition of the English laboring population. On the last head Mr. C. holds the following language.

"PECULIAR CONDITION OF THE ENGLISH LABORING POPULATION.—But there are circumstances, connected with the condition of English society, which give peculiar severity to these laws. A large portion of the laboring population depend wholly upon their labor from day to day, for a supply. If wages were paid in kind, the price of bread would not so much affect the laborer. If wages rose or fell with the price of bread, the case would be different from what it is. But this is not the case; labor is superabundant; the competition for employment is severe; and constant employment difficult to be procured. Land, for the purpose of growing bread for themselves, is a matter wholly beyond the reach of the greater part of the laboring population. They might as well think of getting possessions in the moon. The soil is locked up in comparatively few hands. It is stated confidently, that from the year 1775 to the year 1815, the number of landed proprietors in England was reduced from 240,000 to 30,000, and that the process of absorption has been continually going on from that to the present time. Labor here, then, is wholly dependant upon capital. Emigration, from the insular character of the country, is extremely difficult, and not as in the United States, where a man has only to take his axe upon his shoulder, and find for himself a home. Though the price of bread, therefore, should increase, the rate of wages would not be affected; the laborer would get no more; and, from the advance in the price of that which is indispensable to his subsistence, his wages would virtually become of less value, though the nominal amount remained the same. Add to this, that the increase of the population of Great Britian is going on at a rapid rate, the increase for the last year, as stated upon the highest authority, being no less than 380,000. These considerations, as connected with this subject, cannot fail to have their weight upon reflecting and benevolent minds. Whether any restraint, therefore, should be put upon the supply of food to the people, is a matter which I submit to the opinion of those whom it concerns."

The subjects which close the fourth part are vegetable and meat markets, and market gardens.

Market Gardens.—To give our readers an idea of the great amount of vegetable matter required to supply the city of London, we quote the following passage:

"The extent of the vegetable gardens in the neighborhood of this great city is enormous, and the multiplied facilities of conveyance make even remote places, now, in many articles the suppliers of London. Fifty years ago, it was calculated that there were two thousand acres cultivated by the spade, and eight thousand by the spade and plow conjointly. The extent of cultivation must, of course, be at present much greater. It is said of one individual that he had eighty acres in asparagus, and of another that he had sixty, and that the forming of the beds was estimated at £100 per acre. This undoubtedly was under the old system of growing asparagus, when the soil was to be taken out to a depth of some feet, and a bed of stones placed at the bottom, and other expensive arrangements. Now, asparagus is grown almost as easily as carrots or celery, it only requiring to be first grown in a nursery or seed bed, and then transplanted in the bottom of deep furrows or trenches, made two feet distance from each other, well bedded with manure, and the bed itself kept constantly clean, and annually covered with a loading of manure in the autumn, which must be dug in with a fork in the spring. This, in three years from the seed, gives as good and abundant a plant as under the old method of trenching and bottoming with stones, and laying a foot of manure on the stones.

"The amount of vegetables sent by some individual salesman, is enormous. The principal market days are three times in a week, but Saturday is the principal day; and it is confidently stated—though in relating it I fear that some persons may think the credulity of their too-confiding countryman has been practised upon—that a single grower has been known to send, in one day, more than nineteen hundred bushels of peas in the pod, and seven or eight loads of cabbages, averaging eighteen hundred cabbages each; and at another season, from the same farm, fourteen or fifteen hundred baskets of sprouts will be sent in one day, and in the course of the year from five to six thousand tons of potatoes. In his account of the agriculture of Middlesex, Middleton says, that in 1795, in the height of the fruit season, each acre of the gardens cultivated in small fruits gave employment to thirty-five persons, among whom were many women, who were employed in carrying the fruit to market on their heads; and that the gathering of a crop of peas required forty persons for every ten acres. The account given of the sum of money received from the produce of a single acre is quite worthy of remark, it being the statement of a market-gardener. Radishes, £10; cauliflower, £60; cabbages, £30; celery, first crop, £50; second crop, £40; endive, £30;—making a total of £220, or 1,100 dollars, for the gross produce of an acre in twelve months."

In the fifth and last part of the first volume of European Agriculture, we find among many others the following heads of subjects: the soil, theories and operations of the soil, soils of Great Britain, physical properties of a soil, plowing and its different modes, improved machinery, etc. We will detain the reader a few moments with Mr. C.'s remarks on the soil.

"The farmer's whole business, as far as cultivation is concerned, lies with the soil; and upon the soil, and on the skill and intelligence with which he manages it, must depend entirely his success. The notion, that plants receive a large portion of their nourishment through their leaves,—although some experiments, in my opinion not sufficiently decisive to determine the question, seem to favor it,—appears to me about as probable as that animals receive a large portion of their nourishment through their lungs. If they absorb corbon and discharge oxygen by day, they reverse the process, and absorb the oxygen of the atmosphere, and discharge carbon, by night; and what portion of the latter in this way is assimilated, and made to form a part of the plant, (as far as I can understand the experiments which have been made,) does not as yet seem to be determined. I know the confidence with which this is affirmed, and, as a philosophical fact, I admit that it is of great interest, and extremely worthy of inquiry."

"That the atmosphere contributes essentially to vegetation—that plants derive much of their nourishment and substance from the air, as I have already remarked does not admit of a question; but, so far as any practical use whatever is to be made of this fact, we must consider this nourishment as received through the roots, and consequently through the medium of the soil in which these roots spread themselves, and the manures by which it is enriched. The soil therefore, as the basis of all vegetation, is the great object of the farmer's consideration."

"The ingenious theory of Decandolle, that the exudations or excrementitious matter from one kind of crop unfitted the ground for an immediate repetition of the same species of plant, seems now to be generally abandoned. It is a well established principle, which practical men understand quite as well as the scientific, that a rotation of crops is indispensable to a successful agriculture; and the theory is altogether probable that a particular crop exhausts the soil of certain elements essential to its production, which must somehow be supplied before a second crop of the same kind can be grown on the same land; but it would be extremely interesting if the fact of such exhaustion, and its extent, could be more particularly determined by a chemical examination of the soil which has been cultivated. The beautiful theory of the great agricultural oracle of the day, that certain mineral ingredients which are always found in the ashes of plants, and which are carried off when these products are removed, and, being essential to vegetation, require to be either artificially replaced or supplied by a natural process,—and that, the land being suffered to rest, or applied to a different production, the ordinary influences of air and moisture in decomposing the rocks of the soil will renew the supply of the mineral elements which have been removed,—seems to offer the desired explanation; and the experiments to which this theory has led, and which, under its influence, are now going on in various parts of the country, must presently determine it, and, what is better, show its proper application, and greatly simplify the processes of agriculture, reducing its expenses and giving comparative certainty to its results.

"The operation of air and moisture upon the soil, the effects of light, and electricity, and frost, upon vegetation, all admit to be powerful; but they are as yet only partially understood, and present subjects of the most interesting inquiry. In the progress of science, technically so called, we have much to hope for; but in what it has already accomplished enough has been gained to quicken, but very far from enough to satisfy, the appetite. One of the most eminent agricultural chemists of the present day, Boussingault, second perhaps to no other, has said, " A great deal has been written since Bergman's time upon the chemical composition of soils. Chemists of great talent have made many complete analyses of soils noted for their fertility; still, practical agriculture has hitherto derived very slender benefits from labors of this kind. The reason of this is very simple; the qualities which we esteem in a workable soil depend almost exclusively upon the mechanical mixture of its elements; we are much less interested in its chemical composition than in this; so that simple washing, which shows the relations between the sand and the clay, tells, of itself, much more that is important to us than an elaborate chemical analysis." This is certainly a great confession for an eminent chemist to make.

"To exemplify the different results to which the most scientific men arrive in these cases, I will refer both to Boussingault and Von Thaer in respect to a simple point, the presence of the carbonate of lime in the soil as essential to the growth of a crop of wheat, on which the public mind has been so long, so generally, and so confidently made up.

"Von Thaer says, "The richest argillaceous soil that I ever analyzed, the fertility of which was regarded as of the very richest quality, was taken from the right bank of the Elbe, some few miles from its mouth; it contained eleven and a half parts in a hundred of humus, four and a half of lime, a great quantity of clay, a little coarse silica, and a considerable portion of very fine silica, which could only be separated from it by ebullition. It certainly possessed a great degree of cohesion, but, when moderately moisened, it was not very tenacious. It was made to bear the richest crops, as cabbages, wheat, autumnal corn, beans, &c.; but every sixth year it was necessary to manure it thoroughly, and to give it a fallow."

"On the preceding page, he says, "The richest land I ever analyzed, and which was taken from the marshes of the Oder, contained 19¾ parts in 100 of humus, 70 of clay, a little fine sand, and *an almost imperceptible* quantity of lime; but the situation of this land was too low, and it was too damp, to admit of a correct estimate being formed of its fertility."

"Boussingault says, "I may remark generally, that, from the whole of the analyses of good wheat lands which have hitherto been made, it appears that carbonate of lime enters in considerable quantity into their composition; and theory, in harmony with practice, tends to show that it is advantageous to have this earthy salt as a constituent in the manures which are put upon soils that contain little or no lime."

"On the next page, he says, "M. Berthier's analysis is still far from proving that the presence of lime in a soil is indispensable, inasmuch as beautiful wheat crops are grown in the neighborhood of Lisle without lime. In proof of this fact, I shall here cite the analysis of one of the most fertile soils in the world, the black soil of Tchornoizem, which Mr. Murchison informs us constitutes the superficies of the arable lands comprised between the 54th and 57th degrees of north latitude, along the left bank of the Volga as far as Tcheboksar, from Nijni to Kasan, and stretching over a still more extensive district upon the Asiatic side of the Ural Mountains. Mr. Murchison is of opinion that this land is a submarine deposit formed by the accumulation of sands rich in organic matters. The Tchornoizem is composed of black particles, mixed with grains of sand; it is the best soil in Russia for wheat and pasturage; a year or two of fallow will suffice to restore it to its former fertility after it has been exhausted by cropping; it is never manured.

"M. Payen found in this black and fertile soil,

"Organic matter, .	6.95	(containing 2.45 per cent. of azote.)
Silica, ...	71.56	
Alumina, ...	11.40	
Oxide of iron, . .	5.62	
Lime, ...	0.80	
Magnesia, ...	1.22	
Alkaline chlorides,	1.21	
Phosphoric acid,	a trace.	
Loss, ...	1.24	
	100.00"	

"It is a little remarkable, judging from the analysis here given, that not only is the quantity of lime extremely minute, but even the phosphates, deemed so essential and indispensable to success, are also absent.

"Such are the diversified results to which even the most scientific are led; and they are well adapted to admonish us of the imperfection of human knowledge, and the limitation of human powers."

We hope to be indulged in some remarks upon the opinions expressed by the author in regard to the results of analysis, and the importance of lime in wheat growing. The rich soils analyzed by Von Thaer were certainly remarkable for the great quantity of organic matter as well as lime; but passing at once to the analysis of Payen which we have copied, we say, that we by no means see from this analysis that lime may be dispensed with, and we venture to suggest, that the lime in this case was mostly combined with the organic matter, and which even in the small per centage which is seemingly obtained from the soil; still, in an acre of land it will be found to amount to nearly twenty tons of the salt of lime. Here too, the organic matter, with 2.45 per cent of azote, amounts to nearly 7 per cent, these together with magnesia and alkaline chlorides and phosphoric acid accounts satisfactorily for the productiveness of this soil. We have, however, dwelt in this and in former numbers of this Journal upon the value and importance of organic matter in the soil, especially when combined with the alkalies and alkaline earths; and though the fact be admitted to its fullest extent, that some vegetables do derive nourishment from the atmosphere, still, it ought by no means to turn the attention of the farmer from improving his farm by enriching it with all the means within his reach.

On the subject of plowing, Mr. C. gives us the following characteristics of correct plowing.

"Whatever mode of ploughing the land is subjected to, you should take special care that it be plowed for a winter furrow in the best manner. The furrow-slice should be of the requisite depth, whether of five inches on the oldest lea, or seven inches on the most friable ground; and it should also be of the requisite breadth of nine inches in the former case, and of ten in the latter; but as ploughmen incline to hold a shallower furrow than it should be, to make the labor easier to themselves, there is less likelihood of their making a narrower furrow than it should be, a shallow and broad furrow conferring both ease on themselves, and getting over the ground quickly. A proper furrow-slice in land not in grass, or, as it is termed, in red land, should never be less than nine inches in breadth and six inches in depth on the strongest soil, and ten inches in breadth and seven inches in depth on lighter soils. On grass land of strong soil, or on land of any texture that has lain long in grass, nine inches of breadth, and five inches of depth, is as large a furrow-slice as may possibly be obtained; but on lighter soil, with comparatively young grass, a furrow-slice of ten inches by six, and even seven, is easily turned over. At all seasons, but especially for a winter furrow, you should endeavor to establish for yourself a character for deep and correct plowing."

"Correct plowing possesses these characteristics: The furrow-slices should be quite straight, for a plowman that cannot hold a straight furrow is unworthy of his charge. The furrow-slices should be quite parallel in length; and this property shows that they have been turned over of a uniform thickness, for thick and thin slices, lying together, present irregularly horizontal lines. The furrrow-slices should be of the same height, which shows that they have been cut of the same breadth; for slices of different breadth, laid together at whatever angle, present unequal vertical lines. The furrow-slices should present to the eye a similar form of crest and equal surface; because, where one furrow-slice exhibits a narrower surface than it should have, it has been covered with a broader slice than it should be; and where it displays a broader surface than it should, it is so exposed by a narrower slice than it should be, lying upon it. The furrow-slices should have their back and face parallel; and to discover this property requires rather minute examination after the land has been plowed; but it is easily ascertained at the time of plowing. The ground, on being plowed, should feel equally firm under the foot at all places; for slices in a more upright position than they should be not only feel hard and unsteady, but will allow the seed corn to fall down between them and become buried. Furrow-slices in too flat a state always yield considerably to the pressure of the foot; and they are then too much drawn, and afford insufficient mould for the seed. Furrow slices should lie over at the same angle; and it is demonstrable that the large extent of surface exposed to the action of the air is when they are laid over at an angle of 45°, thus presenting crests in the best possible position for the action of the harrows. Crowns of ridges, formed by the meeting of opposite furrow-slices, should neither be elevated nor depressed, in regard to the rest of the ridge, although plowmen often commit the error of raising the crowns too high into a crest—the fault being easily committed by not giving the feered" (that is, the first or marking-out slices) "furrow-slices sufficient room to meet, and thereby pressing them upon one another. The furrow-brows should have slices uniform with the rest of the ridge; but plowmen are very apt to miscalculate the width of the slices near the sides of the ridges; for if the specific number of furrow-slices into which the whole ridge should be plowed are too narrow, the last slice of the furrow-brow will be too broad, and will therefore lie over too flat; and should this too broad space be divided into two furrows, each slice will be too narrow, and stand too upright. When the furrow-brows are ill made, the mould-furrows cannot be proportionately plowed out; because, if the space between the furrow-brows is too wide, the mould-furrows must be made too deep, to fill up all the space, and *vice versa*. If the furrow-brow slices are laid too flat, the mould-furrows will be apt to throw too much earth upon their edges next the open furrow, and there make them too high. When the furrow-brows of adjoining ridges are not plowed alike, one side of the open furrow will require a deeper mould-furrow than the other."

Another important subject, and which perhaps has not been seen in all its bearings, is harrowing. In the language of Mr. I. Allen Ransome, we are presented with the following considerations.

"It is admitted, by all acquainted with the subject, that harrowing, especially on heavy soils, is the most laborious operation on the farm,—not so much, perhaps, on account of the quantum of power requisite for the draught, (though this is sometimes considerable,) as for the speed with which the operation is, or ought to be, accompanied; and yet it is frequently left to the charge of mere boys, and sometimes performed by the worst horses on the farm.

"If we examine a field, one half of which has been harrowed with weak, inefficient horses, and whose pace was consequently sluggish, the other half with an adequate strength and swiftness of animal power, we shall find the former will be rough and unfinished, the latter comparatively firm and level, and completed in what would be called a husbandry-like manner. Scarcely any thing in farming is more unsightly than the wavy, serpentine traces of inefficient harrowing. The generality of harrows appear too heavy and clumsy to admit of that despatch without which the work cannot be well done; and though it is evident that different soils demand implements of proportionate weight and power, yet, for the most part, harrows have been rather over than under weighted, particularly when employed after a drill, or to bury seeds of any kind.

"Harrowing has been so long regarded as an operation which must be attended with considerable horse-labor, that attention does not appear to have been sufficiently turned to the inquiry whether this labor might not be greatly reduced, by lightening the instruments with which it is performed. Many would be surprised at the moment of reduction of which seed-harrows, at least, are capable, and, where land is clean, to see how effectively a gang of very light small-toothed harrows may be used.

"Having noticed, in some parts of Norfolk, the perfect manner in which seed corn is covered by a common rake with wooden teeth, a friend of mine constructed a gang of harrows on the following plan, and he states that it proved the most popular and useful implement of the kind to the farm."

We have now dwelt as long as is proper upon the published parts of Mr. Coleman's tour. We may not have made the most judicious quotations from the work. We have, however, we believe, given those facts which are calculated to give our readers a glimpse of the objects of the mission, the manner and spirit in which it is executed, and the dress in which it is clothed, for the reader's use. We feel no desire to exhibit our skill in fault finding, or in criticism. We care not whether Mr. Coleman pleases the nobility of England or not; we have a perfect confidence not only in the author's good taste and sense of propriety, but in his judgment to select and fulfill the object of his mission. We have no sympathy with those who feel disappointed in the work as now published, and who complain and say that the objects of the tour have failed; we believe no such thing. The work, in our opinion is one of the most important contributions to agriculture which has been made this last half century. It is true, that it is a contribution rather to the literature than to the science of agriculture; and this is what was especially wanted at the present time. This work is particularly calculated to improve the taste and morals, and to give the right turn to the sentiments of its readers. It may be, that Mr. Coleman is too much of a sentimentalist, too much inclined to moralize incidents and occasions; nevertheless, this feature neither mars the book nor dishonors the occasion. Mr. Coleman's humanity and kindness is very conspicuously brought out on many occasions, and as we know that it is no pretence, but an innate ingredient in the spirit, its utterance no one will suppose to proceed from a feigned sensibility. Again, the Commissioner in treating of the matters and objects which came under his notice, adheres throughout to a plain common sense view. He no where attempts to exhibit deep and profound views, but aims to express himself so as to be understood. He evidently considered that he was writing for plain and substantial farmers, men of good common sense, rather than those who would be ranked with philosophers. Hence, he does not dwell upon theories, or use the language which passes with many for learning, and which would imply an extensive and familiar acquaintance with modern science. Hence, the European Agriculture is adapted to a wide circulation. Some of his subjects may be treated in a too common place manner, and perhaps the author might have said the same things at home and in the United States as well as in England or Scotland. This criticism may apply to what is said of soils, and the subjects which stand in connection with this; and we might say that when the author takes up a subject for discussion his remarks which apply directly to it are often few and confined to a very narrow compass. This we consider one of the faults of the author. Our first quotation of Mr. C.'s remarks, from the first part, illustrates this feature in the work. Important things, however, are still said, and we leave others to entertain their own opinions of what we have considered as faulty.

STRUCTURE AND CLASSIFICATION OF ZOOPHYTES.

By James D. Dana, A. M., *Geologist of the United States Exploring Expedition during the years* 1838, '39, '40, '41, '42. Philadelphia: Lea & Blanchard. 1846. pp. 132.

In a philosophical point of view, the lower forms of life are more interesting than the higher. It is in these, that life is accompanied with the simplest apparatus, and here too, it is less encumbered with complex conditions. In the higher circles of organization, functions are specialized, and the organs by which they are executed are as complicated as though they were independent machines and moved by their own inherent powers. Notwithstanding this, they act together under the influence of one controlling power, which presides over and unites all parts and all functions into one system; hence the multiplied and complex relations which are established by the structure and organization itself, produce necessarily numerous reactions in parts distant from those in which the disturbing causes may have been applied. We cannot, therefore, study the phenomena of life and organizations under such complicated conditions with as much confidence in the results as in those simple and less complex forms. There is too, in the higher grades far less tenacity of life; and the hold which the vital principle has upon the organization is so slight, that it is extinguished by a breath. It is like the union which exists in the complex products of organized bodies, which requires only *presence,* to induce catalyctic actions, when the whole combination of atoms is dissolved: or, it is similar to the arrangement of atoms in Prince Rupert's drop; make but the slightest solution of continuity, and instantly all that remains of a well-formed sphere of glass is a heap of unorganized sand. Zoophytes, however, are more like the simple molecule, they resist changes and bear up under vicissitudes which would destroy the higher organizations; and hence experiments designed to show the relation of organs and functions may be instituted with a greater prospect of success, than in the higher forms of life.

Another fact which creates for them a philosophical interest and makes them objects worthy of special study is, the position which they appear to hold as respects the vegetable and animal kingdoms; and indeed so perfectly neutral is the ground which they occupy that their position in the organized world was not clearly determined until about a century ago.

Standing then, as philosophers admit, as links in outward form at least between the vegetable on the one hand, and the animal on the other, it is not at all surprising that they should be studied with great assiduity at a time when such an impulse to know pervades so extensively the intellectual world.

Mr. Dana, in his brief, but appropriate introduction, holds the following language in relation to this class of animals:

The forms of life, under consideration in the following pages, are appropriately styled *flower-animals.* In external figure, the individual animals closely resemble flowers, and no less so in brilliancy and variety of coloring. Moreover, a large number of zoophytes are so like trees and shrubs of land vegetation as to have deceived even the philosopher till near a century since. The mosses and ferns of our woods—the lichens and mushroom—the clump of pinks—the twig and spreading shrub—have all their counterpart among the productions of the sea. The ocean grove is without verdure, yet there is full compensation in its perpetual bloom; for each coral branch is everywhere covered with its star-shaped animals, the "coral-blossoms."

The similitude to plants, however, is rather external and general, and not real in actual structure. The flower-animal has its mouth and its stomach to receive its food, and when it is digested it is ejected. Around its mouth it has petal-like organs arranged in the form of a star; these are called tentacles, and resemble fingers by which its prey is seized and conveyed to its stomach.

A Zoophyte is an inarticulate animal, with a fleshy body, nearly cylindrical in form, having a circular disk, bordered with tentacles, in the centre of which is the mouth; its body is a visceral cavity only, but without a distinct vascular or nervous system, and no senses but taste and touch. The tenement of life is here reduced to its lowest condition—a sort of sack, closed at one extremity, which is apparently homogeneous, and whose vitality animates equally every particle, so that it may be turned inside out without injury or interruption to its limited functions. To maintain life they must remain in the element in which they live, for upon it depends the expansion of their bodies and tentacles and the ejection of their fluids.

These flower-animals are reproduced in three modes.

1. By ovules either proceeding from within outwards, or from vertical lamellæ in the visceral cavity, and which are ejected through the mouth.

2. By buds or gemmæ, which afterwards become free and independent animals.

3. By artificial sections.

ZOOPHYTES are either simple or compound, a solitary animal, or a cluster of animals, whose combined growth has some determinate form. They may, or may not secrete a hard stony substance termed by Mr. Dana *corallum*, or what is familiarly called *coral*, which is analagous to an internal skeleton, inasmuch as it is really invested with the soft parts of the animal.

Such are the general characters of Zoophytes, whose beautiful forms clothe the shelving shores of tropical seas, and impart splendor to the marine fields which are decked with robes as gorgeous as those of our western prairies.

Mr. Dana divides corals into two orders. 1. ORDER HYDROIDEA. 2. ORDER ACTINOIDEA. The first embraces those corals whose visceral cavity is a simple sac, and whose reproductive functions reside only in the walls of the cavity. The second includes those whose visceral cavity is divided vertically by fleshy lamella and which possess in them the reproductive functions. Hence the ovules are ejected through the mouth. The first contain the minute polyps, and when the coral is secreted it is horny or membranous; they are delicate and compound, and exist in the form of little cups arranged along a tubular axis. The second, actinoidea comprises the common coral forming animals.

Mr. Dana gives a full and admirable description of the two orders, with cuts illustrating many of the generic and specific distinctions.

We copy a few additional facts, those which will give our readers a more full and perfect idea of the nature of the animals belonging to the first order.

They have no glandular system; no special absorbent or circulating system; no ovarian glands, and no distinct nervous system. Every part seems equally a centre of organic forces, and consequently sections made almost indefinitely still live and complete the entire polyp again.

These minute beings constitute the mosses of the coral landscape, the carpeting of marine beds. The corals or actinoidea are likened to the larger plants, the asters, carnation and anemones which deck the marine garden; the astreas and gorgonias make the shrubbery.

Passing over nearly one hundred pages of Mr. Dana's work, some parts of which we would have been pleased to have noticed, had we time to furnish the necessary illustrations, we proceed to notice very briefly his remarks on the distribution of zoophytes.

The agents which influence the distribution of all animals operates upon these in a special manner. Heat, light, pressure, and means of subsistence, are the agents which exert the strongest influence in their distribution. Heat is the most important in giving them latitudinal range, while light and pressure determines the limits in depth. While these causes fix bounds to species and families they do not necessarily confine tribes of species to so small limits.

The hydroidea are found in all seas and at great depths, as well as at the surface.

It is in the torrid zone that the actinoidea display their greatest numbers and beauties. The coral reefs which sometimes extend a thousand miles, are like a thousand miles of a thick tangled shrubbery. Some of the largest and most conspicuous corals, the madrepores, are limited to the temperature of 68° F. This, however, is the winter temperature; it is what they can endure, and not that in which they can germinate. The warmest parts of the Pacific varies from 80 to 85°, and it is here that madrepores and brain corals luxuriate. The depth of these coral reefs is singularly small. Twenty fathoms will include very nearly all the species of the madrepore and astræa tribes. Temperature has but little influence in determining this limit, as 68° F. will not be found under the equator short of a depth of one hundred fathoms. Light and pressure are the principal causes which bring about this result. Pressure affects the function of respiration; the waves which are essential to the due performance of it do not reach to a greater depth than fifteen or twenty fathoms.

Classification.—Zoophytes constitute an order of the subkingdom termed,

Radiata.—Mr. Dana's views in regard to the relation which these hold to other animals, may be understood by the following diagram:

I. Vertebrata.

III. Articulata.
Insecta, Myriapoda,
Arachnida,
Crustacea, Annelida,

II. Mollusca.
Cephalopoda, Pteropoda,
Gastropoda, Conchifera,
Tunicata.

IV. Radiata.
Echinodermata,

Rotifera, Entozoa, Zoophyta, Acalephæ, Bryozoa.

V. Protozoa or Infusoria.

" One of the results of the study of the animal kingdom," says Mr. D., " has been to bring to light lines or general systems of development branching up from the lowest infusoria to the higher grades of life. It is not true that the forms among the *lower* grades are actually copied in any of the imperfectly developed young of the *superior*; yet there is some general analogy, sufficient to indicate that the former commence on the same system of development with some of the latter, although carried essentially out of the upward line by the peculiar vital powers of the species. The rotifera are decidedly crustacean in type. The bryozoa, or flustroid polyps are allied to the tunicata. It is a side-development from the imaginary line, which connects the infusoria with the tunicated molluscs. The entozoa afford other examples, one branch of them passing into crustacea, through the lernæidæ and caligidæ, and the other into the annelida.

"These remarks are intended to support no monad or lamarckian theory, but only to elucidate the established principle that there are in nature certain distinct systems or types of developments. Each species is developed with some reference to one or the other of these systems, but, through the agency of the vital forces peculiar to it—forces which, there is reason to believe, only creative power can change.

"Again, the animal kingdom is throughout a network of affiliations, yet there are main trunks and larger branches, to which the smaller anastomosing ramifications are subordinate. Systems of 3s and 5s, look pretty to the mathematical eye, and have some foundation in nature; yet, in tracing affinities, it is better first actually to ascertain relations, and then to map them out, rather than force the devious windings of nature into circles large and small."

In the foregoing notice of Mr. Dana's work, we have by no means attempted to give anything like a complete analysis. How much we may have desired this, the sphere in which our journal moves would hardly permit the details which it would require. We were desirous, however, of doing something to assist in its circulation and make known its value to our friends; besides, we wish on all occasions to recommend the study of the natural sciences, to excite a taste for them, and bespeak a regard for them in all parts of our country. It is proper to observe, in conclusion, that the work under consideration is merely an introduction to a still larger work upon Zoophytes, and which is, as we are informed, illustrated by numerous colored plates.

DARWIN'S VOYAGE OF A NATURALIST,

Or a Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of H. M. S. BEAGLE *round the World, under the command of* Capt. FITZ ROY, R. N., *by* C. DARWIN, M. A., R. R. S., in 2 vols. 12mo. Harper & Brothers, N. Y. 1846.

We have no intention to write at this time a criticism of this work. Our design in noticing the Journal of Researches is the more humble one, that of recommending the work to the public, as one of the most interesting and instructive books of the kind which has been published for many years. In the form in which it is presented to the public, it is admirably adapted to the purpose of popular instruction and entertainment, and is especially worthy of a place in all the school libraries of our country. It will be found full of interesting matter in all the departments of natural history; indeed it would seem from the range of observation which Mr. Darwin takes, that he is an accomplished and finished naturalist in all the several classes of investigation into which this field of knowledge is now divided. We cannot add to Mr. Darwin's reputation or fame by any remarks which we can make; we shall content ourselves with the above recommendation of his researches, and proceed at once to make some extracts from them which have a bearing upon the objects which this Journal is designed especially to promote. We shall first take up Mr. Darwin at the Banda Oriental with his host on an estate at Arroyo de San Juan. We give a few passages from the Journal here, as it will convey a better idea of South American farming and husbandry than any labored description which we can give, and in connection we shall introduce his account of a singular breed of cattle which came under Mr. D.'s observation at this place.

18*th*.—Rode with my host to his estancia at the Arroyo de San Juan. In the evening we took a ride round the estate: it contained two square leagues and a half, and was situated in what is called a rincon; that is, one side was fronted by the Plata, and the two others guarded by impassable brooks. There was an excellent port for little vessels, and an abundance of small wood, which is valuable as supplying fuel to Buenos Ayres. I was curious to know the value of so complete an estancia. Of cattle there were 3000, and it would well support three or four times the number; of mares 800, together with 150 broken-in horses, and 600 sheep. There was plenty of water and limestone, a rough house, excellent corrals, and a peach orchard. For all this he had been offered £2000, and he only wanted £500 additional, and probably would sell it for less. The chief trouble with an estancia is driving the cattle twice a week to a central spot, in order to make them tame, and to count them. This latter operation would be thought difficult, where there are ten or fifteen thousand head together. It is managed on the principle that the cattle invariably divide themselves into little troops of from forty to one hundred. Each troop is recognised by a few peculiarly marked animals, and its number is known: so that, one being lost out of ten thousand, it is perceived by its absence from one of the tropillas. During a stormy night the cattle all mingle together, but the next morning the tropillas separate as before, so that each animal must know its fellow out of ten thousand others.

On two occasions I met with in this province some oxen of a very curious breed, called nata or niata. They appear externally to hold nearly the same relation to other cattle which bull or pug dogs do to other dogs. Their forehead is very short and broad, with the nasal end turned up, and the upper lip much drawn back; their lower jaws project beyond the upper, and have a corresponding upward curve: hence their teeth are always exposed. Their nostrils are seated high up and are very open; their eyes project outwards. When walking they carry their heads low, on a short neck; and their hinder legs are rather longer, compared with the front legs, than is usual. Their bare teeth, their short heads, and upturned nostrils give them the most ludicrous, self-confident air of defiance imaginable.

Since my return I have procured a skeleton head, through the kindness of my friend, Captain Sulivan, R. N., which is now deposited in the College of Surgeons.* Don F. Muniz, of Luxan, has kindly collected for me all the information which he could respecting this breed. From his account, it seems that about eighty or ninety years ago they were rare, and kept as curiosities at Buenos Ayres. The breed is universally believed to have originated amongst the Indians southward of the Plata, and that it was with them the commonest kind. Even to this day, those

* Mr. Waterhouse has drawn up a detailed description of this head, which Ih ope he will publish in some Journal.

reared in the provinces near the Plata show their less civilized origin, in being fiercer than common cattle, and in the cow easily deserting her first calf, if visited too often or molested. It is a singular fact, that an almost similar structure to the abnormal* one of the niata breed characterizes, as I am informed by Dr. Falconer, that great extinct ruminant of India, the Sivatherium. The breed is very *true;* and a niata bull and cow invariably produce niata calves. A niata bull with a common cow, or the reverse cross, produces offspring having an intermediate character, but with the niata characters strongly displayed: according to Senor Muniz, there is the clearest evidence, contrary to the common belief of agriculturists in analogous cases, that the niata cow when crossed with a common bull, transmits her peculiarities more strongly than the niata bull when crossed with a common cow. When the pasture is tolerably long, the niata cattle feed with the tongue and palate as well as common cattle; but during the great droughts, when so many animals perish, the niata breed is under a great disadvantage, and would be exterminated if not attended to; for the common cattle, like horses, are able just to keep alive by browsing with their lips on twigs of trees and reeds; this the niatas cannot so well do, as their lips do not join, and hence they are found to perish before the common cattle. This strikes me as a good illustration of how little we are able to judge from the ordinary habits of life, on what circumstances, occurring only at long intervals, the rarity or extinction of a species may be determined.

Farmers of this and the New England States have complained of the Canada thistle, and have felt that it is so much of a nuisance as to call for legislative enactments for its extirpation. Let us see what kind of thistles Mr. Darwin saw on the fertile pampas near Mercedes on the Rio Negro:—

21*st.*—Started at sunrise, and rode slowly during the whole day. The geological nature of this part of the province was different from the rest, and closely resembled that of the Pampas. In consequence, there were immense beds of the thistle, as well as of the cardoon: the whole country, indeed, may be called one great bed of these plants. The two sorts grow separately, each plant is company with its own kind. The cardoon is as high as a horse's back, but the Pampas thistle is often higher than the crown of the rider's head. To leave the road for a yard is out of

* A nearly similar abnormal, but I do not know whether hereditary, structure has been observed in the carp, and likewise in the crocodile of the Ganges: Histoire des Anomalies, par M. Isid. Geoffroy St. Hilaire, tom. i., p. 244.

the question; and the road itself is partly, and in some cases entirely closed. Pasture, of course, there is none; if cattle or horses once enter the bed, they are for the time completely lost. Hence it is very hazardous to attempt to drive cattle at this season of the year; for when jaded enough to face the thistles, they rush among them and are seen no more. In these districts there are very few estancias, and these few are situated in the neighborhood of damp valleys, where, fortunately, neither of these overwhelming plants can exist. As night came on before we arrived at our journey's end, we slept at a miserable little hovel inhabited by the poorest people. The extreme though rather formal courtesy of our host and hostess, considering their grade of life, was quite delightful.

Another subject which our friends, the wool-growers, will be interested in is Mr. D.'s description of the South American shepherd dogs; and we would suggest whether the same plan might not be adopted here for breaking in our common dogs to the business of yarding sheep. Certainly the plan appears to us perfectly feasible.

While staying at this estancia, I was amused with what I saw and heard of the shepherd-dogs of the country.* When riding, it is a common thing to meet a large flock of sheep guarded by one or two dogs, at the distance of some miles from any house or man. I often wondered how so firm a friendship had been established. The method of education consists in separating the puppy, while very young, from the bitch, and in accustoming it to its future companions. A ewe is held three or four times a day for the little thing to suck, and a nest of wool is made for it in the sheep-pen; at no time is it allowed to associate with other dogs, or with the children of the family. The puppy is, moreover, generally castrated; so that, when grown up, it can scarcely have any feelings in common with the rest of its kind. From this education, it has no wish to leave the flock, and just as another dog will defend its master, man, so will these the sheep. It is amusing to observe, when approaching a flock, how the dog immediately advances barking, and the sheep all close in his rear, as if round the oldest ram. These dogs are easily taught to bring home the flock at a certain hour in the evening. Their most troublesome fault, when young, is their desire of playing with the sheep; for in their sport they sometimes gallop their poor subjects most unmercifully.

* M. A. D'Orbigny has given nearly a similar account of these dogs, tom. i., p. 175.

The shepherd-dog comes to the house every day for some meat, and as soon as it is given him he skulks away as if ashamed of himself. On these occasions the house-dogs are very tyrannical, and the least of them will attack and pursue the stranger. The minute, however, the latter has reached the flock, he turns round and begins to bark, and then all the house-dogs take very quickly to their heels. In a similar manner, a whole pack of the hungry wild dogs will scarcely ever (and I was told by some never) venture to attack a flock guarded by even one of these faithful shepherds. The whole account appears to me a curious instance of the pliability of the affections in the dog; and yet, whether wild or, however educated, he has a feeling of respect or fear for those who are fulfilling their instinct of association; for we can understand on no principle the wild dogs being driven away by the single one with its flock, except that they consider, from some confused notion, that the one thus associated gains power, as if in company with its own kind. F. Cuvier has observed, that all animals that readily enter into domestication, consider man as a member of their own society, and thus fulfil their instinct of association. In the above case the shepherd-dog ranks the sheep as its fellow-brethren, and thus gains confidence; and the wild dogs, though knowing that the individual sheep are not dogs, but are good to eat, yet partly consent to this view when seeing them in a flock with a shepherd-dog at their head.

To us no subject of enquiry has been so interesting as the process by which our domestic animals have been subdued and domesticated; and hence every fact which bears upon this subject, directly or indirectly, we esteem of great importance. It is a broad field of inquiry, and we have no time now to enter upon a consideration of the facts even in a general manner; we, however, take the opportunity to extract one more interesting passage from Mr. D.'s book, which bears upon this subject, and which contains, aside from its bearing, curious matter of fact for the consideration of naturalists, in regard to the changes which species undergo under the special influence of local circumstances. The observations are upon the cattle which have become wild in the Falkland Islands. They were introduced here by the French in 1764, since which time they have greatly increased. Mr. D. remarks:—

It is a curious fact that the horses have never left the eastern end of the island, although there is no natural boundary to prevent them from roaming, and that part of the island is not more tempting than the rest. The Gauchos whom I asked, were unable to account for it, except from the strong attachment which horses have to any locality to which they are accustomed. Considering that the island does not appear fully stocked, and that there are no beasts of prey, I was particularly curious to know what has checked their originally rapid increase. That in a limited island some check would sooner or later supervene, is inevitable; but why has the increase of the horse been checked sooner than that of the cattle? Capt. Sulivan has taken much pains for me in this inquiry. The Gauchos employed here attribute it chiefly to the stallions constantly roaming from place to place, and compelling the mares to accompany them, whether or not the young foals are able to follow. One Gaucho told Capt. Sulivan that he had watched a stallion for a whole hour, violently kicking and biting a mare till he forced her to leave her foal to its fate. Capt. Sulivan can so far corroborate this curious account, that he has several times found young foals dead, whereas he has never found a dead calf. Moreover, the dead bodies of full-grown horses are more frequently found, as if more subject to disease or accidents than those of the cattle. From the softness of the ground their hoofs often grow irregularly to a great length, and this causes lameness. The predominant colors are roan and iron-grey. All the horses bred here, both tame and wild, are rather small-sized, though generally in good condition; and they have lost so much strength that they are unfit to be used in taking wild cattle with the lasso: in consequence, it is necessary to go to the great expense of importing fresh horses from the Plata. At some future period the southern hemisphere probably will have its breed of Falkland ponies, as the northern has its Shetland breed.

The cattle, instead of having degenerated like the horses, seem, as before remarked, to have increased in size; and they are much more numerous than the horses. Capt. Sulivan informs me that they vary much less in the general form of their bodies and in the shape of their horns than English cattle. In color they differ much; and it is a remarkable circumstance, that in different parts of this one small island different colors predominate. Round Mount Osborne, at a height of from 1000 to 1500 feet above the sea, about half of some of the herds are mouse or lead-colored, a tint which is not common in other parts of the island. Near Port Pleasant dark brown prevails, whereas south of Choiseul Sound (which almost divides the island into two parts) white beasts with black heads and feet are the most common: in all parts black and some spotted animals may be observed. Capt. Sulivan remarks, that the difference in prevailing colors was so obvious, that, in looking for the herds near Port Pleasant, they appeared from a long distance like black spots, whilst south of Choiseul Sound they appeared like white spots on the hill-sides. Capt. Sulivan thinks that the herds do not mingle; and it is a singular fact that the mouse-colored cattle, though living on the high land, calve about a month earlier in the season than the other colored beasts on the lower land. It is interesting thus to find the once domesticated cattle breaking into three colors, of which some one color would in all probability ultimately prevail over the others, if the herds were left undisturbed for the next several centuries.

The few extracts which we have made will convey some idea of Mr. D.'s mode of treating the subject which came under his observation, and we cannot do less than recommend the work to our readers as one abounding in curious and valuable facts; those which are not only practical, but also suited to convey to us reliable information in regard to the state and condition of the Republic of South America, and the peculiar habits and condition of its inhabitants.

A TEXT BOOK ON AGRICULTURE.

BY N. S. DAVIS, M. D., BINGHAMTON, N. Y.

This is a duodecimo volume of 126 closely printed pages, and as its name imports, is a strictly elementary work. The first twenty pages are occupied with a brief account of the imponderable bodies or agents which produce changes in matter; together with the laws that govern chemical combinations, the nomenclature or system of naming, and the general classification of all elementary substances—then follows a short account of each elementary body that enters into the composition of soils and vegetables. The next two chapters treat of the formation, composition and classification of soils, and the composition of vegetables. Then come twenty pages devoted to a consideration of "the means possessed by man for fertilizing the soil, and rendering it fit for the cultivation of any crop that he may desire," including the preparation and application of manures. The chapter on the latter subject closes with the following very just summary of the objects to be accomplished, viz :

"Much more might be written on the subject of manuring, but it is the object of this work to present general principles, rather than minute details. For if the farmer understands fully the object to be accomplished, he will seldom fail to find a way to accomplish that object, suited to his circumstances. These objects, we repeat, are,

"1st. To obtain as large a quantity of organic and inorganic manures as possible. Hence all the solid and liquid excretions of animals, or farm stock; all the straw, refuse hay, spoiled fruit, decayed chips, peat, muck, &c., must be saved for the first; and all the ash, leached and unleached; bones, dried and crushed, or pulverized; soot, lime, plaster, &c., for the last.

"2d. It is the soluble part of all manures that is valuable for promoting vegetation; and as this is particularly liable to be washed away by rains, all manures should be protected by sheds, barn-cellars, or something equivalent.

"3d. All vegetable and animal substances in a state of decay, like barn-yard manure, emit ammonia and other gaseous substances, which, if not absorbed, escape into the air and are lost. Hence this should always be prevented by the addition of dried clay, air slacked lime, plaster, powdered charcoal, leached ash, or even common soil."

Chapter 7th contains a detailed statement of the method of analyzing soils and vegetable substances, together with numerous tables, not only showing the composition of several varieties of soil, but also the composition of almost all the grains, grasses, &c. cultivated by the farmer. This is a highly interesting and important part of the work. The succeeding chapter occupies near thirty pages, and contains a description of particular grains, grasses, &c., with their mode of culture; the rotation of crops; connection of farm stock with vegetation; selection, preservation, and preparation of seeds; and propagation of plants. Following this part of the work is an appendix of twenty *very* closely printed pages, devoted to an accurate and interesting description of the most important insects and worms which injure the crops and fruit of the farm. This, although in the humble place of an appendix, is by no means the least important part of the volume: indeed, the facts here stated are worth far more to every farmer and gardener than the price of the whole work. It will be seen by this brief and imperfect analysis, that it is the author's design to conduct the reader from the simplest principles of chemical science, step by step, up to the most interesting and intricate phenomena of vegetable and animal life. And hence it is remarkably well adapted not only for study in academies and other schools, but also to fill a hitherto vacant place in every farmer's library. We make the following extracts as well for the sentiments which they contain, as to show the peculiarly brief and comprehensive style of the author:

"After all that has been said through the Agricultural Journals in this country and Europe about artificial manures, we must still contend that not only every farmer, but also every man who has a garden and a family, has all the materials for a full supply of manure, more enriching and better adapted to his wants than all the costly guano or artificial mixtures that can be either imported from abroad or contrived at home. And that too, with no other direct expenditure of money than the cost of a half dozen bushels of lime or plaster annually. How the farmer, with his barn and farm stock, may do this, we have already described in another part of this work. But there are thousands in villages and cities who have gardens, but no stables from which to supply them with manure. If all such persons would, in some convenient corner of the garden or premises, prepare a tank, or large square box, and throw into it all the weeds, grass or other waste vegetable matter to be found during the season in the yard and garden, with frequent layers of ash from their own hearths or stoves, and occasionally one of lime or plaster, together with all the bones and gleanings of the kitchen, all the soap-suds that is usually thrown away, and the urine that is emptied from vessels kept in the house, they would accumulate every year an ample supply for the garden of the very best quality of manure. It might be objected by some, that such a heap of decaying and fermenting materials would be offensive and unwholesome; but the ash and plaster distributed through it effectually prevents this, by absorbing all the offensive gases as fast as they are formed. The heap should, of course, be sheltered, so as to prevent its soluble and most enriching parts from being washed away by rains."

"'There is no profession,' says Liebig, 'which can be compared in importance with that of agriculture, for to it belongs the production of food for man and animals; on it depends the welfare and development of the whole human species, the riches of states and all commerce. There is no other profession in which the application of correct principles is productive of more beneficial results, or is of greater and more decided influence.' A *truer* sentiment than this was never penned by man. And we may add, that in no profession or employment is scientific knowledge of more value, or susceptible of more ready practical application. Indeed, it will be seen by the reflecting mind, that almost every act of the agriculturist is but the performance of an interesting chemical or scientific process. And hence the very prevalent idea, that a knowledge of reading, writing and arithmetic, is sufficient for a farmer, is as absurd as to suppose a knowledge of algebra sufficient to make a man a skilful physician. The great and varied benefits to be derived from higher scientific attainments by those engaged in the noble occupation of cultivating the soil, would afford a fruitful theme for a separate volume, and cannot even be touched upon here. We must conclude, then, by simply expressing the hope, that the time is at hand when it will be deemed of more importance to teach the youth in our schools the composition of our soils and vegetables, and the most scientific mode of cultivating the bread which they eat, than simply enough of arithmetic to cypher out how much a few loaves would amount to at a shilling per loaf."

"Concerning the first, we reply, that abundant experience has proved it both cheaper and easier to winter stock in the stable, than out of doors, exposed to all the storms and changes of our inclement seasons. Indeed, so true is this, and so much better is the condition of the stock in the spring, that the most intelligent farmers of the present day stable all their cattle and horses, and provide good shelter for their sheep. The stables should always be kept well ventilated and cleanly. In regard to the expenditure for lime, and the labor in drawing muck, &c., we would ask which the farmer would prefer—to spend five or ten dollars per annum for lime and plaster, and four or five days' work with a team, to haul muck, clay or earth, to prepare the cellar, and thereby obtain a bed of manure which will enable him to obtain, by the same labor in cultivation, 30 or 35 bushels of wheat from every acre which would produce but 15 before; 35 bushels of corn instead of 20 per acre; and 300 bushels of potatoes instead of 200; or to move on, wasting the most valuable part of his manure, starving his soil, permitting enough of his stock to die annually from exposure to the cold and storms of winter, to half pay for building a good stable to keep them in; forever grumbling about the hardness of his lot in getting but half a crop from his fields; and finally, starving out himself, or emigrating to some far off land of promise?"

"Hence the earth, the water and the air, each contribute freely the materials necessary for the living plant. The first, by the disintegrating influence of air, water, heat and cold, gradually unlocks its inexhaustless stores of mineral or inorganic elements;

these combine with the geic or humic, and crenic acids of the decaying vegetable matters, forming soluble salts; which are dissolved by the water, and presented to the living roots for absorption and nourishment. While the last is ever holding in contact with the leaves and flowers its unfailing supply of carbon and nitrogen, from the carbonic acid and ammonia which it is every moment receiving—the first from the respiration of animals and combustion, and the latter from the decomposition or decay of vegetable and animal matters on the earth's surface.

And here we cannot refrain from alluding to one of the most beautiful illustrations of Divine wisdom presented in nature. Every fire kindled on the surface of the earth, and every animal that breathes, is constantly depriving the atmosphere of its oxygen and supplying it with carbonic acid; while the whole vegetable kingdom is as constantly appropriating the carbon of this carbonic acid to itself, and emitting again the oxygen—thus forever preserving the equilibrium, the harmony, and the activity of nature's works. Of the powers of the living plant to appropriate to itself the various elements of which it is composed, or, in other words, of the theories of assimilation, we shall speak more particularly in another chapter."

Although there are some opinions advanced in the work, not entirely in accordance with our own, yet we cheerfully and earnestly recommend it to our readers and the public generally. And we are glad to learn from the author that a second edition will soon be issued, on larger type, and containing accurate plates of each insect described in the Appendix.

SOW WELL AND REAP WELL.

Or Fireside Education, by S. G. Goodrich, *author of Peter Parley's Tales. 3d edition.* E. H. Pease, publisher: Albany. 12mo. 343 pp.

Our Journal is expressly designed for those who sow and reap; not those alone, however, who literally scatter the grain broadcast over the field, and in the harvest thrust in their sickle and gather the fruit of their toil and labor. There is a sowing and there is a reaping in which the hand hath no part, and there are fruits and harvest as sure as when the husbandman sows his corn upon the well prepared fields. We need not explain.

Mr. Goodrich, the author of the work entitled *Sow Well and Reap Well*, is known wherever the young are permitted and encouraged to read; he has scattered precious seed over the hills of New England, and upon the prairies of the west and south of our great country; and even on the shores of Europe it has fallen, and in his own day he has gathered the mature and ripened fruit. The special object of the author of this work is to enforce the doctrine, that none need expect to reap a better fruit than he has sown. The doctrine is based upon a natural law, and is illustrated and enforced by the common results and experience of every day.

There is a proper time for sowing. Does the farmer sow in autumn, expecting to gather a harvest before the snows whiten the field? There is a preparation of the ground: does the farmer sow his seed upon the hard unbroken earth, or upon a rock? The spring is the time to sow; so infancy and youth is the time to put in the seed of knowledge. The field must be broken up, plowed.

But there is another point; there are persons whose duty is emphatically theirs *to sow*. Parents have this duty, and in them it is paramount; all others are but aids. Sow Well and Reap Well is a volume, then, which is entitled to a place in every parent's library. It is written in a style and language which is well adapted to secure the objects of its publication; and though education is really a subject upon which all talk and write, and talk and write much better than they practice, still, the author has no common place matter upon his pages, no dull chapters which may be omitted. It may be read by the young and old, and by its aid the former may be assisted in correcting the errors into which he has fallen, and supply many deficiencies, which in consequence of age and limited experience he may be ignorant of, and thus avoid the mistakes and errors to which he is exposed when left without a guide.

It is by such books as this circulating throughout our country, that we hope to see the true ends and aims of life distinctly comprehended and as positively acted upon. And at such times as these upon which we have fallen, do we need checks to certain evils which are growing up in the literary and political worlds.

ELEMENTS OF DRAWING AND MENSURATION APPLIED TO THE MECHANICAL ARTS.

A book for the instruction and use of practical men. By CHARLES DAVIES, LL.D. *Author of First Lessons in Arithmetic, etc.* 12mo. pp. 240. A. S. Barnes & Co., publishers: New York.

A work of this kind was undoubtedly called for, in order that the higher elementary studies which have been introduced into our common schools might be pursued with advantage. In the preparation of this work Mr. Davies has been highly successful, as he always has been in simplifying the matters treated of in the several parts of the work; thus, in the book on practical geometry, he illustrates in a very familiar and simple mode the construction and uses of the various scales, and also of geometrical figures. So in Book III., all the kinds of drawing are well illustrated and explained.

The work is entirely practical, and particularly calculated to prepare the way for the study of the higher branches of geometry; or, to supply almost every thing which a young mechanic or farmer will need in drawing, mensuration and many calculations which are necessary in the every day operations of life.

CATECHISM OF AGRICULTURE, CHEMISTRY AND GEOLOGY.

By J. F. W. JOHNSTON, M. A., etc., *with an Introduction by* J. PITKIN NORTON. E. H. Pease, publisher: Albany.

The reputation of this work is so well established, that it is hardly necessary at this late day to recommend it. We desire, however, to speak in its favor, were there no other reason than this, that our agricultural friends may know that we have not overlooked or forgotten a valuable publication. But other reasons of a different nature induce us to speak of it now; its adaptation to the wants of schools and farmers. It is certainly as useful to a large class of farmers as to the pupils in schools. It is plain, simple, and contains all the elements of agricultural chemistry; and as much of chemistry as this work contains, must be in his possession, if he would read the ordinary agricultural journals of the day.

Young men may take it into the field in their pockets, for instruction while their teams are resting in the furrow.

FARMERS' MISCELLANY.

A BIRDSEYE VIEW OF THE STATE OF AGRICULTURE OF DIFFERENT COUNTRIES.

BY C. N. BEMENT.

EUROPE.

Face of the Country.—The central part of this continent is in general mountainous. The whole northern part, extending from London and Paris to Razan, and comprising the northern part of France and Germany, the Dutch and Belgian Netherlands, Prussia, Poland, and a great part of Russia, is a vast plain, little elevated above the level of the sea, and scarcely broken by any considerable elevations. There are several elevated plains or plateaus in Europe, but of no great extent. The Swiss plateau, lying between the Jura and the Alps, has an elevation of from 1,800 to 4,000 feet. Central Spain forms an elevated table land 2,200 feet high, and the central part of Russia forms a similar plateau about 1,200 feet high.

Climate in general.—The climate of southern Europe may be described as mild, and that of the north severe, with long winters and hot but short summers. The climate of the western coast is, however, tempered by the vicinity of the ocean, and the same cause renders it liable to sudden and violent changes. That of the eastern part of the continent is rendered much colder, in corresponding latitudes, by its exposure to the icy winds of northern and central Asia. The heat, brought by the burning winds of the African deserts to the southern countries, is in general tempered by their great exposure to the sea, occasioned by their peninsular formation. The mountains of Switzerland, Spain, and Hungary, also modify the character of the climate in the extensive districts which they cover.

ENGLAND.

Face of the Country.—The general aspect of England is varied and delightful. In some parts, verdant plains extend as far as the eye can reach, watered by copious streams. In other parts, are pleasing declivities of gently rising hills and bending vales, fertile in grain, waving with wood, and interspersed with meadows. Some tracts abound with prospects of the more romantic kind; embracing lofty mountains, craggy rocks, deep, narrow dells, and tumbling torrents. There are also, here and there, black moors, and wide, uncultivated heaths. The general aspect of Wales is bold, romantic and mountainous. It consists of ranges of lofty eminences and impending crags, intersected by numerous and deep ravines, with extensive valleys, and affording endless views of wild mountain scenery.

Climate.—England has an atmosphere of fogs, rain and perpetual changes; yet the climate is mild. The rigors of winter and the heats of summer are less felt than on the continent, under the same parallel. The winds from the sea temper the extremes of heat and cold; the changes, however, are sudden. Westerly and southwesterly winds are most prevalent, and also the most violent. Next are the north and northeast. The perpetual moisture of the air is sometimes unfavorable to the crops, but its general effect is to cover the whole island with the deepest verdure. The meadows and fields are usually green throughout the winter, and the transient snows that occasionally fall upon them are insufficient to deprive them of their brilliancy. Many kinds of kitchen vegetables, as cabbages, cauliflowers, brocoli, and cellery, remain uninjured in the gardens through the winter.

Soil.—Of this there is every variety; but the common constituents of the soil, are clay, loam, sand, chalk, gravel and peat. Mossy soils are very common and extensive in the northern parts, and here are the widest tracts of barren territory. On the eastern coast are extensive fens and marshes. The most fertile districts are in the centre and south. There are very large heaths and plains, which are nearly unsusceptible of cultivation, and only serve for the pasturing of sheep. On the whole, England may be regarded as not naturally a fertile country.

Agriculture.—Notwithstanding the general inferiority of the soil, England is under such excellent cultivation that the country may be considered as one great garden. Farming, in many parts, is conducted on a great scale, by men of intelligence, enterprise and capital; and the science, as well as practice, of agriculture is carried to a high degree of perfection. In the northern counties, the farms are large and are leased for twenty-one years. In the southern counties the farms are smaller, and the tenants are often proprietors. The field pea and the tare are often sown as a field crop. Saffron, which was formerly cultivated in various parts of the kingdom, is now grown almost solely in Essex; another singular product of Essex, is a kind of treble crops of coriander, carraway and teazle; the two first on account of their aromatic seeds, the other for its prickly heads, used by the manufacturers in raising the nap on woolen cloths.

SCOTLAND.

Face of the Country.—Two-thirds of the country are mountainous. It is generally considered as divided into two parts, the mountainous regions called the Highlands, in the northern and central part, and the comparatively level country in the south, called the Lowlands. In the north the mountains present nothing to view but heath and rock, with innumerable lakes and pools, darkened by the shade thrown from enormous precipices; the whole forming a landscape wild and desolate beyond conception. In the central parts the aspect of the mountains is less forbidding. In the south is every kind of rural beauty, hills, vales, and cultivated plains.

Climate.—The distinguishing feature in the climate is the excess of moisture. Fogs and drizzling rains prevail in most parts for the greater portion of the year. Considerable snows fall in winter, but are soon melted; sleighs or sledges are never used, but the waters are sometimes so frozen as to permit skating.

Soil.—In many of the valleys or straths, there are tracts which are productive, but the soil is much inferior to that of England. A great part of the country may be considered as absolutely barren. The mountains are naked, and trees of native growth are scarce in every part.

Agriculture.—The articles cultivated are generally the same as in England. Oats are the principal crop, except in the most fertile districts. Potatoes are cultivated somewhat extensively, and in some places hemp.

IRELAND.

Face of the Country.—The surface of Ireland is almost entirely level. The general appearance of the country is varied and pleasant, although bare of trees. In some parts, are rich and fertile plains, and in others gentle slopes and waving hills.

Climate.—The climate is damper than that of England, but otherwise similar. Westerly winds are frequent and violent. Snow is rare in winter, and passes rapidly away. The fields have a green appearance through the year.

Soil.—A great part of this island is covered with immense bogs, or sterile tracts, producing nothing but heath bog, myrtle, and sedge grass. They form a broad belt across the centre of the island, widening towards the west. The remainder of the soil is strong; but the moisture of the climate preserves the herbage, and renders the land excellent for pasturing.

Agriculture.—Agriculture is very backward. The cultivators are not generally proprietors of the soil, and studiously avoid any permanent improvement of the land, lest the rent should be raised. The Irish are idle, and their implements of husbandry very rude. Wheat is not generally cultivated, and what is raised is often inferior. Barley is now common, but oats are raised in a ten-fold proportion to that of any other grain. The Irish staff of life, however, is another article, which is so extẽnsively cultivated as to confer upon this island the name of the "land of potatoes." This root furnishes to the poor the greatest part of their sustenance. It is remarkable that a plant, brought originally from America, and hardly known in Europe a century ago, should now be so universally cultivated in Ireland, and grow in such perfection there. Even in the United States this vegetable is called the Irish potatoe; this however is to distinguish it from the sweet potatoe of the south. The dairy is the best managed part of Irish husbandry.

FRANCE.

Face of the Country.—France generally exhibits a level but not undiversified surface. The most level tracts are in the north. The picturesque beauty of the hilly parts is heightened by the rich and luxuriant verdure of the chesnut trees. In the south the deep hue of the olive gives rather a sombre look to the landscape. From the mouth of the Garonne to the borders of Spain, the coast consists of a flat, sandy, barren tract, called the Landes, extending thirty miles into the country, and producing nothing but heath, broom and juniper. The remainder of the country is, in general, agreeably diversified with gentle undulations.

Climate.—The air of the northern part is moist, and there are considerable snows and sharp frosts in winter. At Paris, the Seine is sufficiently frozen to admit of skating. In the central part no snow falls, sometimes, for many years; frosts seldom occur, and the air is pure, light and elastic. The harvests begin from the latter part of June to the middle of July. The south of France, from the Loire to the Mediterranean, is subject to violent storms of hail and rain which destroy the crops. One-tenth of the crop is yearly damaged by the storms. Thunder storms are frequent and violent; they produce cataracts, which rush down the mountains, burying the meadows under heaps of stone and masses of mud, and cutting the sides of the mountains into deep ravines. In most parts of France frosts are commonly late in spring and early in autumn, which do great injury to vegetation. The high country of Avergne is bleak and cold, and all the districts of the Vosges are affected by the snow which sometimes continues to fall upon these mountains as late as the end of June.

In the southern provinces the summer is exceedingly hot. The vintage is in September. At the end of autumn violent rains fall; but October and November are the pleasantest months in the year. In December, January, and February, a strong northeasterly wind, called the mistral, blows, sometimes with snow, but generally with a clear sky. It is sometimes so violent upon the mountains as to blow a man off his horse. At Avignon, the olive trees are frequently chilled by it. The south of France may be characterized as possessing a mild and salubrious climate. Montpelier, on the shore of the Mediterranean, is celebrated for the purity of its air.

Soil.—France is generally a fertile country, but the soil varies much in different provinces. The northeast is the richest part. There are admirable corn districts along the Seine, Rhine and Moselle. The hills of Champagne and Burgundy produce the most excellent wines. The valley of the Garonne has a warmer soil, but is less productive than that of the northern districts.

Agriculture.—Two-thirds of the population of France are agricultural, and a much greater proportion of the cultivators are proprietors than in most other European countries. The agricultural products of the northern part of the country are corn, pulse and potatoes; of the southern, corn, grapes, mulberries and olives. Besides the common grains of Europe, wheat, rye, oats, and barley, maize is also extensively cultivated. The horses and cows are fed chiefly on clover, lucern and sanfoin, and other artificial grasses, of which no greater quantity is raised than is absolutely necessary. The rotation of crops is little attended to, and fallows still hold a place in French husbandry, which is therefore proportionately less productive than the English. The French are, however, the best wine makers in the world; the principal varieties of the French wines are those of Champagne and Burgundy; the Moselle and Rhenish wines, so called from the rivers upon whose banks they are produced; the hermitage of Dauphiny; and the clarets of the neighborhood of Bordeaux.

SPAIN.

Face of the Country.—Spain is an elevated and beautifully picturesque country. It exhibits an alternate of mountain ridges and wide plains, every where watered by rivers and small streams. The hills are covered with vineyards, and the valleys display the most luxuriant vegetation. The southern part looks like a garden in perpetual bloom. In external beauties few countries in the world equal Spain.

Climate.—This country lies in the southern part of the temperate zone. The cold is never excessive, even in the northern parts. In the south the heats of summer would be intolerable but for the sea breeze, which begins to blow at nine in the morning and continues until five in the afternoon. The interior is so elevated as to be much cooler than might be expected from the latitude. The two bastiles form a raised plain nearly 2,000 feet in height. The sky of Andalusia is pure azure and gold; the inhabitants of Seville affirm that a day was never known when the sun did not shine upon their city. Two kinds of winds are sometimes unpleasant in Spain. The Gallego from the northwest is piercing and cold; the Solano, a southwest wind from Africa, is so hot as to relax the human system and produce giddiness and inflammation.

Soil.—The greater part of the country is fertile, and covered with a luxuriant vegetation. The fruits and plants offer a greater variety than is afforded by any other region of the same extent. The land is every where favorable to the cultivation of the vine. The greater part of Spain may be regarded as naturally the most fruitful country of Europe, but there are extensive wastes in the interior.

Agriculture.—The greater part of the land of Spain belongs to the nobility, the church, the towns, or corporate bodies. The state of agriculture is wretched, and the implements of husbandry are very rude; hardly two-thirds of the productive soil is under cultivation. Hemp and corn are raised in almost all the provinces; olives and the sugar cane are cultivated in the southern parts, and in this quarter may be seen large fields of saffron, rice and cotton. Every part of the country yields wine. The raising of sheep is an important branch of industry, and the wool is distinguished for its fineness. The Merinos or fine wooled sheep, pass the summer in the mountainous districts of Castile and Arragon, and the winter in the plains of Andalusia and Estramadura. They are driven this distance of nearly 700 miles in 40 days, in flocks of 10,000. The mesta or society, composed of the owners of the sheep, has the right to drive them over the land which lies on the route, and to feed them on the pasture where the land is cultivated; the proprietors are obliged to leave a space 250 feet in breadth for their pasturage. The whole number of sheep in Spain is about eighteen millions, more than half of which migrate annually.

PORTUGAL.

Face of the Country.—This country has not so great a proportion of mountains as Spain. There are two extensive plains, that of Beira in the north, and that of Alemtijo in the south. The coast is low in the north, but grows high and rocky towards the south. In the wildness and grandeur of mountain scenery Portugal is inferior to Spain, yet in general appearance it is esteemed a more pleasant country.

Climate.—The climate is more agreeable and healthy than in most of Spain. The air of Lisbon is famed for its salubrity, and that city is resorted to by invalids from different countries. The heat of summer and cold of winter are tempered by the neighboring ocean. At Lisbon there are commonly 200 days in the year completely fair. The raining days are not more than 80. When rain falls it is very violent. If October is rainy it is not uncommon to see the fruit trees blossom anew in November.

Soil.—Portugal is a fertile country; the soil is light, and easily cultivated. The mountains are mostly barren, but some of them are covered with a fine vegetation.

Agriculture.—Portugal though rich in natural productions, wants the cultivation of industrious hands. The wealth of the colonies and commerce withdrew the attention of the inhabitants from agriculture, which has been for several centuries in a low state. Excellent fruit is raised and exported in considerable quantities, and several sorts of wines of excellect quality are produced; the red port wine is much drank in England and the United States. Although the country affords excellent pastures, grazing is little attended to. Corn is raised in so small quantities that it is necessary to import it.

SARDINIA.

Face of the Country.—The country exhibits very diversified scenery. Savoy is an Alpine country, separated by an enormous mountain ridge from the Italian peninsula, and intersected by lofty mountains covered with snow and ice. Piedmont and Montserrat form the western extremity of the wide valley of the Po. The maritime districts are mountainous, and the Island of Sardinia is intersected by several mountain ridges of small elevation.

Climate.—In the valley of Savoy, there is often fine spring weather when the high grounds are covered with snow. In this part, the climate is too severe for southern fruits. The valley of Piedmont is subject to the cold northerly winds from the Alps; yet the air is healthy and the vine flourishes. In the south the Appenines afford a shelter against the northern blasts; here the olive and the fruits of the south prosper. Sardinia has a hot climate; and in the marshy spots, putrid fevers are common in summer.

Soil.—The soil of Savoy is strong and unfavorable to agriculture. The fertile earth lies in a thin strata on the rocks, and is often washed away by the torrents. In Piedmont, Montferrat, and the Milanese are level and rich alluvial tracts. The soil in the island of Sardinia is extremely fertile; but the canals which formerly drained it are neglected, and many parts have become pestilential swamps.

Agriculture.—The arable land is held by large proprietors, who divide their estates into small portions among farmers. The farmers seldom become proprietors, but in general the land descends from father to son. The proprietor receives half of the product for rent and the use of the cattle which are his property;

for the meadows he is paid in money. Part of the tools also belong to the proprietor. The farmers are in general very poor. The landed proprietors are rich. In the Appenines and a part of the Genoese territories, the peasants are proprietors, but their wealth consists in chesnuts, sheep, and olives. Wheat, maize, and other grains, rice, beans, and tobacco, are cultivated. Excellent grasses are raised, but the making of wine is not well understood. The olive is cultivated along the coast, and Genoa is productive in oil. Piedmont raises annually 20,000 cwt. of silk.

LOMBARDY.

Climate and Face of the Country.—The country is for the most part level, but towards the north is broken by spurs of the Alps. To the west of Padua are the Euganean hills, from 1,500 to 1,800 feet high, of volcanic origin. The climate is mild and healthy; near the Alps it is cold, and even in the other parts the rivers are sometimes frozen in winter, and the southern plants are injured by frost. The heats of summer are tempered by refreshing breezes from the Alps.

Soil.—Lombardy is a level country and consists entirely of an alluvial plain, with one of the richest soils in the world. Near the mountains gravel is mixed with the earth, but almost the whole tract is composed of a deep black mould.

Agriculture.—Agriculture is the chief dependence of the inhabitants, but the implements and operations of husbandry are very imperfect. The artificial irrigation of lands is a striking feature of agriculture in Lombardy; the canals for this purpose are very numerous, and water is thus employed for grass and corn lands and vineyards, and also to flood lands sown with rice. It is also used, when charged with mud, for depositing a layer of manure. The lands in Lombardy are generally farmed on the metayer or half-profit system. The landlord pays the taxes and keeps the buildings in repair, while the tenant provides the cattle, implements and seeds, and cultivates the ground, and the produce is equally divided.

TUSCANY.

Face of the Country.—Tuscany is admired for its romantic scenery. The boldness, grandeur and rich luxuriance of the country is hardly any where equalled. The Valdamo, or vale of the Amo, is one of the most delightful regions in the world. One-half of Tuscany consists of mountains, producing only timber, one-sixth is composed of hills covered with vineyards and olive gardens; the remainder consists of plains.

Climate.—The climate is exceedingly diversified. On the mountains the snow lies for weeks, during the winter; in the valleys it scarcely continues a day. Rain is not common, but the dews are copious. On the Appenines, and in the delightful valley of the Amo, the air is always healthy. In summer the southerly winds are very oppressive, and the region of the Maremma is unhealthy.

Soil.—The vale of the Amo is rich and well cultivated. The soil on the Appenines is strong. The coast is low, sandy, and in parts swampy. In the southern part begins that desolate region called the Maremmo, the soil of which consists of white clay impregnated with sulphur and alum, and emits consequently mephitic vapor. The malaria, or unhealthy exhalations of this region have obliged the population to emigrate, or swept them off by disease. In those parts which are cultivated, the peasants from the mountains come down to gather in the harvest, but they often fall victims to the insidious air. This region extends from near Leghorn to Terracina, about 200 miles, and from the sea to the foot of the Appenines, from 25 to 30 miles.

Agriculture.—Corn, wine and oil, are common productions. The valley of the Amo is divided into very small farms, separated by rows of trees or small canals. The Maremma pastures great numbers of sheep and horses. Chestnuts are an important production; in some parts they are used for bread.

PAPAL DOMINIONS.

Face of the Country.—This territory is intersected by the Appenines. The mountains are as barren as those of Tuscany, and

Geno, but higher. The Campagna di Roma is a continuation of the Tuscan Meremma, and is noted for its unhealthy malaria. It exhibits an undulated surface, bare of trees. The Pontine marshes are in the south. The Cæsars and modern Popes have in vain attempted to drain them.

Climate.—The climate is mild, but the mountains are covered with snow from October to April. The Sirocco, or hot wind from Africa, is felt on the shore of the Mediterranean. In the mountainous parts the air is healthy, but in the Maremma on the coast, and in the neighborhood of the Pontine marshes, are pestilential exhalations, which cause fever and ague. The northern parts near the Po are all unhealthy.

Soil.—The soil does not differ materially from that of Tuscany. The oranges and lemons produced in the plains of Rome are the best in Italy.

Agriculture.—The lands are commonly held by great proprietors. In the plains of the Po, cultivation is active, but the rest of the country is neglected. The Romans are less industrious than their northern neighbors. The vine and olive grow every where. Onions are raised in immense quantities in the marshes of Ancona. Hemp, saffron and beans are extensively cultivated.

THE RAMBOUILLET MERINOS.

Dr. Emmons is doubtless a good Geologist, and *meant* to make a fair trial of these samples; *but how much does he know about wool and sheep.—The* Rev. L. G. Bingham, *in the American Agriculturist for April.*

Our attention was called by a friend to an article in the American Agriculturist, in which Mr. Bingham complains that injustice was done the Rambouillets by a writer in the February number of the same work, over the signature of L. It would seem from the tenor of Mr. B.'s remarks, that we, the Editor of this Journal, had some hand in this matter; inasmuch as L. in the February article laid some stress upon the examination of some Rambouillet wool which we had made some time before. This wool was from the back of Grandee, the celebrated crack buck of a Rambouillet flock, though we were ignorant that he was of this blood before. The writer, though we do not know him, seems to have some advantage of Mr. B., as he has no occasion to inquire *how much we know of wool and sheep.* It is true we can lay no claim to the office of a shepherd, as the Rev. gentleman undoubtedly can, and certainly we entertain no envy towards him for any superior skill which he may possess in judging of wool, in consequence of his office. If, however, we have no skill in judging of wool and sheep, we think we can discover how it happens that Mr. B. is disturbed about his Rambouillets; it is the exact measurement of the fibre, it is the test which has been applied; or, it is the drawing of a measuring line over it which creates the complaint and calls forth the inquiry, *how much does Dr. Emmons know?* But whether this is the cause or not, the complaint is really groundless and uncalled for in our opinion, though we have no very strong fears in regard to the result of the inquiry. We intend, however, to teach Mr. Bingham something, and ought he not to be taught, as one who dares make such inquiries, and should he not know too the consequences of his unprovoked freedom. We certainly will show him, if assertion is worth anything, that we do know something about sheep, and the Rambouilllets too, which we hope will be satisfactory to the worthy inquirer. And this is what we know, that the Rambouillet sheep belong to the first order, and especially *those of the flock of the Rev. gentleman*, if the wool we have seen and examined is a criterion; for, we have very rarely seen better. It is just about the same stamp as some wool which we have measured from a buck belonging to our friend, Mr. Sherwood, the President of the New York State Agricultural Society. The difference between them seems to be just about this, one is a Rambouillet Merino and the other is a Merino. If a long name is any advantage to a sheep, as it seems to be sometimes to the high blooded bipeds on the other side of the great waters, why, Mr. Bingham has it.

Now as we have measured the two kinds of wool before us, we supposed it might be agreeable to the parties concerned to see the result side by side, and so here it is; both kinds are magnified and drawn under the same power.

MR. BINGHAM'S WOOL.

Fig. 1.

Fig. 1. *a*, from an ewe. *b*, from a buck.

COL. SHERWOOD'S WOOL.

Fig. 2.

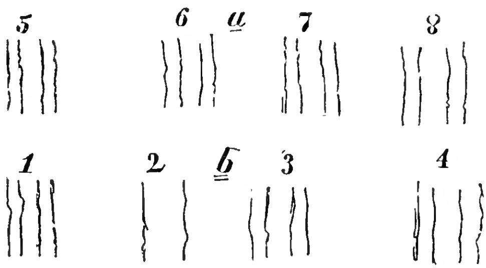


Fig. 2. *a*, ewe; 5 rump, 6 shoulder, 7 side, 8 thigh. *b*, buck; 1 thigh, 2 side, 3 shoulder, 4 rump.

We understand that Mr. Bingham's specimens of wool were from the side. It is very beautiful; not quite so glossy as some specimens of Saxon. It is not so entirely free from an oily substance as Mr. Sherwood's, as it stained through paper in a short time, and is yellowish from the presence of this matter. Yet, we repeat it, it is very rare indeed to see handsomer and more beautiful wool.

Mr. Bingham inquires what treatment the wool of Grandee received before it was measured and otherwise tested. In answer

NOTE.—There is a scale accompanying the measurement of other samples of wool, in two of the former numbers.

to this, we say for ourselves, that it was very carefully used, was neither carried in our pockets nor wallets. We received it from Mr. Tucker, and if he had subjected it to any ill usage before it came into our hands, he can say for himself.

And now, so far as we are concerned in the matter of the article referred to above, we are satisfied; if we have failed to satisfy Mr. Bingham that we know anything about wool and sheep, we cannot help it, we have given him the best possible evidence in our power, that we do know something, and that is by agreeing with him in regard to his wool. If he demurs now, we must give it up.

COMPOSITION OF THE MARLS OF NEW JERSEY.

Surface Marl, 50 *grs.*			*Shell Marl*, 50 *grs.*	
Water of absorption,		2.15	Water of absorption,	0.85
Organic matter,		3.32	Organic matter,	1.86
Silex,		40.07	Silex,	37.77
Peroxide of iron and alumina,		3.06	Peroxide of iron,	3.87
			Alumina,	0.73
Chloride of calcium,	.06		Chloride of calcium,	0.50
Magnesia,	.12		Magnesia,	0.40
Potash,	.61		Potash,	2.85
		0.70		48.83
			Loss,	1.17
		49.98		50.00

The latter marl is well known as a most useful fertilizer, and probably contains phosphate of lime. They belong to that formation which is known as the green sand, and extend from Long Island to Alabama. The green sand of Mullica Hill, N. J., according to Rodgers, is composed of

Silica,	52.32
Protoxide of iron,	27.56
Alumina,	8.94
Potash,	5.50
Water,	5.42
	99.74

Probably few instances are known where the soil of a country was so completely worn out as that of some parts of New Jersey, particularly that of Monmouh county—corn could not be grown upon some of the lighter soils. When, however, marls came into use the lands were speedily renovated. It is necessary, however, to select such as are comparatively free from the decomposing sulphurets of iron, as they prove injurious rather than beneficial. It is singular that these beds are so perfectly free from calcareous matter. Potash is evidently the fertilizing agent; and in order to determine the value of a marl it is at least safe to submit it to analysis. It must be observed that the amount of potash varies in different samples, and probably the potash is more abundant in the middle and inferior parts of a bed.

POTATOE DISEASE.

To guard against this disease, select the soundest potatoes. Plant early, on a dry soil, and manure with a compost of peat, ashes and lime, or a due admixture of organic matter with the alkalies.

Seat of the Disease in Potatoes.—Some maintain that it is in the stems; others in the tuber. As it regards treatment it makes no difference in what part the disease is seated. The cause of the rot is just as distant as before. There is no doubt, however, but that the perfection of the potatoe depends upon the health of the leaves and stems, and yet the inquiry returns what has affected their health and vigor. Liebig undertakes to maintain that the sap is changed into vegetable casein. This, however, is only another effect, it is not a cause. If there is a want of the inorganic matter in a diseased potatoe, it ought to be shown by analysis; but no one has as yet shown this; and yet the most rational way of treating the potatoe is that which will give it the greatest stamina and vigor. We believe the cause is atmospherical, that it is analagous to an epidemic, and that it will, like an epidemic, disappear: but that it will be continued longer by the planting of unsound seed, we have but little doubt. Many too, if our views are right, will maintain that they have discovered a remedy, and they may be confirmed in their opinions by the disappearance of the disease; which, after all, may be merely the effect of causes of a different character from those of the supposed remedies.

COAL ASHES.

Experience has confirmed the supposed utility of coal ashes. We should infer from their composition that they are well adapted to clay lands, though it by no means follows that they will be useless on lands in which sand predominates.

YAZOO MARL—MISSISSIPPI.

Our friend and correspondent, J. Ingersoll, has discovered a stratum of fresh water marl, upon the Yazoo bottoms, which seem to be made up of unios or fresh water clams. It seems to us that it will be found a valuable substance for fertilizing lands which are deficient in lime and other inorganic matters. It is composed as follows:

Water of absorption,	1.68
Organic matter,	4.67
Silex,	32.91
Peroxide of alumina,	4.78
Magnesia,	trace.
	49.98

The broken shells still contain animal matter, and undoubtedly a small proportion of phosphate of lime. It may be applied freely to soils which have been cultivated and partly worn out. In most cases in the application of marls of this description a free application is required.

CULTIVATION OF FRUITS.

Currants.—The currant is so hardy, and so sure to produce at least a tolerable crop, that usually, but little attention is paid to it. Still it is really one of the best fruits we have, green or ripe, and hence, should receive its share of attention.

We have found by some experience, that hoeing, manuring and a proper trimming of the bushes is as necessary as in the cultivation of any other plant. The fruit is larger and sweeter. In the position they usually occupy they are especially exposed to weeds, and a large part of the bush also is shaded, so that the fruit is in part at least imperfect and worthless. Three things then are necessary in the cultivation of the currant. 1. Sufficient pruning of imperfect stems, so as to admit light and air into the clump. 2. The application of barn yard manure, mixed with decomposing leaves which accumulate in a garden. It may be applied in the spring or fall. 3. Hoeing in the spring, after the weeds have started. They should of course be pulled up as they appear during the summer and ripening of the fruit.

Gooseberries.—The gooseberry is subject to mildew, an evil quite common in the best gardens, and which we have no doubt is owing to some defect in their cultivation, and is, in part, we believe, for want of free circulation of air. The plant is feeble and weak, and is unable to produce a healthy fruit, which is capable of resisting the attacks of fungi and parasitic plants.

We copy in this place the sensible and practical remarks of a writer in the Western Reserve Magazine of Horticulture.

"As a testimony of our impression of the manner in which the gooseberry *should* be cultivated not being a wrong one, we take the liberty of extracting from a letter of our esteemed correspondent, the Hon. James Mathews, of Coshocton, O. This gentleman appropriates a portion of his ground, exclusively, to what he terms his "gooseberry orchard," and in reference to which we quote as follows:

"They are planted in rich soil composed of sand and loam, and on a sandy foundation. First, I keep them well pruned, so that when fruiting the sun and air may penetrate freely, and the limbs and foliage not interfere with each other. In the fall or commencement of winter, I cover the ground amongst the bushes (which are planted about *four* feet distant each way) and particularly near to them, with a good coat of coarse barn-yard manure. This I permit to remain until the first opening of spring, or until the leaf buds are about to burst open; when I take off the coarsest part of the manure, and in the morning when the bushes are wet with dew, or just after a shower, I scatter over each one a spade full of strong slaked lime, permitting as much as possible thereof to adhere to the branches. This remains until the weeds begin to become troublesome, when I cause the ground to be well spaded and kept clear the balance of the season. With this treatment I have not yet seen a particle of mildew in the cultivation of about *forty* varieties which have fruited. I have been led therefore to believe that lime is efficacious in the prevention of mildew."

Strawberry.—We copy in connection with the above, and from the same source, a few remarks of James Allen on the cultivation of this fruit, as they contain one or two methods of treating this plant which is new to us.

"More than thirty years ago I commenced cultivating strawberry vines, and at first obtained but little fruit; and as I was then but a new beginner, the directions of every person were well received, and the old (and I hope exploded) doctrine of having male and female plants set together, appeared rational to me; and the consequence arising therefrom soon proved that my beds produced but moderately at first, and every year after rendering them more worthless, I plainly saw that I must know more or abandon the business; and with me at that time I had every thing to hope for and nothing to lose, by any experiments I could make. Consequently I sought new kinds to commence with. The first kind was from Philadelphia, called Scarlet Hautbois—and as I knew the weakness of my judgment, induced me to choose the first of May to set out my plants, when I could select such as had branches of young fruit on them. The following year I had a great crop for the size of my bed; and since that time I have always set out my plants about the first of May, when the young fruit is about the size of garden peas or larger. When cabbage plants can be set out and live, strawberry plants can be set out with equal success. The first summer the vines must be kept clean, and the runners laid aside when dressing them; and ground can be made to produce near one hundred bushels per acre in one year; but the pathway between the beds must be excluded in the measurement. Notwithstanding I never set out any but female plants, sterile (male) plants will soon appear, which no doubt originate from seed of berries that ripen and are trod down by the feet at gathering time.

"I have found it a good plan to mow my beds over before the first of August, which can be done with safety when the ground is not too dry. And to make speed and save much labor in keeping my beds clean, I make them long and narrow, and early every spring harrow them severely. My soil is clay, with but little sand: in a sandy soil I expect less harrowing would do—which could be known by the quantity of vines harrowed up, and in no case ought more than one-fourth of the vines to be removed. After harrowing, all loose vines and trash should be taken from the beds with a hand rake; and if the soil is not sandy, a top dressing of fine sand, raked over, is of great benefit. If there is any kind of strawberry that will not produce good crops of fruit on my plan, others must have it; for none of that description have been received by me as yet, and I have about ten kinds—the Hovey Seedling amongst them; but that kind I have not yet fully tried. If any one differs with me in opinion, the evidence to support the statements now made, can be annually witnessed here."

POULTRY.

Turkeys.—To rear young turkeys warm dry situations are required, and near by a running stream of water; besides this dry woods seem to be sought for instinctively by the animal itself. A turkey very frequently hatches fifteen or sixteen young at one sitting. When first hatched they are extremely tender, and are injured by rains and even heavy dews. Hence, they ought always to be placed in sunny places, where they will be kept dry. Sometimes the hen left to herself will succeed in rearing a brood. The artificial management of young turkeys is well described in the Magazine of Horticulture, from which we shall extract a passage or two.

"When young turkeys accidentally get wet, they should be brought into a house, carefully dried by applying soft towels to them, and then placed near a fire, and fed upon bread which has been mixed with a small proportion of ground pepper or ginger. It should be made up in the form of small peas. If the bread is too dry for this purpose, it may be moistened with a little sweet milk. Should the turkey-poults refuse to eat it, a few of these pellets may be forced down their throats. Even heavy dews prove destructive to them, and frost is no less injurious in its effects. These must, therefore, be most carefully guarded against, when the hens incubate in March, or early in April. Dry and sandy situations are most congenial for breeding turkies, and especially elevated situations where large woods are contiguous. A single male turkey is sufficient for twelve or sixteen females, although the former number is probably the safest, to prevent sterility in the eggs, which is frequently the case with those of turkeys. Eggs should never be entrusted to the care of a female until she is at least two years old, and they may be kept for the purpose of incubation till they reach their tenth year. The largest and strongest hens should always be kept for this purpose. During the time the hen is sitting, it becomes necessary to place food near her; as otherwise, from her assiduity, she may be starved to death, as turkey hens seldom move from their nest during the whole time of incubation.

Where farmers rear turkeys in great numbers, they do not indulge the hen by allowing her to sit as soon as she has done laying, but keep them from her until all the other hens have ceased to lay, as it is of consequence that they should be all hatched about one time. When hens are unhappy during this interval, they may be indulged with hens' eggs. When they have all ceased to lay, each of them is provided with a nest close to the wall, in a barn or other convenient place, and each is supplied with from sixteen to twenty of her own eggs. The windows and doors are then closed, and only opened once in the twenty-four hours for the admission of air, and for the purpose of feeding the hens. They are taken off their nests, fed and replaced, and again shut up. On the twenty-sixth day, the person who is entrusted with the management of the birds examines all the eggs, and removes those that are addled; feeds the hens, and does not again disturb them till the poults have emerged from their shells, and have become perfectly dry, from the heat of the parent bird; as to be subjected to cold at this time would certainly kill them. When the young birds are thoroughly dried, two of the broods are joined together, and the care of them entrusted to a single hen; and those who have been deprived of their offspring are again placed on hens' or ducks' eggs, and subjected a second time to the tedious operations of incubation, in which case it is not unusual for them to bring out thirty eggs. We cannot recommend this practice in point of humanity; for the poor hens when they have accomplished their second sitting, are literally reduced to skin and bone, and frequently so weak as hardly to be able to walk.

As before hinted at, great care should be taken of the young turkey poults; besides warmth, proper food, and shade, the nearer they are to a pure running stream the better, as they drink a great deal, and nothing is of greater importance to their being successfully reared than fresh drink. They must be carefully protected from strong gusts of wind, and on the slightest appearance of a thunder storm, should be immediately taken into a house. They should get no food for twenty-four hours after they leave the egg. Their first food should be hard boiled eggs, finely chopped, and mixed with crumbs of bread. Curd is also an excellent food for them. When they are about a week old, boiled peas and minced scullions are given to them. If eggs are continued, the shells should be minced down with their food, to assist digestion, or some very coarse sand, or minute pebbles. They should be fed thrice a day; and as they get older, a mixture of lettuce milk will be found beneficial, together with minced nettles. Barley boiled in milk is another excellent food at this period, and then oats boiled in milk. In short the constitution of the young turkeys requires at all ages every kind of stimulating food. When about three weeks old, their meat should consist of a mixture of minced lettuce, nettles, curdled milk, hard boiled yolks of eggs, bran, and dried camomile; but when all these cannot be readily obtained, part of them must be used. Fennel and wild endive, with all plants which are of a tonic character, may be safely given to them. Too much lettuce, however, has been found to be injurious. When poults are about a month old, they should be turned out along with the parent bird, into the fields or plantations, where they will find sufficient food for themselves. As their feet are at first very tender, and subject to inflammation from the pricking of nettles and thistles, they ought to be rubbed with spirits, which has the effect of hardening the skin, and fortifying them against these plants."

EARLY POTATOES.

To secure early potatoes cut the seed into two parts, and reject the but end and plant the other. There is a great difference in the time of sprouting and growing of the young shoots from these ends; besides there will be greater evenness in size as well as uniformity in ripening. It is said that the butt end produces a larger potatoe than the other. This rule of planting the ends separately applies to all potatoes, early or late.

TEMPERATURE OF THE SOIL FOR PLANTING CORN.

The temperature of the soil ought to reach 60° of Fah. in the shade before corn is planted; but little danger will then be incurred of its rotting before germination begins, for when this has taken place it will invariably come up, although the temperature may be subsequently reduced. It is recommended to give it a coating of tar after it has been slightly swollen in water. It secures it from crows, and from certain insects. In regard to soaking seeds it ought to be remembered that a very dry soil will absorb the water in the seeds, and hence circumstances ought always to determine the propriety of the practice.

EXTRACTS FROM THE JOURNALS.

NUTRITION OF PLANTS—LIEBIG'S THEORY.

Dr. W. Seller has communicated to the Royal Society of Edinburgh, his examination of the views adopted by Liebig, on the Nutrition of Vegetables; for the purpose of determining how far these are just, and with what limitations they require to be received.

The following propositions represent the spirit of the opinions on which Dr. Seller comments:—

1st. That the food of plants is strictly of a mineral or inorganic nature.

2d. That ammonia, carbonic acid, and water impregnated with a few saline matters, are the sole aliments of plants.

3d. That the organic matter of soils must pass into the mineral state, namely, into water with a saline impregnation, carbonic acid and ammonia, before it can become subservient to the uses of vegetation.

4th. That the saline matters and the like, which form the ashes of plants, are, without exception, taken up from the soil, and are in no respect the product of vegetation, as was taught in the beginning of the present century.

Thus the maxims adopted by Liebig on the nutrition of plants are of a negative character; for if it can be shewn that the doctrine of the nutrition of plants by organic compounds in the soil is unfounded, then the truth of Liebig's grand axiom, as to the mineral nature of the food of plants, is established at once.

We have not space to quote (from *Jameson's Journal*, No. 77) the arguments by which Dr. Seller seeks to refute these views. The following, abridged from the close of this valuable contribution to science, is highly important:—

The spirit in which De Saussure so long since studied the vegetable economy, appears to have become dormant among botanists for a good many years. They had too little faith in the conclusions of modern chemistry to trust to it as an instrument of research. Nor was it surprising, at the commencement of this century, when chemistry was hardly beyond its infancy.

Chemistry, in short, must always be the very groundwork of vegetable physiology. It must teach the number, the properties, the relations of the elements, which the vital force combines and operates on. And had this truth been more clearly seen, and more firmly held to, at an earlier period, it would not have been left for Liebig at this late day to surprise the world with the announcement of the great bonds of union which so strictly unite the operations of the vegetable economy with those of mineral and of animated nature. For Liebig has not taught much, the rudiments of which are not to be found in De Saussure's work. De Saussure taught, in 1804, that plants fix carbon both from the carbonic acid of the soil and of the atmosphere; that they fix oxygen and hydrogen from water; that they derive their saline matter from the soil. He knew the ammonia is contained in some decomposing vegetable substances; but he does not appear to have arrived at Liebig's conclusion, that it is an essential part of the food of plants; and without affirming what Liebig so pointedly denies, namely, that the extractive matters of the soil are part of the food of plants, he contents himself with saying that these "contribute in a certain proportion to the fertility of the soil;" while he adds, in the same sentence, that "the ashes of these extractive matters contain the same principles as the ashes of plants."* Moreover, De Saussure notices, in particular, that vegetable mould contains more ammonia than the wood from which it forms; and this difference he ascribes to the effect produced on the soil by the numerous insects frequenting it.

It may be seen, then, that the spirit of the view adopted by Liebig is not of recent date. That plants convert mineral substances into their own substance is a proposition almost coeval with our knowledge of the ultimate composition of air, water, and soil. And all that is essential of this proposition remains unchallenged, even if the progress of enquiry shall graft the views of Mülder on those of Liebig, namely, that certain azotised substances formed in the soil, which have not yet lost their organic character, are indispensable. For if such compounds do aid in the nutrition of plants, it manifestly cannot be otherwise than as yeasts contribute to fermentation. The substance of vegetables is from mineral nature. Plants metamorphose parts of the mineral covering of our planet into organic substance. Animals dissolve the spell bound on it by vegetable life, and reconvert this organic matter into its original mineral condition. Thus, from air, water, and a little soil, all organic bodies are made.

Thus, modern science realizes the happy conjecture of the ancients as to the number of the elements. The four elements of the ancients are the elements of organic nature—Air, Water, Earth and Fire, are in truth the elements of the organic world;

* Recherches Chemiques sur la Vegétation, par Théod. De Saussure, p. 185.

for their fire represents that warmth, the absence of which extinguishes all organic life.

A brief notice of the mode in which the numerical results made use of have been brought out may be satisfactory, and will shew that no exaggeration has been practised to the prejudice of the opinion that the food of plants is organic substance.

The area of the earth's surface is roundly estimated in square miles, by multiplying the circumference into the diameter.

24,000+8000=192,000,000, area of the earth in sq. miles.

$\frac{192,000,000}{5}$ =38,400,000, one-fifth part of the earth's surface in square miles.

The number of square feet in a square mile is 27,878,400; whence 38,400,000+27,878,400=1,060,520,560,000,000, the number of cubic feet of soil a foot deep, in the surface of one-fifth part of the area of the earth.

A cubic foot of water weighs 1000 ounces avoirdupois; call soil twice the density of water, which is near its density; then a cubic foot of soil weighs 2000 ounces, or 125 pounds:

125+1,060,520,560,000,000,=132,564,071,000,000,

which number represents the quantity of soil in avoirdupois pounds contained in one-fifth part of the earth's surface.

The same reduced to tons is 59,180,388,839,285.

Take ten per cent of this quantity as organic matter, 5,918,038,883,928.

Take three-fifths of the organic matter as carbon, 3,550,823,320,352; or there is something more than three billions and a half of carbon in the soil of one-fifth part of the earth's surface.

If a thousand millions of men consume daily five ounces of carbon each in respiration, they consume in a year 50,922,420 tons of carbon. A horse, according to Boussingault, throws off, in carbonic acid, 6·07 pounds of carbon, or nearly a ton in a year (·988 ton).

The horses of Great Britain, on a moderate calculation, are estimated at a million and a half;* and the inhabitants of Great Britain are less than a fifth part of the human race: say, then, there are fifty times as many horses in the world as in Great Britain, and horses alone will be found to consume every year nearly 75,000,000 of tons of the carbon of organic matter.

An ox or cow converts nearly four and a half pounds of carbon daily into carbonic acid. There are about three millions and a quarter of cattle in Great Britain;† or the cattle of Great Britain must consume more than three millions and a quarter of tons of

* Macculloch's Statistical Account of the British Empire, vol. i. page 284.

† Ib. page 490.

carbon annually in respiration; and if the black cattle all over the earth be in the like proportion to the number of inhabitants, these alone will consume more than 150 millions of tons of the carbon of organic matter in a year (162,500,000).

The number of sheep in Great Britain is estimated at about forty millions (39,648,000) Macculloch. Take the average weight of each at no more than fifty pounds, the weight of the whole comes to nearly a million of tons; or, at all events, since in warm-blooded animals the quantity of carbon thrown off by respiration in a year considerably exceeds the weight of the animals, there must be at least a million of tons of the carbon of organic matter converted yearly into carbonic acid by the sheep of Great Britain.

This should give, for the annual consumption by sheep, over the whole earth, fifty millions of tons of carbon.

Hogs, rabbits, poultry, &c., in Great Britain can hardly amount to less than half the weight of the sheep, or to half a million of tons. It may be reckoned, then, that such animals over the whole earth consume annually not less than twenty-five millions of tons of carbon—thus:

Carbon consumed yearly by men------	50,000,000 tons.
" " by horses-------	75,000,000
" " by cattle-------	150,000,000
" " by sheep-------	50,000,000
" " by hogs, poultry, &c.	25,000,000
Combustion of wood, being at half the rate at which coal is consumed for domestic purposes in Great Britain-----	425,000,000
	775,000,000 tons.

By a reference to the paper it will be seen that many sources of the consumption of the carbon of organic compounds are not taken into account in the above computation; and, in particular, that the consumption by animals in the wild state is not added. It seems not unlikely, then, that instead of 600 millions of tons, at which the annual waste was stated in the text, double that quantity would come nearer the truth.

LIEBIG'S PATENT MANURES.

These manures have been patented, on Dr. Liebig's behalf, in the name of Mr. James Muspratt, of Liverpool.

The object of the invention is to prepare manure in such manner as to restore to the land the mineral elements taken away by the crop which has been grown on, and removed from the land, and in such manner that the character of the alkaline matters used may be changed, and the same rendered less soluble, so that the otherwise soluble alkaline parts of the manure may not be washed away from the other ingredients by the rain falling on the land, and thus separating the same therefrom. And it is the combining carbonate of soda or carbonate of potash, or both with carbonate of lime, and also the combining carbonate of potash and soda with phosphate of lime, in such manner as to diminish the solubility of the alkaline salts to be used as ingredients for manure (suitable for restoring to the land the mineral matters taken away by the crop which may have been grown on, and removed from the land to be manured), which constitutes the novelty of the invention.

Although the manures made in carrying out this invention will have various matters combined with the alkaline carbonates, no claim of invention is made thereto separately; and such materials will be varied according to the matters which the land to be manured requires to have returned to it, in addition to the mineral substances above mentioned. The quantity of carbonate or phosphate of lime, used with carbonate of soda or potash, may be varied according to the degree of solubility desired to be obtained, depending on the locality where the manure is to be used, in order to render the preparation less soluble, in localities where the average quantity of rain falling in the year is great; but as in practice it would be difficult to prepare manures to suit each particular locality with exactness, such average preparation is given as will suit most localities. In making manure according to the invention, carbonate of soda or of potash, or both, are fused in a reverberatory furnace, such as is used in the manufacture of soda-ash, with carbonate or phosphate of lime, (and with such fused compounds other ingredients are mixed), so as to produce manures; and such composition, when cold, being ground into powder by edge stones, or other convenient machinery, the same is to be applied to land as manure. And in order to apply such manure with precision, the analysis and weight of the previous crop ought to be known with exactness, so as to return to the land the mineral elements in the weight and proportion in which they have been removed by the crop.

Two compounds are first prepared, one or other of which is the basis of all manures, which is described as the first and second preparations.

The first preparation is formed by fusing together two or two and a half parts of carbonate of lime with one part of potash of commerce (containing on an average sixty carbonate of potash, ten sulphate of potash, and ten chloride of potassium, or common salt in the hundred parts), or with one part of carbonate of soda and potash, mixed in equal parts.

The second preparation is formed by fusing together one part of phosphate of lime, one part of potash of commerce, and one part of soda ash.

Both preparations are ground to powder; other salts and ingredients in the state of powder are added to these preparations and mixed together, or those not of a volatile consistency may be added when the preparations are in a state of fusion, so that the manure may represent as nearly as possible the composition of the ashes of the preceding crop. This is assuming that the land is in a high state of cultivation; but if it be desired to grow a particular crop on land not in a high state of cultivation, then the manure would be applied in the first instance suitable to the coming crop, and then, in subsequent cases, the manure prepared according to the invention would, as herein described, be applied to restore to the land what has been taken therefrom by the preceding crop.

Preparation of Manure for Land which has had a Wheat crop grown on and removed therefrom.—Take of the first preparation six parts by weight, and of the second preparation one part, and mix with them two parts of gypsum—one part of calcined bones—silicate of potash (containing six parts of silica), and one part of phosphate of magnesia and ammonia.

And such manure is also applicable to be used after growing barley, oats, and plants of a similar character.

Preparation of Manure for Land which has had a crop of Beans grown thereon, and removed therefrom.—Take fourteen parts by weight of the first preparation; two parts of the second preparation, and mix them with one part of common salt (containing two parts of silica)—two parts of gypsum, and one part of phosphate of magnesia and ammonia.

And such manure is also applicable for land on which peas, or other plants of a similar character, have been grown and removed.

Preparation of Manure for Land on which Turnips have been grown, and removed therefrom.—Take twelve parts by weight of the first preparation, one part of the second preparation, one part of gypsum, and one part of phosphate of magnesia and ammonia.

And such manure is also applicable for land where potatoes or similar plants have been grown and removed.

The patentee has selected the above cases, because they represent the chief of the products cultivated in this country; and in doing so, such average preparations are given as will be beneficial in most, if not in all cases, as manure, to be used after the different crops mentioned; but manures may be prepared according to the invention for other plants than those mentioned; and, if desired, manures may be made with greater exactness for those plants which have been mentioned for particular cases, if the matters of which the plants are composed and the quantities are first ascertained, by burning the plants and analyzing the ashes, and then combining the manure according to the analysis. The manure so made is to be applied to the land in quantities as great or greater than the quantities of the elements which have been removed by the previous crop. It should be stated that, where the straw of wheat and other similar plants, which require much silicate of potash, is returned to the land as manure, that is considered to be the best means of restoring the requisite silicate of potash to the land; in which case, in preparing the manures above mentioned, the silicate of potash would be omitted.

ROTATION OF CROPS.

A paper has been read to the Royal Society, by Prof. Daubeny, "On the rotation of crops, and on the quantity of inorganic matters abstracted from the soil, by various plants under different circumstances."

The author was first led to undertake the researches, of which a detailed account is given in this paper, by the expectation of verifying the theory of De Candolle, in which the deterioration experienced by most crops on their repetition was attributed to the deleterious influence of their root excretions. For this purpose, he set apart, ten years ago, a number of plots of ground in the Botanic Garden at Oxford, uniform as to quality and richness, one half of which was planted each year, up to the present time, with the same species of crop, and the other half with the same kinds succeeding each other in such a manner that no one plot should receive the same crop twice during the time of the continuance of the experiments, or at least not within a short period of one another. The difference in the produce obtained in the two crops under these circumstances would, the author conceives, represent the degree of influence ascribable to the root excretions.

The results obtained during the first few years from these experiments, as well as from the researches which had in the meantime been communicated to the world, by M. Braconnot and others, on the same subject, led him in a measure to abandon this theory, and to seek for some other mode of explaining the falling off of crops on repetition. In order to clear up the matter, he determined to ascertain, for a series of years, not only the amount of crop which would be obtained from each of the plants tried under these two systems, but also the quantity of inorganic matters extracted in each case from the soil, and the chemical constitution of the latter, which had furnished these ingredients. The plants experimented upon were spurge, potatoes, barley, turnips, hemp, flax, beans, tobacco, poppies, buckwheat, clover, oats, beet, mint, endive, and parsley.

From a chemical examination of the crops, Dr. Daubeny concludes, first, that the falling off of a crop after repetition depends, in some degree, on the less ready supply of certain of the inorganic ingredients which it requires for its constitution; not but that two crops equally well supplied by the soil with these ingredients may take up different quantities of them, according as their own development is more or less favored by the presence of organic matter in the soil in a state of decomposition.

Secondly, that it is possible that a field may be unproductive, although possessing abundance of all the ingredients required by the crop, owing to their not being in a sufficiently soluble form, and therefore not directly available for the purposes of vegetation; so that in such a case the agriculturist has his choice of three methods—the first, that of imparting to the soil, by the aid of a manure, a sufficient quantity of these ingredients in a state to be immediately taken up; the second, that of waiting until the action of decomposing agents disengages a fresh portion of those ingredients from the soil (as by letting the land remain fallow); and the third, that of accelerating this decomposition by mechanical and chemical means.

Thirdly, that it is probable that in most districts a sufficient supply of phosphoric acid and of alkali, for the purposes of agriculture, lies locked up within the bowels of the earth, which might be set at liberty, and rendered available by the application of the artificial means above alluded to.

Fourthly, that the aim of Nature seems to be, to bring into this soluble, and therefore available condition, these inorganic substances, by animal and vegetable decomposition, and, therefore, that we are counteracting her beneficial efforts when we waste the products of this decomposition by a want of due care in the preservation of the various excrementitious matters at our disposal.

Fifthly, that although we cannot deny that plants possess the power of substituting certain mineral ingredients for others, yet that the limits of this faculty are still imperfectly known, and the degree in which their healthy condition is affected by the change is still a matter for further investigation.

Lastly, that the composition of various plants, as given in this paper, differs so widely from that reported by Sprengel and others, that we are supplied with an additional argument in favor of the importance of having the subject of ash analysis taken up by a public body, possessed of competent means and facilities for deciding between the conflicting authorities, and supplying us with a more secure basis for future calculations.—*Athenæum*, No. 919.

THE POTATO DISEASE.

The premature disease which has taken place in the potato crop, has induced the government to appoint a scientific commission to inquire into the subject in Ireland. Dr. Kane, Dr. Lyon, Playfair, and Professor Lindley, have investigated the matter, and have come to conclusions at which most persons had long since arrived:—1. That the cause of the decay has been a cold and wet summer. 2. That to prevent an extension of the decay, the potatoes should be dug up, allowed to dry, and then kept in a dry place. 3. That decayed potatoes may by contact or proximity affect those which are healthy—a fact well known in relation to putrefaction in animal substances. Many tubers, however, which are to all appearance sound, are probably partly affected, and the water in which such tubers were boiled, has been observed to have a strong odor analogous to sulphuretted hydrogen, although the potatoes were wholesome and fit for food.

As the potato disease has extended throughout Europe, the attention of *savans* on the continent has been directed to its investigation.

M. Payen has submitted to the Paris Academy of Sciences, some specimens of diseased potatoes, and read a note on the phenomena which his examination of them has presented to him. The change seems to M. Payen to be transmitted from the stalks to the tubercles. If a diseased potato be cut, the parts attacked can be discerned with the naked eye by their yellow color, and they emit a marked fungous odor; the tissue of these parts is softened and easily separated. Very thin slices under the microscope exhibit at the limits of the change a slightly yellow liquid, which insinuates itself into the intercellular spaces, and gradually envelopes almost the whole periphery of the cells. In the parts strongly attacked it destroys the adherence of the cells; and this explains the easy disaggregation of the tissue. The cells, by degrees invaded by the yellow liquid, preserve their grains of starch intact. When the dislocation of the cells has made new progress, the mass of the tissue becomes pulpy, semifluid, whitish, or of a brown color more or less deep; a great number of the cells are destroyed, even broken up. In this state, however, the grains of starch are still intact, their substance being insoluble even in water heated to + 50°; and although with greater ease divided mechanically, they behave with iodine, sulphuric acid, &c., as normal starch.

M. Philipper has also directed his attention to this subject; and attributes the cause of the malady to the state of the atmosphere only, during the summer of 1845. He has remarked, that the infected tubercles kept badly; that those partially attacked quickly become wholly so, and communicate the evil to the sound ones; and that the change is more rapid if the potatoes are housed moist, and kept in a close place. Hence the precautions necessary are, to dig early, to dry well, separate the bad from the good, house in any airy place, and reduce quickly into starch.

HUMAN FOSSILS.

BY G. C. MONELL, NEWBURGH.

[Translated from the French and Foreign Medical Review et Clinical Journal of Hotel Dieu and La Chante, of Paris. 1824. Vol. 3, p. 451, 452.]

Mr. Fourier presented, in the name of Messrs. Julia, Fontenelle, Payen and Chevallier, a paper concerning the human fossils of Fontainbleau.

Do human fossils exist except in the imagination of certain geologists? The negative has been, and still is sustained by many learned naturalists, who have classed among hypotheses the most absurd, this man-witness of the deluge of Schenchzer; fossil human bones taken from the rocks at Aix, of which there is mention made by Florer of Hapellius; the petrifactions in the calcareous strata of Œhrringen: the petrified men found in the mines of Brugelettes, in Hainault Belge; since found to contain the fossils of many saurians, etc. The question seemed definitely settled until toward the end of April, 1824, we announced the discovery of a human fossil and a petrified horse, found in the large rock at Moret, near Fontainbleau. A short time after Mr. Barruel, who made an analysis of it, is said to have found animal matter and phosphate of lime. This authorized the conclusion that it was truly an anthropolite. Notwithstanding Messrs. Cuvier, Geoffrey Saint Hilaire, and many other learned men, persisted in regarding this asserted human fossil, as one of those uncertain imitations of organic bodies, which are *sometimes* found in nature. Witnessing the discussions which confused this subject, Julia, Fontenelle, Payen and Chevallier, joined together to make an analysis of the fossil of Fontainbleau; the result of their labors, which they communicated to the Royal Academy of Sciences, was, that the various specimens which they had examined, contained besides a sort of free stone insoluble in hydro-chloric acid,

1.	A proportion of	Azote	varying from	0.017 to 0.014
2.	"	Water	"	0.0115 to 0.009
3.	"	Silicia		
4.	"	Albumen,		0.025
5.	"	Oxide of Iron		
6.	Some traces of lime.			

These chemists did not find any phosphate of lime, although it was so stated by Mr. Barruel. The Royal Academy of Sciences charged Messrs. Taquelin and Thenard, to make a report of the labors of Julia, Fontenelle, Payen and Chevallier. At the session following that of which we speak, a commission of the Linnæan Society of Paris presented a new analysis, which is less methodical and less scientific than that of the three chemists, and confirms their results. After this Messrs. Vauquelin and Thenard reported a third examination, from which it appeared that of six fragments of the anthropolite of Moret, which they had analyzed, one only presented traces of phosphate of lime. This new result tended to confirm the exactness of the preceding analysis, and to demonstrate that the human fossil of Fontainbleau is simply a free stone to which a human form and origin has been too readily attributed.

The editor adds in a note to the above article. We have been informed that a company of chemists occupied at this moment in the analysis of divers fossil bones which had been submitted to them by M. Cuvier, have already found considerable quantities of phosphate of lime in several of them. Without doubt when their labors shall have terminated, these new analyses will not carry any new conviction, or afford any type by which to know henceforth true human fossils. As to the animal matter found in the fossil of Fontainbleau, we know that the same chemists found it also in many other stones which they have analyzed.

Prof. E. Solly has communicated to the British Association a series of experiments on the influence of galvanic electricity on the germination of seeds. The seeds of barley, wheat, rye, turnips, and radish were exposed to feeble currents of electricity; the plants came up sooner, and were healthier than those which were not electrified. On the other hand, opposite results were obtained by a number of experiments. Out of 55 experiments, 21 appeared to favor the electrical influence, 10 decidedly against it, and 25 showed no effect whatever.

Prof. S. stated that he felt doubtful whether the observed were really due to electricity.—*Year Book of Facts.*

HORSFORD'S ANALYSIS OF THE ASHES OF RED CLOVER.

	Parts in 100.
Potash,	12.164
Sodium,	1.414
Soda,	30.757
Lime,	16.556
Magnesia,	6.262
Phosphate of iron,	0.506
Chlorine,	2.159
Phos. acid,	2.957
Sulphuric acid,	0.801
Silica,	1.968=99.718
Carbonic acid,	22.930
Sand and coal,	1.244

Analysis given in the Catechism of Agriculture, by Johnson:

	Amount in a 1000 *lbs.*
Potash,	31.00
Soda,	5.25
Lime,	3.
Oxide of iron,	trace.
Silica,	4.
Sulphuric acid,	4.50
Phosphoric acid,	6.50
Chlorine,	3.50
	74.75 lbs.

GOADBY'S PRESERVATIVE FLUID.

Of which there are two kinds.

1st, consists of Bay salt,	4 oz.
Alum,	3
Corrosive sublimate,	2 to 4 grs.
Water,	1 qt. or 2 qts.

The weakest preparation is first employed.

The second kind consists of

Bay salt,	½ lb.
Arsenic,	½ drachm.
Corrosive sublimate,	2 grs.
Water,	1 qt.

Insects and the fine animal tissues are beautifully preserved in these fluids.

STATURE OF MAN IN DIFFERENT COUNTRIES.

The average height of Englishmen is placed at 5 feet 7½ inches. In the yeomanry it is 5 f. 1 inch to 6 f. 3 inches. In the peasantry, as derived from army returns, it is from 5 f. 6 in. to 5 f. 7. The French conscripts give an average of 5 f. ¾. The Irish are taller than the Scotch, and the Scotch than the English. The Belgians are of still lower stature.—*Jameson's Journal.*

CULTURE OF MADDER.

The value of Madder cultivated in a single province in France (Vaucluse) is estimated at from 30 to 40 millions of francs per annum. The fields are laid out in beds with trenches between for carrying off superfluous moisture. The soil is light and the roots stand at equal distances, and must be kept free from weeds. Madder, by means of chemical agents, affords many shades of color, varying greatly from the original red.

RESPIRATION IN MAN.

M. Vierardt, a physician in Carlsruhe, gives the result of some experiments on the respiration of man under different circumstances and at different hours of the day. After eating, it is found that the number is increased in the proportion of 1.72 upon 14 per minute. After drinking spirituous liquor the proportion of carbonic acid is almost instantly diminished, and this continues for nearly two hours.

It is maintained by Mr. Ogilby that the fore-arm, or the anterior extremity of the mammalia are entitled to a higher consideration than has heretofore been given them, inasmuch as they are the exponents of the habits, mental power and economy of animals. The fore-arm is the seat of the power of locomotion of manifestation and touch. It is, however, to be taken in conjunction with the teeth in establishing the true basis of a scientific classification. The dental system furnishes the clue to the position which the animal must hold in the scale of being, and is the most valuable diagnosis to a knowledge of the structure and condition of the stomach and digestive system.

STAND BY YOUR OWN.

[Extract from an Address delivered before the Madison County Agricultural Society, by Ledyard Lincklaen, 1844.]

"Among the French, on the contrary, a country life is regarded with dislike, and followed by none who can escape it; almost all wealth and talent is concentrated in the cities, and consequently, a few great towns dictate in morals, literature and politics, to the whole nation. Corrupt city morals are universally diffused, a metropolitan excitement becomes a national movement, and a constant succession of revolutions is prevented and restrained only by the strong hand of centralized power.

"An independent country spirit, then, is desirable on considerations of general patriotism. But motives of personal and sectional interest also impel us to contribute, to the extent of our power, to raise our country and county standing and influence. It should be our desire, to see a county spirit prevail among us, like that which lately brought the sons of old Berkshire, in Massachusetts, home from every quarter of the land, to testify of their attachment to the spot where they were born and bred.

"On this principle, there is one profession among us, which has a special claim to our support. I refer to that of the country press. A well conducted newspaper, which, instead of taking its key in all things from some leading city journal, and merely aiding to diffuse more widely among us notions of politics and other subjects ready prepared for our adoption by central cliques or associations, shall stand up manfully to defend and advocate the interests of a particular section, and express the views of its citizens, is of great benefit, and adds to the importance and influence of that section in no small degree. Such a paper, however, cannot be sustained without a large list of subscribers, and unless citizens generally patronize the printer, and *pay* him too, they cannot reasonably expect a sheet, the appearance or contents of which will be creditable or beneficial to their village or county.

"It is often said that the city papers are afforded cheaper, and that they give the general news of the day equally well. But the general news is not all that we need to see in a paper. The city journal, the Sun or Tribune, does not give you the local news of your own district, it does not contain the advertisements of your neighbor, or the proceedings of your meetings. In its long, vague list of marriages and deaths, you do not find that record of the joys and sorrows of your immediate friends and fellow-citizens which your own paper regularly contains—nor, most important of all, does it speak the sentiments of your own county.

"The exclusive circulation of city papers tends to centralize all public opinion, to submit the feeling and action of all the land to city dictation, and to destroy that country steadiness and independence which it should be our pride to maintain, and which has already been alluded to as so important to the public welfare. Its loss, and the monopoly of influence by a few great cities, would be a system of centralization, far more dangerous to our permenent liberty than any which the most ultra federalist of the last century ever projected—and its maintenance is more important to our true interest, than the success or defeat of half of the political measures which convulse our land.

"Let us, then, support our own presses—the organs by which our sentiments should be expressed, and our interests defended. Are you a whig? Then take the county paper which advocates the principles of your party. Are you a democrat? Then subscribe for the organ of your political class. Use your own preference as regards such distinctions, but let the first paper which you make a visitor to your home, be one of those printed in your *own* county.

"The feeling of attachment to the country in general, is closely allied to, and aids to produce one of attachment to a particular spot or locality, which, as tending to maintain a fixed and stable population, is of great value and importance. One of the deficiencies in American character, caused by the extent of our territory, is the want of fixed attachment to, and preference of, a particular residence or home. To encourage such a local attachment should be among our main objects, for in the prosecution of none could more benefit accrue from success.

"Wherever men consider themselves permanently settled to spend their lives, they at once acquire a deep interest in the place. In acting for their own future advantage, they act for the advantage of the country where they reside. Houses are better built, lands are more carefully cultivated, roads are better made, churches, schools, and public institutions of every kind are more earnestly and liberally supported. All is done substantially and well. The country thus benefitted and improved, attracts the best class of inhabitants, and it becomes still more our interest as well as our wish to remain in it, and enjoy its increased advantages.

"On this account, our national propensity to change and emigration is a great difficulty in the way of our steady advance and improvement. We are too ready to "Go West," to leave the home where we have always lived, and the friends whom we have always known, and seek new homes and new society in distant and only partially known quarters of the land.

"With too many of us it is too true that

'Distance lends enchantment to the view—'

with too many, the farthest territory is ever thought to be the best. First, Ohio, then Michigan, then Wisconsin and Iowa are held up as the promised land, till already the cry is, "For Oregon!" and the Pacific ocean itself scarcely confines our restless spirit.

"It is true that there are among us many exceptions to this observation, many who hold and cultivate the farms on which they have lived for twenty or thirty years. Such men are the main strength of our country, and their general comfort and prosperity form a striking contrast to the fate of hundreds who have pursued a different course. But there are far too few of them, and too many of a contrary disposition.

"There is no doubt, that though some may find comforts and fortune in the far west, very many find that they might as well have chased a rainbow, and when they have at last, after repeated changes and removals, reached the farthest verge of civilization—then the same attractive haze of distance seems to hang over the place they first left, and they remember its hundred comforts and privileges they never sufficiently realized or valued when they possessed them. Then it is that they look back to their early home among the hills of New York or New England, with its fine forests, convenient quarries, plentiful streams and pure springs, a soil neither drowned in spring nor parched in summer, with canals and railroads which brought it within twenty-four hours of the sea-board, with its mills and mechanics in every valley, good roads in every direction, its society settled and established, churches near at hand to all, schools established and improved, and all the other fruits of half a century of labor in a land of fine natural capabilities—and if their new home on some remote and boundless prairie, with its single and only advantage of a cheap and fertile soil, does not suffer in the comparison, it is strange indeed.

"Let us endeavor not to be deceived by every story of the West, of lands that need no clearing and soils that can never wear out—nor believe that there exists, either in Wisconsin, Illinois or any where else except in imagination, a land where all may be rich and live without labor. Let us remember that some counterbalancing portions of evil are found mingled with the good of every situation, and instead of looking only at the fancied advantages of other sections of country, let us dwell more upon the real blessings of our own. Let us discourage that propensity to change, which constantly breaks up our society, and interferes with steady, well directed occupation. Let us discourage that spirit of dissatisfaction, which ever longs for that which it has not, and despises and undervalues that which it has. Let us encourage an opposite disposition—and if all other reasons were wanting, let us stand up for our own home, simply because it is OUR OWN. The same instinctive patriotism, which prompts us to prefer our nation before all others, should also impel us to prefer *our* State, *our* County, *our* Home, before all other states and counties and homes.

"This feeling need imply no want of liberality toward other sections of our country. We will do them justice, but let us first do justice to our own. Our standing principle should be, that our home is to be considered better than any other place until it is proved to be otherwise, and not, as would seem to be too common, the reverse—that every other place is to be considered better than the one in which our lot is cast, until dear bought experience shall prove to us the contrary."

GUANO.

We have been cautious in recommending the common use of this substance for the following reasons: its beneficial effects depend too much on circumstances; if the season is very dry, it is useless; if it is applied in a dry time, the good effects will be quite uncertain, for it is essential that it should be dissolved and incorporated with the soil, and be brought to the roots in a solution. Other evils, too, attend the use of the substance, which arise, however, from the application of too large a quantity; but abuses of a substance never ought to be a bar to its employment. If a thing is good in itself, let us use it carefully until we learn how to avoid the evils to which it is liable. We believe, however, that in a few years the whole stock will be exhausted, and hence cannot be relied upon by the farmers of this country as a common article to enrich their lands and supply their wastes. Others may think differently. The nature and composition of guano is everything which is required for manure; at the ssme time, it has a drawback, viz., that it is liable to spontaneous decomposition when it is exposed to air and other atmospheric agents by which it loses its ammonia, a very essential part of its composition. It is not entirely destroyed, its phosphate of lime remains, and it is still as useful as ground bones. In this connection we will digress, as the subject puts us in mind of a suggestion in the Farmers' Cabinet, by Chemico, of the expediency of bringing home the carcasses of whales for manure. We do not know whether the plan is feasible or not, and yet the suggestion is a good one, and well worthy of consideration. But to return to the consideration of guano, we copy in continuation an article in the same valuable journal we have just referred to.

"For the use of guano in this country, besides these general reasons, there are the particular ones offered by the article itself. Its component parts are precisely those we want for manure, and precisely those we have in the manures usually employed, but in a far more concentrated form. It appears from the analyses made by many distinguished chemists, to contain everything that is wanted to act on soils and increase their powers of producing, as well as every ingredient contained in plants. From this it would seem expressly designed for a strong action on vegetable life, and expressly calculated for the restoration of worn-out soils. In this country, as we have before said, the experiments have been so few and on so small a scale, that we cannot bring forward much of a practical and definite nature to bear out this opinion. All that has been done here, however, proves it, and if we choose to admit the success of England, there is no doubt or question on that point. In the experiments that were made last year in different parts of the country, it should be borne in mind that the season was extremely unfavorable. The drouth at the commencement of the season, and the long continued and excessive heat, would have kept back the action of any manure, more particularly of one that must have moisture for its decomposition. There was besides a very severe frost in the spring, that killed acres of wheat and cut down potatoes and corn: this, with the aid of the cut-worm, in some cases very much diminished the anticipated glories of the guano. But as far as the experiments made in East Bradford went, they prove the strong action of guano on vegetation. The clover and the grass were both very much increased; the corn which was moistened with a solution of guano, showed itself sooner than any of the rest of the field, and appeared, until attacked by the frost and worm, much the most flourishing. For so slight an application, this was all that could be expected; but if this had been followed up by the Peruvian mode of throwing the guano about the roots after the corn reaches a few inches in height, and then again when out in tassel, the full effect would have been seen, and a general conclusion could have been drawn, as respects its action upon this vegetable. But unless each plant had been watered after these applications, the excessive drouth would have caused disappointment, and the manure considered in fault. A gentleman near Boston, on a poor, sterile, sandy soil, planted a few hills with the variety known as sweet corn. A teaspoonful of guano—South American—was mixed with the soil when the corn was sown. A second application was made when the grain was a foot or more in height; the earth was drawn away from the hill, and about three spoonsful thrown in. It was not placed near the stem, but five inches or more from it; the trench made by the hoe, was three or four inches in breadth and a half to two inches deep. The whole was then profusely watered. The product is stated to have been much beyond that which received no guano. Besides these, we know of no experiments made on corn. We cannot appeal to England here; but if this manure is to be used on this, our staple, more experience must confirm its value, and the judgment of our own people direct its application. On grass and clover, the greatest satisfaction has been expressed as to this manure. It has been tried on different soils; at Germantown, Massachusetts, and Chester county; in each of these districts the benefit has been very marked. So far as the experiments in the latter region go, the result was very remarkable, when the season is considered. They were made without any experience but that of British farmers to direct; the result was most satisfactory; and the question presents itself—if this material can produce such excellent effects during a season so entirely unfavorable as the last summer, how much more considerable would they have been in one of more rain? On the potato, it will be seen from the account of the experiments made in East Bradford, published in the Farmers' Cabinet of September, that the action of the guano was very marked. Those plants cultivated with it came up the first, and grew far more rapidly than the others, which had only barn-yard manure. The crop of turnips was also much increased, or rather, it should be said, was supposed to be—as there was no other ground manured in any other way and sown with that vegetable, it is impossible to make any comparative estimate. We have in this superficial and unsatisfactory way, given all the positive knowledge we possess. By others, this manure has been tried on peas, melons, strawberries, cabbages, cauliflowers, grapes, and hot-house plants, successfully and satisfactorily in every case, but as they do not belong to agriculture, it will not, perhaps, be thought worth while to notice them more particularly. As to the mode of application and quantity per acre, we must again fall back on the experience of England. There it has been mixed with the usual light manures: ashes, plaster, charcoal, muck, &c., and used in quantities from one hundred and fifty pounds the acre, to four hundred: in one case, we think as much as six hundred were put on. Our impression is, that it is as well to apply it alone, for two reasons; one that you then know to what to attribute the condition of your crop; the other, that being an extremely sensitive article, it is impossible to tell how far it may have been effected by its companion. Changes and decompositions may be produced that might alter its whole character, and the guano be made to bear the whole blame of a failure, that was due rather to its associates. We would prefer to throw it on the ground in the spring, and let it be plowed in at the rate of two to three hundred pounds of the Peruvian, and of three to four hundred of the African. One absolute essential in its use is, that the ground be moist. It will have no effect, or but a bad one, if employed in dry weather, or on a dry surface. We must take advantage of a storm of rain, or exert our judgment in the anticipation of one. It is from this necessity of moisture, that arises its extreme importance on sandy soils—on stiff clays, it does not do so well.

"If this material should find favor with our farmers, and a regular supply can be relied on, it will produce two good effects, the saving our barn-yard manure, and the keeping our fields free from weeds, except such as are kindly supplied by our benevolent but negligent neighbors. Even if guano were dearer than it now is, and it can now be put upon our lands at about the same expense as fifty bushels of lime to the acre—the saving of labor in the destruction of weeds, the satisfaction of seeing our fields cleared of this foreign vegetable population, and the keeping our tempers untried, will repay amply, even if there be no decided additions to the crop. Besides, we have very little doubt that the guano will be found very destructive to the insects that cut our corn to pieces, and to all which harass us in our grains, vegetables, or fruits; at least they must be more than usually thick skinned, to be able to bear the application of so irritating a substance.

"In this imperfect way we have gone through this important subject; but with such scanty materials, how could we say any thing of much value to the practical farmer? He cannot go out of his way to make experiments; he can place no confidence in conjectures; he cannot afford to change the whole conduct of his life to adopt novelties, or act upon another's imperfect experience; and in the matter before us, where he has to deal with a thing that is literally the edge-tool of agriculture, it would be madness to run the hazard of losing an entire crop, before the art of managing the instrument had been ascertained and perfected."

NICKEL.

The ammonio-sulphate of nickel may be employed for giving a silvery coating of that metal to copper. It is prepared in the same way as the ammonio-sulphate of copper. The plate of copper is merely plunged into the solution.

WELL AT GRENELLE, NEAR PARIS.

The Artesian well, at Grenelle, is the deepest but one from which water is obtained. The shaft or tube extends to the depth of 1,794, mostly in chalk. The temperature of the water is 82° F., 31° above the mean temperature of Paris. The water rises to the surface, and is discharged at the rate of 600 gallons per minute.

STARCH.

It has been recommended to extract the starch from diseased potatoes, and to be used as food. In consideration that starch by itself is not a material which serves for the support of the animal frame, this object is not regarded by others as worthy of consideration. 100 lbs. potatoes contain 74 lbs. water, fibrous matter 8 lbs., starch 16, gluten 2 lbs. An animal fed on starch alone dies of starvation.

LUTE FOR JOINING OF TUBES AND RETORTS.

Make a saturated solution of isinglass in acetic acid, and such that it will set into a solid on cooling. Add a little alcohol to prevent its spoiling. Keep in well-stopped bottles. Spread on moistened paper cut into slips. It may also be spread on bladder to promote its adhesion.—*Berthier Med. Gazette.*

METEOROLOGICAL OBSERVATIONS.

BY PROF. C. DEWEY.

[Extracted from the Report of the Regents of N. Y., 1846.]

Dark Color of Clouds over Lakes.—This appearance is commonly noticed. If a cloud lies over the Lake Ontario north of Rochester, its color is dark blue, or nearly black, whether the other parts of the concave are clouded or not. This is doubtless owing to the less reflection of light from the water, compared with that from the land. The appearance is more distinct in winter, when the ground is covered with snow, as there is then a greater difference in the reflection from water and land. I suppose this dark color of clouds over a large surface of water is common, and accounts for the description of clouds at sea.

Fall of Lake Ontario.—The water has been slowly falling for months in this lake. The mouth of the Genesee affords a place for easy measurement, and the fact is certain. Not only is the lake and the water at the mouth of the Genesee river lower than the same was a few years ago, but the fall has been considerable in the last few months. The collector of the port has made the following statement of the fall:

	Feet.	Inches.
1845, June 1, water below top of wharf, ----------	1	0
Sept. 1, " " " ----------	2	1
Oct. 1, " " " ----------	2	6
Nov. 1, " " " ----------	2	9
Dec. 1, " " " ----------	3	1
31, " " " ----------	3	3

The reason of this fall is, *that less water has been poured by the rivers into the lakes.* It was announced sometime since that the river at Niagara Falls was lower than ordinary. The last nine months has been one of uncommon drought over a wide extent of our country, and has been especially felt in the region around the great lakes. The summer too was uncommonly warm, and the evaporation from the land and lakes much greater. For both reasons Lake Ontario has received less than its usual volume of water. It is seen by the measurements of the fall that it has been much less rapid in the latter months of the year. The fall rains, however, though considerable, were less than common, and a continuance of the fall is to be expected till the streams shall be abundantly supplied. An unusual amount of rain will be followed by a rise of the lakes.

It is now well ascertained that there is no regular and periodical rise and fall of the lakes. A variation in their level occurs, from time to time, on the principle and for the reason already given.

It might be expected perhaps that a greater evaporation should be followed by a greater amount of rain. This is probably true on the whole, but does not hold for any given section of country. In Europe there appears to have been a wet summer and autumn, while drouth rested on our land. It has been remarked that the opposite sides of the Atlantic have different states in respect to the quantity of rain. The drouth and heat may change the currents in the atmosphere, so that the evaporated water shall be transferred to some other part of the world. It is more common still that the northern and southern portions of our country have different quantities of rain in the same season, and a dry season at the north be attended by a wetter one at the south.

Certain it is, that the fall of Lake Ontario need not be traced to any uncommon or mysterious agency. The operation of the common laws of nature offers an adequate and satisfactory solution.

Sudden fall and rise of Lake Ontario.—September 20th, 1845, the water at the mouth of the Genesee is stated, *suddenly* to have fallen about two feet, from the apparent passing of the water in mass outwards, and after some minutes to have suddenly returned in a wave about two feet above the common level. The Advertiser of this city referred to the log-book of the revenue cutter John Y. Mason, for proof. At Cobourg, on the Canada side, the same phenomena was observed near the same hour, and noticed in the Cobourg papers. Only good evidence will substantiate such a matter as fact, and the cause is probably to be traced to winds or water-spouts, or both. There have been reports of such phenomena before, and once as occurring in Seneca lake and observed at Geneva.

Since the preceding facts were penned, the Daily Advertiser has added to the evidence and added other facts. The writer states, that the oscillations of the water on said September 20th, took twelve and a half minutes—that the difference in the level of the water was twenty-five inches—that the water rushed out of the marshes and caves as well as the river, with great rapidity—the boats were left entirely on land for some minutes—that at Toronto and Cobourg in Canada, the same phenomena were observed, and that the steamer Princess Charlotte was aground for a short time, by the difference of the level greater than on the American side of the lake, and that the *cause* was probably a *tornado* which passed that day in a N. E. direction over Orleans county, doing much damage, and spent itself on the lake—that several *water-spouts* were seen during the storm, one of which endangered the safety of a steamboat then on the lake. It hardly needs to be remarked, that the cause here assigned is plausible and adequate.

Comparative Snow.—In the early settlement of this section of our state, only a moderate depth of snow is said to have fallen in the winters, while the weather was much less severe than it has been since the country was cleared of the forest. For the last ten years, there has been much snow during the winter, and the depth has not unfrequently been from a foot to two feet in depth at a time. February has proved a month of snow of late years. It should be remarked too that more snow falls on the district near and south of Lake Ontario, than on the tract a little farther south. The almost daily fall of snow, caused by the vapor of the lake, extends only a few miles from the lake.

Results of Thermometrical Observations made at Rochester, at 7 A. M., 2 P. M., and 9 P. M.

MONTHS.	⅓ Daily Observations.			Regents Mean.			Barometer.		
	First half.	Second half.	Mean.	First half.	Second half.	Mean.	First half.	Second half.	Mean.
January,	28.15	25.70	26.89	28.15	25.45	26.76	29.42	29.58	29.50
February,	17.48	36.99	27.24	17.68	36.82	27.25	29.48	29.45	29.46
March,	35.40	39.23	37.38	35.20	39.51	37.42	29.47	29.40	29.48
April,	38.13	54.46	46.29	38.20	54.59	46.39	29.50	29.55	29.52
May,	55.55	51.75	53.66	55.51	52.05	53.72	29.60	29.60	29.60
June,	67.12	63.92	65.02	67.12	63.97	65.04	29.56	29.56	29.56
July,	71.07	69.37	70.19	71.40	69.26	70.32	29.60	29.45	29.53
August,	69.42	70.46	69.95	69.57	70.28	69.93	29.61	29.60	29.60
September,	60.90	56.00	58.45	60.99	56.06	58.52	29.49	29.54	29.52
October,	52.53	44.98	48.63	52.29	45.19	48.62	29.58	29.81	29.69
November,	40.82	34.40	37.61	40.72	34.19	37.46	29.38	29.65	29.52
December,	22.89	22.64	22.76	22.91	22.57	22.75	29.69	29.55	29.57
Annual Mean,			47.01			47.01			29.55

The foregoing results show that there is little or no difference between the "*Mean Temperature*," obtained by the method of the Regents, or by taking one-third of the daily observations. The results have been the same for years, and the two means will not be given hereafter. By taking one-third of the three daily observationn, taken at the hours prescribed by the Regents in their *Instructions*, it will be found to differ but very little from the mean taken as the Regents direct. As the taking of one-third for the mean of each day is much less labor than the other way of obtaining the daily mean, *it is respectfully suggested to the Regents*, to change the mode of taking the daily mean for that which is the *easier*, *simpler*, *shorter*, and *every way more economical.*

It has been shown by taking the observations on the thermometer at every hour, or half hour in the day, that the twenty-four parts of those observations, or *their mean*, is the same as that of the three observations at 7 A. M., and 2 and 9 P. M., or the mean of two observations at 10 A. M. and 10 P. M.; at 6 A. M. and 6 P. M.; 12 at noon and midnight.

Table of the amount of Rain and melted Snow, observed at the Albany Academy, by Prof. Ten Eyck, *compiled from its Meteorological Register.*

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
1826, ---------	2.43	1.36	3.81	1.77	0.76	6.22	5.53	2.46	3.58	2.37	1.56	1.27
1827, ---------	5.40	3.07	2.38	4.66	3.43	3.75	5.43	4.69	5.67	4.65	2.76	3.91
1828, ---------	2.25	2.53	1.94	2.52	4.48	2.87	5.40	0.88	8.08	1.56	4.91	0.24
1829, ---------	4.56	3.26	2.78	4.77	2.68	3.90	3.22	1.46	2.73	2.41	3.86	2.44
1830, ---------	1.76	1.41	4.86	2.37	4.63	7.58	2.37	1.55	0.93	3.15	7.29	3.95
1831, ---------	1.88	4.17	2.38	4.59	2.88	4.04	4.32	3.25	3.93	4.82	1.71	1.57
1832, ---------	4.21	3.12	2.59	2.90	2.69	3.57	4.28	7.51	2.76	4.20	3.28	3.34
1833, ---------	2.63	2.56	1.62	1.33	8.47	2.36	4.48	3.36	3.14	7.50	2.43	1.86
1834, ---------	1.35	2.04	1.60	2.35	3.70	2.32	5.25	2.77	2.34	3.77	1.37	3.59
1835, ---------	4.64	1.79	2.60	4.54	2.71	6.48	5.39	5.34	1.28	2.22	2.26	1.19
1836, ---------	7.30	4.39	1.70	2.30	3.86	5.67	2.43	2.25	3.49	3.99	3.31	3.91
1837, ---------	2.25	2.77	3.47	1.63	7.34	5.06	4.38	3.96	1.95	3.59	2.14	2.63
1838, ---------	2.25	2.20	2.09	1.53	7.45	7.60	1.72	4.91	4.46	3.32	3.55	0.95
1839, ---------	2.17	1.57	1.52	4.75	3.83	5.12	5.77	1.24	2.75	1.35	2.95	5.09
1840, ---------	2.16	2.44	3.99	5.23	2.28	3.47	3.40	4.77	5.76	4.81	3.13	2.95
1841, ---------	4.19	2.12	3.15	3.75	2.24	2.10	1.56	4.27	5.65	1.34	3.34	4.14
1842, ---------	1.15	3.21	2.69	4.90	1.44	4.44	3.42	4.15	6.40	4.22	4.76	5.21
1843, ---------	2.13	3.21	7.37	4.25	2.07	5.54	4.42	6.05	2.19	5.72	3.04	2.36
1844, ---------	1.35	2.04	1.60	2.35	3.70	2.32	5.25	2.77	2.34	3.77	1.37	3.59
1845, ---------	4.64	1.79	2.60	4.54	2.71	6.48	5.39	5.34	1.28	2.22	2.26	1.19
1846, ---------	3.03	3.72	3.34	0.74								

EDITORIAL NOTICES.

Visit of a Distinguished Foreigner.—It is expected that the distinguished Prof. Louis Agassiz, of Neufchatel, Switzerland, will visit this country sometime during the present season. He will spend two years with us, accompanied with a draughtsman and taxidermist to copy and prepare the different specimens of natural history which may fall under his observation. He enjoys the patronage of the King of Prussia, and possesses the friendship and confidence of the most distinguished naturalists in Europe.

Height of Vesuvius.—As measured by M. Pentand, it is 3,864½ feet above the sea. Its height has not varied from this for many years.

Reward of Merit.—The honor of knighthood has been conferred upon Roderick Impey Murchison, F. R. S., by the Queen. The Russian Emperor has also conferred the same honor, and made the distinguished geologist Knight of the first class of the Imperial Russian Order of St. Stanislaus.

The honor of knighthood has been conferred also upon the celebrated Polar traveller, Dr. John Richardson, medical inspector of fleets and hospitals.

Gradual Rise of Newfoundland.—It is confidently stated that the whole land in and about the neighborhood of Conception Bay, is rising out of the ocean. At many places the large flat rocks over which schooners might pass several years ago, scarcely admit at this time the passage of skiffs.

Descriptive Catalogue of Horticultural and Agricultural Implements and Tools, Seeds, Fruit Trees, Etc.: *By A. B. Allen.*—We find this Catalogue an invaluable book for reference for information upon a great variety of subjects. In addition to what is given above, it contains a list of Valuable Fruit Trees, and a description of the best breeds of Domestic Animals. It may be regarded as a manual for the farmer, in which he will find, in a condensed form, a great amount of information. It is generally known, we suppose, that Mr. Allen has established an Agricultural Warehouse at No. 187 Water street, New York, to whom we would recommend our friends who wish to make purchases of implements, tools and seeds.

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AMERICAN

QUARTERLY JOURNAL

OF

AGRICULTURE AND SCIENCE.

CONDUCTED BY

DR. E. EMMONS, A. OSBORN, & O. C. GARDINER.

VOL. IV.

FROM JULY TO DECEMBER.

NEW YORK:
HUNTINGTON & SAVAGE,
No. 216 Pearl Street.
1846.

NUMBER EIGHT.

DESCRIPTION OF THE PLATE.

Fig. 1. *Agrilus ruficollis.* Fab.
" a. Natural length.
Fig. 2. Hessian fly, male. (*Cecidomyia destructor*, ♂.)
" b. Its natural size.
" c. Ventral view of the terminal segments of its abdomen.
" d. Its antennæ.
Fig. 3. Hessian fly, female. (*C destructor*, ♀.)
" e. Its antennæ.
" f. Profile view of the head, palpi, and origin of the antennæ.
" g. Dorsal view of the worm or active larva.
" h. do do "flax seed," or larva case.
" i. Ventral view of the same.
" j. Lateral view of the same.
" k. Dorsal view of the lormant larva, dissected from the larva case.
" l. Ventral view of the pupa.
" m. Wheat stalk; sheath broken away, showing the young worms on their way to the joint.
" n and o. Wheat stalks; sheath broken away, showing the "flax seeds" in their ordinary situation.

A. Appearance of a healthy, (*) and a diseased (†) shoot of wheat in autumn, the worms lying at §.

B. Appearances of a healthy (**) and two diseased stalks of wheat at harvest time. (††) Stalk broken, from being weakened by the worms. §§ Base of sheath swollen from worms having laid under it, and perforated by parasites coming from those worms.

All the illustrations are magnified, except *m* and those following it.

AMERICAN QUARTERLY JOURNAL

OF

AGRICULTURE AND SCIENCE.

No. VII. JULY, 1846.

RUNNING NOTES, AGRICULTURAL AND GEOLOGICAL, OF A TRIP TO CARBONDALE.

BY HENRY S. RANDALL, OF CORTLAND.

On the beautiful morning of the 8th of June, I turned my horses' heads down the east bank of the Tioughnioga, "bound for" Carbondale,—ninety miles distant.

The valley of the Tioughnioga grows narrower, as you advance south from Cortland Village, the hills more elevated, the soil poorer. At Marathon, fourteen miles from Cortland, it again widens into a handsome valley, and extends thus for several miles.

A beautiful feature in this, as in many other valleys of the grazing regions, is the profusion of shade trees, spared from the axe. The "weeping elm," the finest *solitary* tree of our country, everywhere dots the landscape. The streams too, fringed with dense belts of low willows, with now and then an opening where the water sparkles and flashes through in the sun's light—take away that impression of hot, scorching, monotonous aridness, which so often oppresses us in traversing the fine wheat lands of the western counties, where land is too often plowed, and too valuable, to have trees spared merely for purposes of ornament or shade.

The rocks of the Portage group extend to the southern borders of the county. They are not rich in fossils, and there are few good exposures of them on this road. Considerable masses of "northern drift" lie here and there, and even high on the hill sides, where the road occasionally winds up them, exhibiting rounded pebbles and fine gravel, formed from the Onondaga and other northern limestones, and the red Medina sandstone. The latter is more prevalent, particularly in surface boulders. Boulders of it, of Oriskany sandstone, and of granite, extend to the Susquehannah—diminishing however in size and frequency south. What and when were those stupendous dynamics in operation which caused these phenomena? Under some of these drift-beds, seven or eight miles from Cortland, a conglomerate is forming, the different colored lime and sandstones being cemented into a firm rock, which clinks under the hammer.

Two miles below Lisle, (and twenty-three from Cortland,) the road leaves the river—which here makes a detour to the east—and passes directly over the hills, through the towns of Barker and Chenango to Binghamton. In Barker, I noticed several septaria by the road side, probably from the local group—the Chemung—which commences at the borders of Cortland, and extends (west of the Susquehannah,) into Pennsylvania. This group is richer in fossils than the Portage. The soil of the last named towns is thinnish, and well adapted only to grazing, until you strike the banks of the Chenango, five or six miles from Binghamton, where a broad and fertile plain spreads out before you.

I was annoyed to see men furrowing out, preparatory to hoeing, a noble field of thirty or forty acres of corn, near Binghamton, with a *plow!* Here let me remark, that from a point ten miles south of Cortland Village to Carbondale, I saw but two *cultivators*, and they looking as if they were manufactured in the days of Tubal Cain, if not by that renowned "instructor of artificers in brass and iron" himself! The "school-master may be abroad" in these regions, but the agricultural periodicals I fear are not,—or at least, sufficiently so. The truth is, "lumbering" has rendered agriculture a secondary pursuit, until a period comparatively recent, in the pine producing regions which border on our navigable rivers.

Binghamton is a beautiful—nay, a superb village, of three thousand inhabitants, situated on, and near the apex of, the angle of land, between the Susquehannah and Chenango rivers, at the point of their confluence. Both are fine streams, the former somewhat the largest, measuring forty-five rods across at the ferry,—though it does not quite average this width for any distance.

I looked at Binghamton with peculiar interest, as here, twenty years ago,

"I was a happy boy at Drury's,"—

or rather, under the private tuition of the Rev. Mr. G——, now a chaplain in the United States army,—and I had not been there since. I could scarcely find the spot where I once lived, all is so changed! Stately blocks of commercial buildings have superseded the scattering residences and shops. The hamlet has grown into an incipient city. Nothing remained to remind me of "lang syne," but the hills and the rivers! And even these had changed somewhat from the picture painted on my youthful memory. The blue outline of the hills tower not so near the sky—the rivers seem to flow in diminished channels,—so true is it, that not only "*tempora mutantur*," but that "*nos mutamur* in illis!" But without allowing any thing for that reversion of the telescope, by which advancing years dwindle, what youth magnified, I looked for an island off the point, which I have a thousand times trod, and it was clean gone—swept away by the abrasion of the rapid currents!

It is a most agreeable feature in Binghamton that the business part of the town, all its stores, shops, &c., are compressed into a single district, while its fine residences lay clustered about, in spacious shady streets, uninvaded by the din of commerce. What more odious than to see shops garnished in front with hams, and fish-barrels, and clouds of blue bottle flies,—all redolent of tar, and treacle, and rum,—thrust under the windows—under the very nose, as it were—of a beautiful mansion! There are more elegant dwellings, with tasty shrubberies, gardens, and out grounds, in Binghamton, than in almost any other village of its population, in our state.

From Binghamton to Great Bend, sixteen miles, the road follows the banks of the Susquehannah, the valley averaging probably a little more than a mile in width. It is a pleasant and highly fertile one. When older and cleared of its pine stumps, it will be one of the finest agricultural regions in the southern counties. Near Great Bend is a good exposure of the rocks of the Chemung group, on the banks of the river. They took me by surprise, as from geological maps, I had been led to expect the "old red sandstone" there.

The Carbondale road leaves the Susquehannah at Great Bend, and bears in a direction a little east of south. Near New Milford the beautiful sheep laurel (Kalmia angustifolia,) begins to abound. It was in full blossom,—converting many a distant barren steep, apparently into a garden of roses. At one place the road passed the foot of a hill belted with a coppice of young hemlocks—when young, and especially at this period of the year, when the dark green of each bough is tipped and contrasted with the paler tints of the newly grown foliage of the present season, the finest of our northern evergreens. Every interval of the coppice was filled with laurels in full blossom, and they fringed its outer margin, and extended quite to the road side. The effect was singularly unique and splendid.

Soon after passing New Milford the "old red sandstone" begins to crop out in those vast tabular masses, which characterize this group. On reaching the high land at Mott's tavern, and commencing the descent of the creek, which leads off towards the Tunkhannock mountain, these tabular masses increase, and lie thickly scattered over the surface of most of the adjacent slopes. They usually approach a regular quadrangular form, though some are entirely irregular in shape, and others are rounded. They are from five to twenty-five feet square superficially, and rise from one to ten feet above the surface of the soil. It is singular that of those near enough the road to have their stratification observable, it was, in a large majority of cases, unconformable,—different depositions forming not unfrequently three or four angles in the same rock! The old red sandstone does not vary widely in its lithological characteristics, from the rocks of the Portage and Chemung groups. The greater sterility of its soils, is due probably, partly to the thinning out of the northern drift, and partly to elevation. All these rocks are deficient in the lime necessary to a highly luxuriant vegetation, and particularly to the more valuable grains. To the two first named groups, it is partially supplied by the drift alluded to.

This group is remarkably destitute of fossils. For miles my eye sought in vain, on the constantly exposed surfaces of the rock, for the faintest trace of a cypricardite, or those fern-like forms found in the quarries of Montrose,—or in fact, for any fossil whatever.

The ascent and descent of the Tunkhannock mountain occupy four miles. Its ragged declivities give frequent proof of stupendous convulsions, in its masses of rock, broken and thrown together in the wildest possible confusion. On its northern declivity, I first noticed boulders of cornstone,—those accretionary masses of slate and lime, stained externally to a dark umber color, which gives them provincially the name of "nigger heads." From the southern base of the mountain to near Carbondale, it is comparatively level.

After traveling the "New Turnpike" a few miles, you commence following Fall Brook down a mountain gorge, deeping as you advance, cut out in the "old red sandstone." Finally from the narrow chasm, the scene of many a former robbery and outrage, you descry, through the tree tops, the white masses of the "conglomerate rock" capping the adjacent summits, and looking like the battlements of ancient castles. So great is the dip of the conglomerate, that the rapidly descending road soon enters upon it, and its sides are strewed with vast blocks, resembling in size and shape those of the red sandstone before described. One magnificent slab nearly ten feet square, and over three feet thick, lay close upon the road, inclined at an angle of about 45°, the surface stained, by some metallic oxide probably, to a warm tint of yellowish brown—with pebbles of quartz of pure white, and of palish tints of yellow and pink, scattered over it in a rich mosaic. What a monumental slab this for the tomb of a geologist! I detached one of the pebbles, the largest, which weighed three pounds and a half! A quarry hard by, exhibits the rock, ranging from a coarse sandstone to a conglomerate, the thickly imbedded pebbles in which are of the size of bird's eggs. I picked up several fragments drused or crusted over on one side with delicate quartz crystals.

A little further on, and not four rods from the road, from which it is hidden by laurels and evergreens, Fall Brook plunges down eighty feet, in a chasm in the conglomerate. When the stream is swelled by rains, the cascade must present a wild and picturesque appearance.

Still passing rapidly down,—at the northern extremity of a trough-like valley between two spurs of the Alleghany mountains, you perceive in the centre, a village with streets and painted buildings;—innumerable small unpainted buildings scattered, seemingly promiscuously, on the adjacent slopes, amid stumps and fallen trees;—a black rail road viaduct in the foreground high above your head, one end resting on a declivity of the Moosiac mountain, the other terminating at a range of sheds and buildings which the piled up masses of coal &c., proclaim to be the fixtures of a colliery. Such is a *coup d'œil* view of Carbondale, entered from the north.

The village contains 5000 inhabitants. Thirty stores, most of them doing a good business, attest the amount of its trade, to say nothing about the operations of the "Delaware and Hudson Canal Company," who own and work the mines. Carbondale is, in every point of view, a singular place. Less has been done in it for ornament of every kind, than in any other village of even half its size, I was ever in. It does not contain one elegant building public or private! A lounger or a fop is not to be found within its precincts. Every foot strides rapidly. At the hotel where I lodged — one of the two principal ones of the place — dinner was ordinarily dispatched in fifteen minutes! Activity and industry are the exclusive order of the day!

The soil about Carbondale and in the adjacent country is poor, and is considered poorer where the coal underlies it than elsewhere. Bread stuffs are received principally from the Wyoming Valley, and salted beef, pork, &c., from the southern counties of New York. The water is good, and it is somewhat singular that it is abundant, and gushes forth in copious springs, where the coal has been excavated from beneath, though vegetation, under the same circumstances, becomes obviously feebler.

The stratification of the coal basin is nearly as follows, in the descending order, commencing at the highest summits which the coal underlies.

	Feet.	Inches.
Earth, loose stones &c. on surface from	1 to 300	
Clay slate, unknown thickness.		
Coal,	7	
Sandstone,	80	
Coal of an inferior quality,	5	
Sandstone and slate alternating and passing into each other,	20	
Roof coal, of an inferior quality,	1	3
Coal,	8	
Coal and slate intermixed,	3	
Coal,	5	
Slate,	4	
Coal,	1	2
Clay slate, say	20	
Conglomerate,		

The eight foot seam is the one which has been principally worked, — though some excavations have been made in the five foot one below.

Fourteen main galleries or "headings" penetrate the coal strata, with a general parallelism, in a horizontal direction; and the longest extends $1\frac{3}{4}$ miles under ground. They are designed to average ten feet in width, and they vary from five to eight or nine feet in height. A wall twelve feet in thickness of solid coal, with the exception of the openings about once in fifty feet into the "chambers," is left on each side of the galleries, to render them secure from a fall of the superincumbent strata. At right angles to these, are the chambers, fifty feet wide, and extending to the side walls of the next gallery, usually about five hundred feet. These are also supported by columns of coal, at suitable distances, twelve by fifteen feet in diameter; and wooden props formed of the trunks of trees from a foot to eighteen inches in diameter, are set up thickly between them. The entire galleries are traversed with rail roads, with a twenty inch track, for hauling out the coal, and each chamber has a lateral road. There are twenty miles of rail road in the mines!

There are now one hundred and thirty-one chambers. Four men work in each chamber, two "miners" who are contractors, and two laborers employed by them. All the coal is excavated by contract, at so much per ton. It is delivered by the miners at the mouth of their chambers. The coal trucks are then hauled out by horses or mules, weighed, "dumped" into larger cars, and started for the Hudson river. A miner earns at the present prices of coal, (by which the Company regulate the price of excavation,) from $1.37½ to $1.50 per diem, and the laborers now average about $1.06 per diem. The payments of the Company are never one day behind hand. About six hundred men are employed in the mines—fifteen hundred tons of coal daily excavated and sent off—and the work continues ten months of the year.

I have omitted to mention that the mines are drained of the water constantly percolating into them from springs, &c., by twelve pumps, of eight feet stroke, and most of them with a twelve inch bore or tube,. worked by four fourteen feet wheels, turned by a canal from the Lackawana creek.

Those who labor in the mines are usually hale, hearty, well fed looking men. The occupation is not considered an unhealthy one. Fire damp or carburetted hydrogen never occurs in these mines. Carbonic acid is constantly generated, but owing to ventilators tunneled down into the galleries from above, and the draft of air thus produced, it rarely accumulates to a dangerous extent in the galleries which are worked. Accidents, considering the number of men employed, are ordinarily rare,—not perhaps more frequent, than they would be among the same number at work in a stone quarry.

Few children, I was most happy to learn, are employed in the mines, and ordinarily only as drivers. There are many schools in the village, and the miners and laborers, I was informed on reliable authority, very generally keep their children at them, as much as is common among the people of our country. I asked a miner, a fine manly appearing Welshman by the name of Maxy, if the children of the extremely indigent, orphans, etc., were permitted to attend to schools. "To be sure they are—do you think we would see it otherwise?"—was the decisive reply.

The miners and laborers are almost exclusively foreigners, principally Irish and Welsh. Among this heterogenous population it would be expected, perhaps, that immorality and disorder would prevail. Such is not the fact, apparently, to a greater extent than in any of our manufacturing towns of the same size. I did not see a drunken man in Carbondale. I strolled round among the laborers' huts at twilight, and some were working in their gardens, some quietly smoking their pipes in their doors, rarely more than two or three congregated in a place, and I heard not a loud or angry or improper word—nothing like strife or confusion during my stay.

Much of this, as well as those systematic arrangements in and about the mines which render the Delaware and Hudson company one of the most successful in the United States, is due the officers of the company. A more thoroughly able, practical, and energetic set of men can not be found. Fill these offices with pampered sons of stockholders—hungry nephews and needy cousins, and a few months would introduce disorders of every kind—and the company would divide no more eight per cent semi-annual dividends!

The general superintendent of the company in Carbondale, its financier, &c., is James Archibald, Esq., who is *de facto*, by common consent, mayor, common council, and police of Carbondale! The vigor and sagacity of this man—the perfect confidence which all entertain of his strict justice and extraordinary ability, give him an unbounded influence—and it is an influence, if the public voice may be credited, wielded only for good. James Clarkson Esq., superintendent of the mines is emphatically of the same practical vigorous stamp—a man of *great strong* muscles of *mind* and body! The assistant superintendents are Alexander Bryden, Mr. Hossie, and Mr. Harris. All the officers are Scotchmen, except the last named, who is a Welshman. Hossie is the individual who was so long imprisoned in the mine at the time of the great " fall," a few months since, and the narrative of whose perils and final escape, seems more like the creations of a disturbed dream than sober verities. Alexander Bryden it was who performed such prodigies of heroism in rescuing the men shut in at the same time. As few seem to have any very distinct impression of the nature of the accident, or of the character of this most daring achievement, I will repeat some of the principal incidents as I learned them from the mouths of Mr. Bryden himself, Mr. Clarkson and Mr. Hossie.

A point in the mines had begun to " work," in miners' phrase, that is, to crack and give indications of an approaching " fall," some days prior to the catastrophe. But it ultimately came sooner and extended over a much large space, than was anticipated. Bryden was at the pump house, and observing an unusual commotion at the mouth of the mines, proceeded to ascertain the cause of it. Men " whispered with white lips" of some terrible disaster, but no one could give him any intelligible account of it. He entered one of the galleries, and soon met three men who informed him that a portion of the mines had fallen in, and that they had left behind sixteen or eighteen men, who were already crushed, or shut out forever from the light of day. They besought him to retire, as there was no hope or possibility of rescuing their comrades. The gallant Scotchman hesitated not one instant. He flew along the passages, the roar and crash of the splitting and grinding rocks every moment sounding louder and nearer in his ears. He reached the verge of the "fall." The superincumbent mountain was heaving and rending, as if an earthquake were tearing its rocky strata. Vast masses of slate were detaching themselves, and falling into the passages, with reports like the loudest thunder. Into these choked passages, amid the falling rocks, the noble hearted Scotchman rushed on. The passage is entirely closed—no—the huge slabs have fallen so as to leave a narrow opening in the angle formed by the floor and one of the sides of the gallery. On his hands and knees he creeps on. Now the opening has diminished so that he absolutely forces his way along with his hands and feet lying nearly prostrate on his face!

About a mile from the mouth of the mine, he found the eighteen men, in a gallery or heading where there was solid coal all about them, and oh joy of joys! his own son was among them! The boy had already manifested something of the stern resolve of the sire. One of the three fugitives who had escaped, and whom those left in the mine supposed had perished, had proposed to attempt to take out a horse with him, which was also in the gallery where the men were congregated. "Leave him," said the boy—"we shall have need of him." He was already coolly looking death by starvation in the face!

Bryden was on the point of leading out the men, when he learned that another lay wounded in a chamber four or five hundred feet off, in the most dangerous part of the "fall." Was it his brother—was it his bosom friend—was it a wealthy or influential man, who might advance his rescuer's interests, who lay there helpless, to die a miserable death? He was a common laborer—a poor Irishman. Bryden had satisfied, nay more than satisfied the calls of duty and humanity. If the love of praise had stimulated him, (which it had *not*,) he had earned enough. If the father had felt a premonition that he might be struggling for his child, that child was found. The man was badly wounded, and might only be carried out to die. Was he not bound now to take heed for his own safety—to lead and guard his own recovered son back through the perilous path? Not thus did that great heart commune with itself. With a word of indignant censure to the men for not bearing their wounded comrade with themselves to the gallery where he found them, he pointed out their path, bade them escape, and then turning back, entered a path more perilous and difficult than his preceding one. He nears the chamber. A cry from the wounded and prostrate man, who descried his advancing light, brings him to his side. Mangled and helpless he could not stand, and shrieked with pain as he was lifted up. When placed on Bryden's back, he had not even strength to hold himself on. The former placing the flaccid arms of the wounded man around his neck, and crossing them on his breast, grasped them with one hand, his miner's lamp with the other, and thus commenced retracing his steps! For rods he bore him on his hands and knees! When the rocks were too low even for this, and could not be clambered over, he partially dragged him, and the man who was now somewhat revived, partially assisted himself! Thus through perils which no man can appreciate, who has not strode through those gloomy caverns, he bore him a full mile—bore him to the light of day and to safety!—What is the bravery of the warrior, excited by the hope of glory,

> " —— the neighing steed and the shrill trump,
> The spirit stirring drum, the ear-piercing fife,
> The royal banner; and all quality,
> Pride, pomp, and circumstance of glorious war."

to the disinterested heroism of this act! The Romans awarded a *civic crown*, the highest military reward, to him who saved the life of a citizen. He who bore it took his seat next the Senators in the theatre, and these haughty warriors and sages rose up, and the assembled people of Rome rose up, to honor him, as he entered. Shall no testimonial perpetuate the memory of an act by which the lives of *eighteen* American citizens were saved from peril more imminent than that of the battle field, or any of those ordinary casualties, where man risks his life for his fellow man?*

* The stateliest ballad in any language—Schiller's Diver—was written in commemoration of an act, which, should we concede that its commission re-

Alexander Bryden is about forty-five years of age. His form though well knit and sinewy, betokens no extraordinary physical power. A placid gray eye, a well arched nose, curling locks of light brown escaping under his Scotch cap—intonations of voice modulated to "more than woman's mildness"—a reserved, modest, and entirely unassuming demeanor, are external traits which would strike any observer; and perhaps few would see, under this unpretending exterior, the man who could do and dare what he has done and dared. But there is a firmness in those gentle tones, a deep earnestness and truthfulness—a quiet but unwavering decision—an utter merging of self—a gushing tenderness of feeling, which pervade the whole man, which would lead the deeper analyst of character to expect the legitimate manifestations of these united traits. A high sense of duty and overflowing humanity, it was, and was alone, which prompted his heart and his hand in that dreadful hour.

Bryden, I need not say, is an intelligent, reading man. A mile from the light of day, on the edge of the "fall," we talked of and quoted Burns,—(eight miles from whose birth place, and in the same county—Ayrshire—Bryden was born;) and with the gigantic vegetation of pre-Adamite ages over our heads, he and Clarkson and I discussed the theories of Buckland and Lyell, and the "Vestiges of Creation."

The escape of Hossie, who was for two days and two nights shut in the mines, without food or light, has already been pretty fully and accurately recounted to the public. He is a plain, pleasant appearing young man—of from thirty to thirty-five years of age—filled to the full, as the facts accompanying his escape amply prove, with Scottish nerve and Scottish forecaste. The most determined efforts were made to save him; but while Clarkson and Bryden and many a bold heart sought him in danger, he had escaped to a place of comparative safety in the unbroken chambers of the mines. For two hours he was buried to his middle, by a mass of rubbish which caught him in one the passages he

quired an equal amount of bravery—mere animal courage—was instigated by motives, *mean* compared with those which led to the one I have described.

was digging through! Another convulsion lifted up the mass, and relieved him! I alluded to the terrifying circumstances in which he was placed. He said that he felt no fear until he emerged from the mouth of the mine and was in safety,—" then he did have, and has often since had, a feeling of dread creep over him, in thinking of them." He represents the reports when the rocky strata above the mine split and gave way, as absolutely deafening—louder than the loudest thunder.

Eight dead bodies were taken out, and six—five men with families, and one the only son of a widow—were left in. The Company expended large sums in attempting to rescue them, and finally to recover their bodies—made every effort that propriety or humanity could dictate—and gave not over the search until the nearest relatives of the deceased surrendered all hope of discovering them. And what recks it, that they sleep where their " life-ache" ended? Is not a mountain as good a monument as a hillock in the graveyard!

The " fall" extended over about forty acres, and strange as it may seem, though there is only from one to two hundred feet of earth, rocks, &c. above, (I here speak from recollection, having made no minute of the fact on the spot,) there are no external traces of it, excepting at one edge. The fallen chambers being mostly exhausted of coal, will, of course, never be re-excavated. In fact, all the old chambers, as the wooden props rot away, gradually fill up with the falling masses of slate.

It was arranged that I should explore the mines, with a guide, on the 10th, but Mr. Clarkson, with a courtesy I had no right to expect, signifying to me that if I would defer my visit until the morrow, he would himself accompany me, and " give me a day," I occupied the intermediate time in outside researches, and also in visiting two other mines of the company a short distance from Carbondale. With Doct. S. and Bryden I mounted a returning coal-truck, drawn by a horse, and started for the " Powderly" mine, two miles off. The railroad passes a long viaduct on its route, supported on wooden props seventy feet in height. It seems to me now, that the surface width did not exceed five feet. On it we dashed with our *reinless* horse, the driver occasionally cracking his whip " calm as a summer morning!" A keen young physician not long since, called upon to examine a fractured leg, in the very essence of professional abstraction, dashed across this dizzy bridge on a horse which had never before been on it! Near the mine Doct. S. called my attention to a sharp rattle, which I at once recognized as the angry warning of a rattlesnake—not distant probably fifteen feet from the railroad track! They are frequent in the surrounding crags. Thus closely in our *boutez en avant* country, does civilization—commercial enterprise, tread on the kibes of savage life! The iron road and the rushing car invade the domain of the rattlesnake!

I went through portions of the Powderly mine, with my companions, and for the first time saw the process of excavating coal. With a light, straight, sharp steel pick-axe, and a rapid sidelong stroke, the coal is detached—commencing at the bottom and working under and towards the roof. Excavations are often made several feet under at the bottom, so low that the miner lies flat on his side, partly hidden by the overhanging coal, and in this position plies his pick! The coal is then blasted with powder above, and large masses are thrown down. Blasts took place within fifty feet of us, in each of which a pound or more of powder was exploded, enveloping us in sulphureous smoke. The report and concussion are but faint in those hollow subterranean caverns. Each man, while at work, carries his light, a small tin oil lamp, with a large wick, attached by a wire hook to the front part of his hat.

From Powderly, we walked back to the Calamite mine, (as Mr. Clarkson has agreed it shall be christened, instead of bearing the unmeaning designation of New Shaft,) a mile nearer Carbondale, and a little off the road over which we had passed. This is chiefly remarkable as the locality of those calamites—the finest in the United States—which are brought from Carbondale. A ditch was dug through a bed of shale or sandstone, (it has escaped my memory which,) which disclosed an innumerable number of these fossil plants, in an uncompressed state, of all sizes from the diameter of an inch up nearly to that of a foot, exhibiting the joints and striations of this peculiar family in the most perfect manner. In the interior of these, nodules of argillaceous iron ore not unfrequently occur, of the size of a man's fist. Though vast quantities of these calamites have been taken away, cart loads of them still remain. In the mouth of the mine, over the ditch, they still stand thickly in the shale of its sides, extending in some cases from the roof to the floor, and all of them vertical, or nearly vertical in position. When submerged, they evidently were growing on their native bed; and they could not have been acted upon by strong currents of any kind, when imbedded in the muddy deposition.

On the morning of the 11th, accompanied by Mr. Clarkson, Mr. Bryden, and an assistant,* I entered the deserted gallery No. 3, to explore the main mines. We penetrated a mile,—searching a multitude of deserted chambers, for choice specimens of the gorgeous fossil Flora of the coal beds—Sigillaria, Stigmaria, Favularia, Filices, &c., &c. In the galleries, a part of the time, we could walk erect, but when we diverged from these, we scrambled, now over broken masses of slate fallen from the roof, and now over heaps of refuse coal—often crawling on our hands and knees—and once or twice I was fain to drag my *not* attenuate person, through narrow outlets and openings, by grovelling a-la-mode serpent! The corners of the slate, and the smooth sharp edges of the broken coal were any thing but an anti-fraxinal application to skin or clothing! A beautiful white fungus, resembling the finest down, sometimes in the form of stalactites, sometimes in festoons, hung dankly from the rapidly decaying props and other wood employed in the mines. Striking a prop occasionally with my hammer, I found most of them in an advanced state of decay. Broken ones lay here and there. When they give way, the roof of slate, as has been before remarked, piece by piece gradually falls in. We sought a specimen of Sigillaria, seen a few weeks previously by Mr. Clarkson. It was buried under tons of slate!

* Robert Eaton—whom I here name for the convenience of others, he being the only individual I know of in Carbondale, who is in the habit of collecting fossils on orders from abroad.

I expressed a wish to witness some of the confusion wrought by the great "fall," and Mr. Bryden immediately offered to accompany me. Leaving Mr. Clarkson and assistant procuring specimens, we threaded some choked and mouldy passages, and at length stopped by a rough barrier of rocks—the verge of the "fall," we stood a few hundred feet from the scene of Hossie's imprisonment, and the graves of those who perished. Gigantic masses of slate lay piled in wild confusion, and the glare of our lamps shot up frequently into vast and ragged cavities above, from whence the rocks had fallen, and in which semi-detached masses of enormous weight yet hung suspended as if by a thread. The surrounding props, many of them, were crushed and broken. Some of them were snapped short off, though they were green and tough at the time of the catastrophe;—others were splintered and riven

"As the whirlwind rends the ash."

The day was sultry and close, and no air stirring. This, with the deficient means of ventilation in the deserted chambers, since the "fall," caused an unusual accumulation of carbonic acid. Our lights burned dim repeatedly, and held close to the floor, would probably have been extinguished. Once they were on the point of going out. "Never mind," said Bryden, "there will be time to save ourselves from the effects of the gas, and I can pilot you out in the darkness!" Rejoining our companions, we, after an exploration of five hours, debouched from the mines at gallery No. 5, under the bed of the Lackawana creek.

After dinner, we entered No. 2, still more desolate and decayed than the galleries previously visited. The props were more rotten, the rail way itself falling in pieces. The drainage had become choked, and we frequently waded in water over ancle deep.

Immense sigillaria were every where visible. I measured one on the roof of the gallery, which was three feet and a half in diameter, and it extended unbroken for thirty or forty feet. One has been exposed, of similar dimensions, for more than one hundred feet, both extremities still passing under the slate! In the whole of this distance it tapered, I believe, but two or three inches—indicating a prodigious altitude. No branches have ever been found, going to show that the trunk was covered with leaves alone. Not one of these, though their insertions are every where visible on the fluted stems, escaped decomposition. Traces of the long leaves of the stigmaria are frequently preserved, and the Ferns seem absolutely to *flourish* in all the variety and perfection of existing species. Even the impress of their peculiar flowers are frequently and distinctly visible. But it would require too much space to attempt even an enumeration of the coal plants.

A wagon load of fossils can be secured in an hour, but to obtain any thing like a full suite of good specimens, is a work of time and labor. An individual might search weeks or months to effect it. The miners work only *to* the roof, and consequently have not those facilities for obtaining and laying aside fossils, ordinarily supposed. They are best found in the deserted and falling chambers.. Some varieties are plentiful—others exceedingly rare—and others are only occasionally stumbled on by accident. Four of us—three as conversant with their mines and the locality of their fossils, as any men in Carbondale—searching a whole day, secured some good specimens. But these added to a stock which one of the company (Eaton) had been collecting for me for some time previously, furnished but a small portion, and not one-half of the varieties, of the collection which it was my good fortune to secure. For the balance, I was mainly indebted to Mr. Clarkson, whose collection far exceeds in extent and variety any other in Carbondale.

A public museum should be established by the young men of the place, comprising a full suite of perfect and massive specimens, for the inspection of travellers and men of science from all parts of the world.

After an exploration, similar to that of the forenoon, of several hours, I emerged, and bade good bye to the mines. The next day I spent in carefully packing a ton of fossils, and on the 15th, commenced my homeward journey. I soon obtained a new and noble view, but I paid rather dearly for it. At a fork in the road, where I had scanned the geology better than the topography of the place, on my previous passage, I was confused, enquired the road, was miss-directed by a young miss standing by a cabin at the junction of the roads, in consequence of which miss-statement I took the Dundaff instead of the New Turnpike, and had the "immense satisfaction" of climbing over a series of sharp conical peaks for thirteen or fourteen miles,—decidedly the hardest road for a loaded team I ever passed over! I compensated myself as well as I could with the commanding view from the banks of Crystal Lake, a pretty little sheet of water a mile long, on the very summit of one of the Moosiac Mountains. At its northern extremity, a little way off from Dundaff, the eye sweeps over a circular area, the chord of which is not probably less than thirty miles. Ridge stretches off beyond ridge until their blue outlines blend with and are lost in the tints of the sky. On the other side of a deep valley, Elk Mountain lifts his solitary peak in the north-east, high towering over the surrounding summits. In all this region of Pennsylvania, he

> "——— is the monarch of mountains,
> They crowned him long ago."

Both going and returning, I made enquiries, particularly on the rivers, for traces of the Iroquois tribes who once inhabited them, such as forts, implements of war and peace, amulets, ornaments, &c. I could find or hear of nothing which would add any thing to the archæological information, communicated to our legislature last winter by Mr. Schoolcraft in his admirable report, transmitting the "census of the Iroquois." Hatchets and arrow-heads are frequently picked up on Tioughnioga, the Chenango, and the Susquehannah, and these are nearly all that remains to show the present inhabitants that they are not the original occupants of the soil. Indeed, most of them seem already to have forgotten that on their hills, and on their valleys, and on their waters, these fierce predatory tribes once lived, hunted, fought, adored and—— perished.

Cortland Village, June 20th, 1846.

ON THE ICEBERGS OF THE ANT-ARCTIC SEA.

BY JAMES EIGHTS.

To the voyager, whose adventurous inclination has conducted to almost every clime and distant shore, to which the ocean rolls its wave, there is perhaps no scene in all his wide wanderings, that so powerfully arrests his attention, and calls forth those feelings of admiration in so sublime a degree as that produced by his earliest prospect of the polar seas. In approaching these dreary and uninhabitable regions, the chilling influences of the land are sensibly felt, long ere it becomes visible; but when the curtain of mist that enshrouds its glories, discloses the sublime spectacle, all the feebler sensations of the mind are at once lost in the all-absorbing sentiment of delight which pervades his breast.

The vast masses of snow and ice that lie piled over the uneven superficies of the land, and the numerous icebergs that drift through the Southern ocean, and are every where strewed along its surface, are, in a peculiar manner, adapted to create feelings of awe and admiration in the bosom of the beholder, not alone from the majesty of the size, but likewise, by the variety of the forms and everchanging hues that they assume, throughout the different hours of the long-continued light in these high latitudes.

From the shapeless mass of comparatively small dimensions, to that of some miles in extent, these icebergs are not unfrequently seen, elevated to the height of between two and three hundred feet above the ocean's level; they are then swept along with an inconceivable grandeur, borne by the powerful currents, and aided by the almost ceaseless winds, they move steadily onward until they finally become dissolved, and entirely disappear, in the warmer regions much farther to the north.

It is almost impossible to conceive anything more delicately beautiful than the effect produced by these icebergs, when the sky is free from clouds, and the ocean is at rest; it is then there can be traced, among the numerous angles and indentations by which they are impressed, all those mingling gradations of color, from the faintest tinge of emerald green to that of the most intense shades of blue; and when the sky is filled with clouds—which is most generally the case—the scene, though equally as picturesque, exhibits a much severer aspect; these clouds being all over torn into rough and irregular patches, by the powerful winds that here prevail; while the sun, having but a moderate altitude, and almost encircling the heavens but a few degrees above the horizon, pierce with its rays the numerous openings between, and light up both cloud and ice, into a most magnificent glow. These changing hues are again brought to the eye of the spectator, in mild and beautiful reflections, so that, throughout the hours of the long summer day, the entire scene presents the ever-varying aspect of a most gorgeous sunset.

But when seen amid the turbulence of cloud and storm, the scene becomes sternly sublime. The dense masses of heavy vapor that deadens the entire face of the heavens, and roll rapidly along its surface, together with the dashing of the wild waves against the icebergs' slippery sides, sometimes sending the spray far beyond their loftiest tops, where, soon becoming dissipated in clouds of silvery mist, it gradually descends and envelopes the distant view as with a soft transparent veil of light. But it is only when, under these circumstances, these masses of ice are seen through the gloomy twilight of the midnight hours, that they assume a strangely terrific aspect; their huge forms then loom in the hazy atmosphere that surrounds them, and fall upon the vision shadowy and indistinct, like fragmentary spectres of a disruptured world.

These icebergs at all times derive their origin from the land; being merely detached fragments from the huge glaciers which every where fill the numerous valleys, and cover the hills from the water's edge upward, until they attain their greatest eminence. These glaciers are all formed from the accumulating snows of ages, this being almost the only form that moisture ever assumes in falling in these elevated regions; scarcely a day occurred while we were in the vicinity of these southern lands—even though at mid-summer—that snows did not descend, and water congeal into ice upon our decks.

The powerful winds which prevail in these high latitudes, acting with their usual energy upon such portions of the land as are freely exposed to their sweeping influence, have a direct tendency in the first instance, to drift up and fill the valleys and other depressions with snow, until they become almost even with the adjoining hills; it is then, by the pressure of the enormous weight, that it is speedily condensed into solid ice. During this process it is, that those numerous shrinkage fissures are also produced, that are to be seen traversing the glaciers in almost every possible direction.

In passing along the surfaces of these glaciers, the journey ofttimes becomes one of extreme peril to the incautious traveller, from the circumstance that the fissures are not unfrequently crusted over by a thin and fragile covering of snow, which readily yields to his footstep, and suddenly precipitates him some hundreds of feet below.* It is in this manner that animals sometimes perish, and when at length discovered, firmly imbeded in the drifting ice, give rise to no small degree of surprise and varied speculation.

The carcasses of penguins and seals, which in the greatest profusion inhabit the southern lands, were, in several instances, observed in such positions; and it is in this way that the remains of animals are frequently conveyed to distant shores, and deposited in climes in every way uncongenial to their species.

From the constantly increasing weight of accumulating snows above, these glaciers are silently and almost imperceptibly encroaching on the sea, so as, in many places, to project far over its foaming waves. Sometimes they are seen gradually to approach from opposite directions, and eventually to bridge over some of the narrower straits that in various places divide the land; in most instances, however, they are observed to encompass

* This, but to an unimportant depth, occurred to one of the officers of our ship, and it was only after a considerable time had elapsed, and some exertion on our part, that he was ultimately relieved.

the land by a series of precipitous cliffs, which have an extent for miles together, presenting a naked wall or barrier of ice to the sea. Huge masses of these, particularly during the season of summer, are continually breaking off with an astounding report, and after falling into the waves beneath are carried onward, and constitute the vast icebergs of the Southern ocean.

These icebergs, when first detached from the land, are of a rudely tabular form, but by the continued action of the oceanic waters about their bases, penetrating into their fissures, and wearing them away in such a manner as to destroy their equilibrium, they suddenly topple over, and then exhibit all those strange and imitative forms which have so often been described in most glowing terms, by the many voyagers whose good or evil fortunes have hitherto led within their influence.

Embraced within these drifting icebergs, rocky fragments, varying greatly in size, are not unusually to be seen, sometimes rounded into the boulder form, but for the most part angular, and so arranged as to present a dark striped, or partially stratified appearance, strikingly visible from the contrast of their darker hues, with those of the lighter tints of the ice in which they are inclasped. The origin of these last is extremely obvious, and admit of a simple explanation. In many places, isolated masses of the rock that constitute the land, are observed to penetrate and protrude far above the general level of the surrounding snows; portions of these are almost continually falling, from the expansive power of the congealing water among their fissures: these fragments are thrown upon the indurated surface of the snows, and are then slidden to some considerable distance from whence they were derived; upon these the falling snows soon accumulate to a sufficient depth to retain them in their places, until they become firmly embraced within the mass. When portions of these glaciers are detached, and tumble into the sea, icebergs bearing rocky fragments are then produced. These fragments, like the animal remains, are frequently borne along, and deposited in regions far remote from the parent rock, from whence they were detached.

The largest drifting iceberg that we saw, during a period of three months in their vicinity, was estimated at about two miles in extent, and elevated between two and three hundred feet in the air. Should we take into consideration the specific gravity of ice, which allows about eight parts beneath, to one above the sea, we will be able to form some conception of the vast magnitude of these floating mountains. One of these larger ones was seen drifting along at the rate of two and a half knots an hour, at which speed, on approaching Cornwallis island—one of the South Shetland group—it suddenly became arrested in its course, the anterior portion grounding, and remaining attached, while that which followed, submitting to the powerful impulse of the current, was swept around, describing a complete semicircle ere it again became free. Should this part of the ocean's bottom, at any future time, be elevated into dry land by the active energies so peculiar to volcanic regions, the impressions made by this iceberg would furnish to the world a highly interesting subject for geological speculation. When agitated by the waves, these mountains of ice are frequently rent assunder with terrific explosion, scattering their fragments far and wide over the surrounding surface of the deep. In fine weather too, they are not unusually seen covered with penguins, whose chattering noise is often heard at an incredible distance over the silent sea.

AGE OF FOREST TREES.

BY S. B. BUCKLEY.

The age of our forest trees is not as great as we had supposed. We thought that some of them had weathered the storms of at least four or five hundred years, because here in America many of the giants of the forest have remained undisturbed, nor can it be truly said that our oldest trees have been destroyed by human agency. We have very few trees that are three hundred years old. We have lately taken considerable pains to ascertain the ages of many in this vicinity, embracing many of the largest forest trees. The age was ascertained by counting the rings in a stump of a tree lately cut down, and the diameter of the upper surface of the stump measured, and the results are given in the following table:

	Years old.	Feet.	Inches.
Bass wood, (Tilia glabra,)----------	66 ------	1	9
Black oak, (Quercus tinctoria,)------	200 ------	2	4
White oak, (Quercus alba,)---------	224 ------	2	7
" " ---------	225 ------	"	"
Black oak, (Quercus tinctoria,)------	190 ------	2	0
Elm, (Ulmus Americana,)----------	215 ------	2	4
White oak, (Quercus alba,)---------	230 ------	3	0
" " (large roots,)	206(rich soil)	3	1
Swamp oak, (Quercus bicolor,) ------	45 ------	1	10
Shag-bark hickory, (Carya alba)-----	180 ------	1	11
White Pine, (Pinus strobus,)--------	183 ------	2	8
Maple, (Acer saccharinum,)--------	125 ------	2	6
" " --------	130 ------	2	4
Elm, (Ulmus Americana,)----------	248 ------	4	0

The above is a fair sample of the growth of timber in this region, embracing some of the largest trees. We do not wish to be understood that there are no larger trees in this county, because there are without doubt some few, which we remember to have seen, but they are very scarce. Many of the large white oaks in this section have already begun to decay and die, to speak comparatively, evidently having passed the prime of life and now being in their extreme old age. On visiting a piece of ground while it was being cleared of its wood, we found many of the white oaks decayed and hollow to the distance of from five to ten feet from the roots, at the same time the extremities of their upper branches were dead. We have invariably remarked that the largest growth on any one side of a tree from the heart wood was always on the side which had the largest and most numerous roots. On counting the age of an elm lately cut down we found that the diameter from the heart wood to the bark on the south side was much less by nearly one-half than that of any other side of the tree, but we soon discovered the cause of this—a brook had encroached on the south side, washing away the soil and exposing the roots to within about two feet of the trunk of the tree. Does not this seem to prove that trees derive a large portion of their substance from the soil? However, we are aware that it might be asserted that the greater growth on any one side had caused the larger roots.

It will be seen that we cannot boast of any very ancient trees, like the cedars of Lebanon, which are said to be 2000 years old. According to Adanson, some of the famous Baobab trees in Africa are 5150 years old, and Decandolle supposes that the cypress trees of Chapultepec, in Mexico, are still older. In the language of another, " It would seem that after a certain age, all trees decrease in their rapidity of growth, a fact of some importance to be known to planters; the oak, for instance, between its fortieth and sixtieth years; the elm, after its fiftieth year; the spruce after its fortieth. Of this rate of growth an interesting table has been constructed, showing the increase in diameter of certain trees every 10 years, from 1 to 150 years."

The prevailing growth of timber in this vicinity is the white oak, growing on a good wheat soil.

Yates County, N. Y., June 1, 1846.

No conduct is so injurious to a cause as cruelty; erroneous opinions may be entertained, differences of sentiment may prevail; but a cause which is supported by cruelty, even if good, will meet with just execration. To support and sustain a cause, therefore, a kind deportment and a gentlemanly regard to the persons and opinions of others, will secure the attention of opponents, and do more to win favor than the most powerful arguments.

SOME OF THE MINERAL RESOURCES OF NEW YORK.

The development of the resources of a state or nation is a duty which can not be performed too early or too thoroughly; for as soon as a nation begins to legislate or perform the functions required by a civilized people, some knowledge of the natural resources of the country become indispensable. The foundation of commerce, the elements of trade and the materials for exchange must be sought out and extracted from their store-houses, before wealth can flow into a nation's coffers, or capital accumulate in the hands of individuals. Industry is excited and encouraged by every discovery of the raw material; first, in raising it from its beds; second, in forming and fashioning it for use; and third, in distributing it by trade to those parts where it is required for the purposes of life. The channels through which industry travels diverge in all directions from the original source from whence the raw material is extracted or drawn, and hence, a whole community may be employed in industrial pursuits, whenever a supply of unwrought material is brought to light.

From these remarks it is evident, that the pursuits of life are controlled by circumstances and not by an independent and absolute choice of individuals. The residence of a civilized people being fixed, the pursuits of industry must be subordinated to those natural reservoirs of wealth which are stored up in the mountains, the sea or bowels of the earth. It may be that they are fixed upon a plain, whose deep alluvial soil invites to husbandry and tillage; if so, the plow is the instrument by which industry gathers and strows her wealth. It may be that hills and mountains are chosen as places of residence; then flocks and herds offer themselves as suitable channels by which to secure competence and independence; or, it may be mines of ores crop out from beneath and become the productive fields of employment. It is here, too, that the powers of nature are concentrated to move machinery for manufactures and the reduction of the mineral products.

We might proceed farther in the same train of thought, and show still more fully that the business in which men engage, and by which competence and wealth are attained, is determined and controlled by the constitution of the country which they have chosen for their residence; or, in other words, that its geological formations, and its structure controls their affairs, excites and directs their enterprises and opens before them the main sources from which their wealth is drawn. Hence it is that men do not choose before hand, and independently of circumstances, what they will do, and what they will pursue, so often as may at first view appear; but, they are rather following a lead which nature opens before them in the circumstances and conditions in which they may be placed.

The earth is the great store-house from whence is drawn all that is esteemed valuable and useful in this life; and although much springs out of it by forces independent of man, still it is rare that much can be appropriated and employed for his use and benefit without labor and the exercise of his mind upon it; and in order to encourage his efforts and make it possible to secure the greatest amount of good, order has been observed in the distribution of the most important materials, those which are required for his daily use and consumption. It is no part of our present purpose to show the importance of order in the distribution of useful materials, or to dwell upon the designs of Providence in thus furnishing what is required for sustenance in relations which may be known by observation, and which when once discovered is an available fact for all future generations, and which in truth serve in the place of a principle to guide all farther researches in the same channels of inquiry, but simply as an enunciation of what is true, and what at the same time gives importance to investigations whose objects are the discovery of useful materials in the bowels of the earth. It is certainly a magnificent fact that it is so; and though it is what we ought to have expected *a priori*, yet, it is one which we have been very slow in discovering, and which never was admitted of the earth, until the fact was discovered by thousands of observations made in all parts of the world; and even now, many who in other instances see order established, still have very incomplete and imperfect views of order as established in the strata forming the earth's surface, although here it is of the most importance to man; it is here that his daily subsistence is derived; in fine it can not be doubted but that order here is more important, so far as man is concerned, than any where else in the universe. We deem these remarks important when taken in connection with the subject of this paper, for if it can not be shown that economical productions are arranged in the interior of the earth in some order, the value of systematic study ceases to be important, or at least loses one half of its value. This does not, however, conflict with a fact which will appear by and by, that certain important mineral productions have a wide range, and may be considered as common to many distinct formations.

The formations of New York belong to four great systems, marking four corresponding eras or periods in the earth's history. The first, and most ancient is denominated primary, inasmuch as it existed prior to animals and vegetables, or in other words, preceded organic existence. It was a period marked by the predominance of inorganic force which is every where indicated by crystalline rocks and minerals, and though this force has never ceased to play its part in modifying the earth's surface, still the period when primary rocks were forming is emphatically one when this kind of force predominated. Different varieties of granite and primary limestone, gneiss and hornblende and iron ores were the formations which were the creations of the first periods, or those which preceded organic existence. The second system, proceeding in the ascending order, is the taconic, which is also marked by the same inorganic force, as is plainly discoverable in the structure of the marbles and crystalline limestones and the regular jointed structure of the slates of this system. It is, however, less strongly marked, for all the members of this system carry with them the distinct marks of a sedimentary origin, and earthy characters which show that they were derived from preëxisting masses which had been already consolidated: but what is still more important, and what is particularly interesting, is, that in this system, organic bodies first make their appearance; that during their formation life, in its humbler condition, was first manifested, the dawning of which indicated the future development and power of a new order and kind. The third, or silurian, sometimes called also the New-York system, is well distinguished from the preceding by the great abundance of organic bodies, belonging both to the animal and vegetable kingdoms, all of which, however, are forms ranking low in the scale of organic existence; and it is only in the superior part that we find unequivocal evidence of the superior grade to which life seemed to be tending in the remains of fish, which the strata are now known to enclose. The fourth system in New-York is called Devonian, or old red; and seems to be scarcely more than the prolongation of the silurian; for while all the typical forms go up into it from the silurian, no decidedly new types or forms have yet been discovered, except in the ichthyolites or remains of fishes. Many new species and genera it is true are found in the Devonian which are not known in the silurian; yet, it is scarcely possible to discover that they belong to new types, or are very far removed from the mollusca and conchifera of the silurian. These general remarks are introduced for the purpose of opening the way for pointing out what is peculiar to each system, and what useful materials belong to each respectively; and also in what part of each system the valuable products belong.

We begin with the primary system and proceed in the ascending order. In the first place to what use may the rocks themselves be applied? In answer to this question we may remark, that the primary formations in New York are somewhat peculiar. The stratified rocks, such as gneiss, mica slate and hornblende, and which in New England are fissile, and form good flagging and good fire stone, are generally defective in those qualities which render them suitable for construction, except for the most common purposes. In that part of New York north of the Mohawk valley the gneiss, for the most part, is so irregularly bedded that few if any quarries of this rock are known which are susceptible of being wrought into good flagging stone or other works of construction.

The only rock of this northern district which may at some future time be turned to a valuable account, is the hypersthene rock of the interior of Essex county. This rock consists of Labradorite, a handsome variety of feldspar, the finest colored varieties of which are smoke gray of various tints. This rock is susceptible of a fine polish, and for the more expensive and beautiful ornaments for parlors, is extremely well adapted. It is sufficiently hard to resist all ordinary instruments which are in use, and hence, would retain its polish and lustre as long as most of the gems. Hardly any thing can exceed the beauty of this stone for mantle pieces, centre tables, or any other piece of furniture for the parlor. We are well aware that the expense of dressing and polishing it will be considerable; still we believe that, by suitable machinery, it may be prepared for use at a price which shall not carry it beyond the means of our men of wealth and fashion. We, however, can only speak of this material as one which may *probably* be turned to good account hereafter, or, as one which will furnish a field for labor, and a probable return of profit to ingenious and skilful workmen.

The primary limestones. It is necessary to keep up the distinction of the limestones found associated with the granites, and occasionally with gneiss and hornblende, and those which occur in the taconic system. They may frequently be known, even in hard specimens, the former being distinguished by their containing graphite and other minerals which are usually associated with primary rocks. This limestone occurs in veins in granite in beds beneath it, and in irregular masses in hornblende and gneiss; sometimes apparently in beds parallel to those of the rock with which it is associated. It is usually magnesian, and is not so well adapted for quicklime, or for a furnace flux in smelting ores, as the pure carbonate of lime; neither is it suitable for marble, on account of its coarse grain and imbedded simple minerals which it so frequently contains. It is, or may be used for lime, when free from the latter, and when the purer limestones are at too great a distance. Thus, in numerous localities in the primary districts, this rock becomes an important one for furnishing lime; indeed it is believed that the whole primary district may be supplied with lime from this source; or, it may be substituted for the purer sedimentary limestones, when these can not be obtained. This rock is, however, only worthy of notice in the primary districts, and it is spoken of here to show that the important article lime may be procured throughout the wide primary district north of the Mohawk valley. It will be found here an important mineral resource, both in building and in agriculture, when these lands come to be settled. Associated, very frequently, with the primary limestone is a variety of verd antique, composed of carbonate of lime and serpentine, mixed or aggregated in various proportions, and in small and large masses of the latter. The usual form in which this occurs is a gray limestone, which forms the ground or base into which the serpentine is imbedded, or through which it is disseminated. It forms by no means an inferior marble, and will one day be wrought, and will adorn the parlors of the farmers and mechanics of the northern section of the state. It can not, however, come in competition with the black marbles of Glen's Falls or Isle La Motte; still, it must be regarded as one of the minor resources, which, at some future time, will be brought out by the enterprise of the generation now coming upon the stage of life.

The most important of the mineral resources of New York are her mines of iron ore; and in this material she probably is more richly supplied than any other state in the Union. It is a remarkable fact that not only is every system of rocks within her borders supplied with deposits of ore, but they are distributed in every great section of the state. The primary system abounds in the magnetic and specular ores; the taconic, in brown hematites; the silurian in oolitic and argillaceous; the diluvial and tertiary with bog ore. These different species of iron ores are found first in the northern counties; the magnetic in Orange, Warren, Saratoga, Essex, Clinton and Franklin; the specular in Jefferson and St. Lawrence counties. The hematites are found only in the eastern and southeastern; the oolitic in the western. The latter extends more than one hundred miles, or from near Utica, westward, and beyond Rochester. The bog ore occurs in all parts of the State, in small basins, from a few rods to ten or fifteen acres in extent.

The most important of these ores is the magnetic and specular. The former occurs in veins and beds, and in the condition of rocks over an extent of country equal to 1,600 square miles; occupying a tract of country about the sources and tributaries of the Hudson river, or in that primary region which terminates near Saratoga south, and extends north nearly to the provincial line between Canada and New-York, and principally on the eastern slope of the mountains lying between Little-Falls on the south and the town of Moore on the north. The specular iron ore is found only in a few townships in Jefferson and St. Lawrence, the most important of which lie in Gouverneur and vicinity, and which furnish ore for the Parrish iron works at Rossie. The greatest accumulation of magnetic ore at any one locality is at Adirondack, in the township of Newcomb. We have on several occasions attempted to determine the quantity of ore at this place, by measuring the veins or the parts of the exposed beds, and we have found that from 6 to 700 feet in width and between 2 and 3,000 feet in length of bodies of ore are exposed, or merely concealed by a thin layer of soil. But we have satisfied ourselves that the exposed beds are but a small part of the masses which exist near the surface; for in the immediate neighborhood of the bodies of ore at Adirondack it is very frequently exposed by blasting off a few feet of rock; and so frequently does this happen, that the whole valley, which is six or seven miles long, seems to be underlaid with ore. We may then regard the ore at this place as a rock formation, and which may be quarried as a rock and worked out in open day, for an indefinite period. Hence it will be observed, that the amount of ore is incalculably great, and we have no occasion to sit down and ascertain when it will probably be exhausted, if worked at a certain yearly rate. The calculation how much ore might be consumed yearly must have regard to the fuel of the surrounding mountain and valleys, which fortunately are now covered with primeval forests. It seems to be an important fact, for the iron manufacturer in New York, that so much forest and wild land should remain till the importance of the ores of this section of country should be in a condition to be appreciated. Had it been settled as early as was designed by the original proprietors of its lands, the finest and best parts of the wooded country would have been cleared long ere this. This ore is now known to rank with the best and finest in the world, having been proved by recent experiments to be adapted to the manufacture of steel and the most important parts of machinery, where strength, hardness and durability are required. The experiments by which its value has been tested were of the most unexceptionable kinds, and they have also been performed by persons whose experience entitles them to the highest confidence; and hence it may be set down as certain that we have abundance of ore in New York, which will soon be employed in the manufacture of the tools and machinery. It is difficult, if not impossible, to estimate the value of the ore of Adirondack; but we have often made a rude estimate of one of the mines, that which is known as the Sandford vein. The estimate of its value is founded upon the following data. One thousand feet of the exposed surface is 600 feet wide. This great mass may be worked to the depth of 50 feet, without any expense for drainage, and every cubic yard is worth four shillings in the mine. One thousand feet in length and six hundred feet wide and fifty feet deep, contains one million one hundred and eleven thousand and one hundred and eleven cubic yards; which, at the value at which a cubic yard of ore is estimated, gives in round numbers half a million of dollars for one mine at Adirondack. A cord of the ore may be profitably raised for ten shillings. The facilities for transporting the ore are quite favorable, and it may be carried on wheels twenty miles down the valley of the river, cheaper than fuel can be brought to the mine. By adopting the plan of reducing the ore at points below the mines, fuel and power for moving machinery become accessible, and at the same time the movement is towards the market. There is still an immense water power at Adirondack. The distance from Lake Henderson to Lake Sandford is about one mile, and the fall in this part of the river is about one hundred feet. The great reservoir of water in Lake Henderson makes it a valuable location for the establishment of works at this place, which is the highest point on this branch of the Hudson at which works can be located; but proceeding downward, the number may be multiplied to any extent which may be desirable, and to which the ore may be transported.

It will be impossible for us to go over the whole mining region of New York and state particularly the value of the ores as they exist in the mine, and which will constitute hereafter a source of wealth and prosperity, and which at the present time is greatly undervalued; we can only speak of the mines in mass. We therefore ask our readers to regard them rather as sources of wealth to the next generation, when iron will be required in much greater quantities than it is at present. In order to form a true estimate of the value of the northern mines it is necessary that we should consider that they are adapted to the manufacture of refined iron, and that this must be the province in which New York can compete with the iron of Pennsylvania and other coal producing States. By refined iron we mean that which is produced by charcoal, and which only can be employed for the manufacture of steel. Most if not all the failures in making steel of the northern magnetic ores have arisen from the imperfect manner in which the iron had been previously reduced. It can not be expected that iron made by the Catalan forge, unless uncommon pains is taken, will be perfect and free from particles of ore which have escaped reduction. There are so many inducements to hasten the process of reduction and to cheapen the iron by this cheap mode, that it is feared that it will still be followed by the manufacturer at the risk of entailing a bad character on his productions. The Catalan forge will produce iron cheaper and faster than by any other mode; and where the ore is in one state of oxidation, either a protoxide or a peroxide, it is the most economical of all the processes which have been devised; yet, it is liable to objection, inasmuch as it may be very slovenly performed, and a great amount of ore wasted. But it is the most direct, and where only small loops are brought out, and the ore is well prepared and introduced in proper quantities into the fire, very good iron may always be made, such as suitable for all ordinary purposes, and even nail plate, horse shoes and wheel bands.

The great drawback to the iron manufacture of the north will be found in the principle which so often moves men of enterprise, that of making the most of present advantages, by which sufficient prudence and economy will be lost sight of in the use of fuel. The common practice in this country of sweeping down an entire forest or a large tract, in one season, and converting the most profitable parts of it to coal is one which would be highly injurious if adopted in the northern sections of the state. By this course nearly one-third of the younger growth of trees is destroyed by being broken, or cut down and thrown into heaps to rot; the soil consequently is left to be washed off when the surface is at all steep, and the whole field is thereby reduced, or nearly reduced to barrenness, or a condition of poverty from which it can scarcely recover in an entire generation. It is true that in coal making, the additional expense which attends the selection of the ripe and full grown timber is an inducement to cut the whole and convert it into coal upon the spot; still, in the long run, the former course, that of cutting only that which has reached its full growth and is upon the verge of decay, will be found by far the most profitable. We regret, even now, that in any parts of New England and New York the forests are prostrated even for a wheat field, and we deem it a waste in all the older settlements to cut them down for any purpose whatever. They should be merely thinned out; the young and those of vigorous growth left to be matured. The pasturage which might be secured would amount to more than would be made, in many cases, by cutting the whole. The wheat or rye crops which may be obtained for a few years will be of less value than the wood which has been burnt in heaps upon the ground. Our object in introducing these remarks is to inculcate the principle of economy in saving fuel in our manufacturing districts, for unless a judicious course is pursued in this matter they will be greatly crippled in their operations, at a time and period when they will be the most valuable to individuals and of the most importance to a community. Errors committed against our forests are the errors of a life, and the repairs, if ever made, will consume the life of a whole generation; but the great misfortune is that it is rarely they are repaired but imperfectly, and often the axe which has felled the pride of two centuries, has consigned a handsome estate to barrenness.

We deem it unnecessary to dwell longer upon this single resource of wealth in New York, the magnetic ores, for we are unable, at the present time, to estimate its value. We know that it is distributed over an area of sixteen hundred square miles; that new deposits of it are coming to light every year, in all that region which gives origin to the Hudson, or on those rivulets which feed the Champlain; and that we are far more likely to underrate than over estimate its importance to the citizens of this state. We see in it one of those sources from whence the great public works are ultimately to draw a revenue which will materially aid in sustaining them. Besides the magnetic ores, the specular of Jefferson and St. Lawrence, which furnishes material for two or three large establishments in those counties, and which not only supply a large proportion of the maleable and cast iron in different states, for their own population, but which furnishes also a large amount for exportation, some of which finds its way to Rochester, and the Genesee valley and Canada, and to Boston, where it is highly esteemed. To this we must add the hematites of Columbia and Dutchess counties, some of which are also adapted to the manufacture of an excellent tough iron. The ore of the western counties is confined to one formation, viz. the Clinton group. It occurs in one or two beds. This ore is only available when and where it crops out, or is within twenty or twenty-five feet of the surface. Its position may be seen in the gorge below the lower falls at Rochester. It rises to the surface near the ferry, and wherever else it thus appears high above and upon the surface, it may always be regarded as a valuable and important deposit. It will be observed, however, that it dips beneath a portion of the Clinton group at the rate of one hundred feet to the mile, and that in consequence of the thinness of the stratum it can not be quarried where it is covered with more than twenty-five or thirty of rock. There is, however, an immense amount of ore ranging east and west between Oswego and Monroe counties. This ore is particularly well adapted to mix with the harder ores, such as magnetic and specular, or even the hematitic, aud would, if so employed in this way supercede the necessity of employing other fluxes for reduction, in virtue of its containing both lime and alumine. It yields by itself about thirty per cent of iron in the large way. If this ore was used as extensively for pigs and stove castings as it may be, it would be sufficient to supply the Rochester market with castings for its important trade in the stove business.

From the preceding statements, in regard both to quantity and location, or distribution of the important raw material for iron, it will be seen that the whole of New York is remarkably well provided for; every section of this great state being furnished with it, and in such quantities that a home supply is always at hand at the least possible cost; and inasmuch as it is widely distributed, it performs two important functions, that of giving employment to manufacturing workmen, and a market to the farmer for his produce, and an exchange of his grain, his butter or cheese for this necessary article of the household and his farm.

We may now proceed to speak of materials for construction, which, though they may not be called for as products worthy of transportation, but still as materials which possess the properties required in building; and even if employed only in the immediate neighborhood of their beds are of great value, which we can only estimate or form a conception of their worth by supposing all the materials for construction were required to be purchased at a distance, and then brought to all those points where they are required. It is an important consideration that in New York every part has a supply of building materials in the formations upon which they are located. Those sections of the State which are most deficient in good materials for building are the eastern counties; still, even here quarries of shale and thin-bedded sandstone might be opened, which are quite important and useful. To begin, however, with the Potsdam sandstone, the lowest member of the New York system. This occupies a large territory in Jefferson, St. Lawrence, Franklin and Clinton counties, and small insulated patches in Lewis, Warren, Saratoga and Washington counties. It, however, furnishes one of the best and most durable stones for building which has ever been used, being perfectly weather tight, as well as indestructible under all changes of weather, either above or below the surface. It furnishes the finest material for building, flagging, or any purpose for which stone may be employed at Potsdam. Being in most cases a fire stone, it is used for hearths of furnaces and the like, and being in many instances a purely silicious rock, white and free from iron, it may be, and has been employed in the manufacture of glass. It is the best flagging stone in the northern counties.

The next series of rocks which produce materials for construction are the Hudson river rocks, or Pulaski and Lorrain shales and the sandstones which terminate the Champlain division of the New York system. But it must be said that the shales and sandstones are liable to injury from the weather, when exposed. The most durable are layers of this group which are found in Oneida and Oswego counties, where some fine quarries have been opened which furnish even-grained and even-bedded layers, for grindstones as well as blocks for building. The only rocks which furnish roofing slates are those of the taconic system. Hoosic, in Rensselaer county, is the place best known for this material, and the experience of thirty years proves it as valuable and durable as the Welsh slate.

The next series of rocks which furnish flagging is the Clinton group in the Ontario division. The strata suitable for this purpose may be found from Utica to Rochester. The quarries near the former place, though not of the best quality, are still important. At Rochester, the building and flagging materials are found in the next series above the Niagara group. It is a thin-bedded limestone, situate below the Niagara or Wenlock limestone and above the green or Wenlock shales. It is quarried for ten shillings per cord, and is the rock from which has been obtained the stone for all the public and private dwellings in Rochester. It is an indifferent flagging stone; and, as a general rule, limestones are too uneven and thick-bedded to be employed for this use. The best flagging which we know of, and which are calcareous, are obtained from the Manlius waterlime series. In the eastern part of the state this mass is too deeply concealed by the pentamerus limestone, but in Onondaga county, where this rock is thin and unimportant, the flags may be reached and quarried to advantage.

The most valuable flags, however, are found near the superior part of the Erie division of the New York system, near the top of the Helderberg range. These flags are the most beautiful in the world. They are thin and even-bedded, firm and extremely well adapted for side walks; their evenness making it extremely easy for walking, while their hardness gives them great durability. Quarries of this stone may be opened from near New Scotland in Albany county, to Madison in Greene county. The distance of the quarries from the river varies from six to fifteen miles. Albany, Coeymans, New Baltimore and Coxsackie are the principal points to which this fine flagging is brought to the river. The three last named places are points from which it is shipped for New York and other places. The principal streets in Albany are now being relaid with this fine rock. Some of the pieces are eight and ten feet long and five or six wide; forming so much of the entire walk. The old pavements of brick or stone are removed to give place to the Helderberg flagging. The cost of this material is from ten to fourteen cents per foot. In the quarries the strata are nearly horizontal, and hence, when the slate and worthless rock is removed, which sometimes amounts to eight or ten feet, they are raised with facility by means of iron and wooden wedges. The same rock is also beginning to be used for cisterns, a purpose for which it is also well adapted. Five flat stones, cemented, form the bottom and sides, and the sixth, with its perforation, the top, completes the structure.

Flagging stone possessing properties of the same kind as those just described occur also in the Catskill sandstones above. Near the Mountain House a quarry of very fine stone has been opened. We have spoken of this rock as it occurs near the Hudson, and of its existence at points from whence it may be transported to market. It extends, however, from the Helderberg to Lake Erie, and from the Hamilton group to the tcp of the Catskill, as we have already stated. Hence numerous quarries may yet be opened in the westward prolongation of this series of rocks, and every village, almost, may be provided with fine and beautiful walks, as well as building material, when the layers are of a proper thickness. In New York the value of a material of this kind is imperfectly understood. In England, stone, however coarse, is reckoned as a part of the estate as much as the soil.

The limestones of New York are more circumscribed than the flag stones; but still, many localities furnish important and valuable stone for construction. The lowest or oldest deposits belong to the taconic system. The gray and white marbles of Westchester at Sing-Sing are the most noted. These marbles are not all equally good. The dolomitic are friable, and waste and break when exposed to the weather. Sulphuret of iron often stains and spoils large blocks, and segregated masses of silex often injures them for polishing. Passing up to the New York system, we find that the lowest limestone, the calciferous sandstone, is a valuable rock, and when blocks are well dressed it is an excellent material for building, for locks and piers. It resists the weather, damp or dry, warm or frosty. The best locks of the Erie and Champlain canals are constructed of the calciferous sandstone.

The next limestone which may, or which has been used for construction is the birdseye. It is a pure carbonate of lime, and ages of exposure to the weather are required to make a perceptible impression upon it. It is used in Oneida and Lewis counties for the construction of dwelling-houses. The Trenton limestone is black and gray, the latter variety is used for building; the cathedral of Montreal is constructed of this variety. It resembles granite at a distance. The Onondaga limestone is the only one employed for building in the Helderberg division. As it extends from the Hudson to Black Rock, it furnishes a great amount of building stone, as well as material for the construction of canal locks and other public and private purposes.

The limestones which are suitable for lime, are the white and clouded marbles of the taconic system; some varieties of the calciferous sandstone, the birdseye, Trenton and Onondaga limestones; these are the most important; the best and purest lime is made from a dark variety of the birdseye as it occurs at Chazy, in Clinton county. The hydraulic limestones are associated with the calciferous sandstones and limestones of the inferior part of the Helderberg rocks. Lime for agricultural purposes is made from the sparry limestone of the taconic system near Caldwell, and at Barnegat, from the calciferous sandstone, where it is furnished after air slacking at six pence per bushel. Three pecks of the recently burnt lime become a bushel after it is air slacked. The agricultural lime is all used either on Long Island or in New Jersey. From these facts it will be seen that all parts of the State are supplied with limestone except the southern tier of counties. Here an imperfect and deficient supply is derived from beds of white marl.

We might dwell at length upon other mineral productions of New York, if it were necessary, viz., the brine springs and plaster mines. The former, as is well known, yields an enormous revenue to the state. Both sources of wealth are, however, so well known as to require only a passing notice in this place.

In the preceding account of the mineral resources of this state we have taken no notice of clay for brick or pottery, peat for fuel and manure, and marl for manure and the common purposes for which lime may be used. Some idea of the value of the clay of New York may be formed when it is stated that from 75 to 100 millions of bricks are annually made from the Hudson river clay. The value of the peat beds of the state is also immense; or is so prospectively. There are probably no less than one hundred thousand acres of peat land, varying in depth from four to twenty feet. The average depth will be equal to six feet at least. Marl, too, accompanies the peat and increases greatly the value of this substance as a manure.

We have no correct data by which to determine the value of the lime business, but in Orange it exceeds a hundred and eighty thousand bushels per annum, and in Dutchess, at Barnegat, the produce exceeds 1,500,000.

It appears, then, from the foregoing imperfect account of the mineral wealth of New York, that every section of the state is supplied with something valuable, from which her citizens may derive advantage, and to which they may direct their energies. In regard to their value, though we have not attempted an estimate in the aggregate, or even on individual products, we have no doubt of this, that time, instead of diminishing will greatly increase the value of the productions which have been described in this article. The persons, or the class who are deeply interested in these productions, is the farming class, for it must supply the means of living to those who are employed in raising and manufacturing the products of the mineral kingdom. All business of this kind furnishes a home market, which is worth a third more than a distant one; the price of a farmer's produce is as great at home, or at his own village, as at a distance of 25 or 30 miles, and the time, the expense, the wear and tear of journeying for man and beast is saved. The proper encouragement of industrial pursuits of a mechanical kind, and those concerned in bringing into use the raw material of our hills and of our rocks, ought not to be forgotten by the agriculturist. We have seen obstacles thrown in the way by some men in this pursuit. Prejudice against strangers, or foreigners, has usually been at the foundation of this opposition. It is true the Irish laborer, who is often employed in these laborious pursuits, is not at first one of the best members of society; still, may we not hope and expect that in a few years, by intercourse with a more enlightened people, the despised laborer will attain a respectable standing in society, and finally make an excellent addition to the population of this country. The great advantages which our hilly country has over a flat or prairie country, is its furnishing sites for hundreds of villages, all of which are small market towns, at which the produce of a wide region is consumed; where pork and beef, mutton and veal, corn, oats and potatoes, fruits of all kinds, in fine where all products, from a pickled cucumber to the stall fed ox, finds a ready cash sale, or a mutually profitable barter for the mechanic's skill and labor. In a community which we have now in view, composed of industrious and enlightened members, of mechanics and farmers, those who bring up from the bowels of the earth the raw material, and the farmer who supplies food and clothing, there is no occasion to fear western competition. It is only in our great markets, and in our great staples, that western competition affects the value of the products of the soil. The New-York and New-England farmers derive their profits from many productions, instead of one great staple, and the aggregate profits of a farm which produces butter and cheese, pork and beef, corn and potatoes, poultry, eggs and fruit, hay and oats, none of which have distant competitors, are equal in a series of years to the profits arising from the great western staples, of which wheat and flour are the principal, though wool, corn and pork are highly important.

IMPORTANCE OF CORRECT VEGETABLE ANALYSIS; DUTIES OF AGRICULTURAL SOCIETIES, ETC.

BY DR. N. S. DAVIS, BINGHAMTON.

If a mechanic should attempt to construct a building without knowing of what it should be made, he would be ridiculed for his folly. If the chemist should mix in his crucible two substances, the composition of which he knew nothing, it is evident that he could know nothing of the results that might follow. So, if the farmer places his seed in the soil without knowing the composition of either the soil or the plant he wishes to have spring therefrom, how shall he be able to calculate with certainty the result? True, he may have seen his father or neighbors raise similar crops from the same soil, and may, therefore, infer that he can do the same.

But precedent here fails to be a guide, because every successive crop changes more or less the composition of the soil; hence we may consider it an established fact, that a correct knowledge of the composition of soils and vegetables is as important to the judicious farmer, as a knowledge of law is to the lawyer. But how are our farmers to obtain this knowledge? If they search agricultural books and periodicals, they will find the composition of every vegetable substance to be stated differently as the result of every new analysis. See the following for instance, in regard to the composition of red clover:

Horsford states 100 parts of the ash of red clover to contain, of potash, 12.16: soda, 30.75: lime, 16.55.

Johnson states it to contain, of potash, 24.80: soda, 4.20: lime, 2.41.

And still another author gives it as follows: potash, 16.40: soda, 4.00: lime, 22.40.

Again, compare the following statements of the quantity of ash left after burning a given quantity of the different species of grains. The first column is quoted from the 53d page of the first volume of American Quart. Jour. of Agriculture and Science; the second from Boussingault; and the third from Weignan and Palstorff:

Ash in 100 lbs. of		*Ash in 100 lbs. of*		*Ash in 100 lbs. of*	
Wheat,........	1.18	Wheat, ...	2.40		
Wheat straw,..	3.51	Wheat straw, ..	7.00		
Rye, ...	1.04	Rye, ...	2.30		
Rye straw, ...	2.79	Rye straw,.....	3.60		
Oats, ...	2.58	Oats, ...	4.00	Oats, ...	2.86
Oat straw,.....	5.74	Oat straw,.....	5.10		

Here we have three writers who make the amount of potash contained in the ash of red clover vary from 12 to 24 per cent; the amount of soda from 4 to 30 per cent; and that of lime from 2 to 22 per cent; while the amount of ash derived from a given quantity of grain or grass is equally various, as seen in the table.

Further quotations might be made to illustrate this point, but enough has been adduced to show that no positive knowledge can be obtained from books, concerning the exact composition of plants. But whence come these wide discrepancies in the results of different investigators? Do they arise from imperfections in the modes of analysis, or from actual variations in the composition of the same species of plant when grown on different soils; or is it owing to the analyses being made at different periods of the growth of the plant? Doubtless all these causes have aided in producing the result alluded to. But the perfection to which chemical analysis is now carried should prevent the first from exerting any influence in future. That the composition of the same plant will vary to some extent, according to the composition of the soil on which it is grown, or that one alkali may be made to replace another in the living plant, within certain limits, is very probable. But how far this variation may be carried, and yet the plant be brought to full perfection, is a highly interesting question for investigation. That the quantity of ash or inorganic ingredients yielded by any given plant, at different periods of its growth, varies considerably we already possess some positive evidence. Thus De Saussure states that wheat straw, one month before flowering, yielded 7.9 per cent of ash; in flower, 5.4 per cent; and when ripe with grain, only 3.3 per cent; and maize or Indian corn presented a still greater variation. It is very possible that some of the discrepancies in the statements of different writers concerning the composition of the same plant, may be owing to this cause. And if so, it only proves the necessity of accompanying every analysis with a full statement of the age and condition of the plant analyzed; and also how easily valuable facts are rendered useless and contradictory by the omission of a single collateral circumstance. A well conducted series of experiments for determining both the questions here alluded to is demanded, as well by the practical bearing of the subject as by the interests of science. Single or isolated facts in agriculture, are only valuable when they are capable of being connected with other facts in such a manner as to furnish general conclusions or principles of action. Thus it is practically of no importance that we know the single fact, that the composition of plants will vary with the varying composition of the soil on which they grow, unless we know the nature of such variation, the extent to which it may be carried, and the degree of perfection to which the plant arrives, at each step in the progress of the variation. It is true that we may find scattered through the agricultural literature of the present day, many facts in regard to the composition of soils and vegetables, and many tables showing the results of analysis by able chemists. But it is equally true that we are still destitute of that careful, exact and connected series of experiments, in regard to all the varieties of soils and farm produce, in the varied conditions of the former and the different periods of growth of the latter, which the best interests of agriculture imperiously require. Neither can so desirable a result be gained by the labors of a single individual, or a single school of individuals. The very nature and extent of the inquiry requires a division of labor, and the investigations to be carried on in different localities, and under the direction of minds of various education. For such is the universal tendency of the human mind to see what it most desires to see, or in other words, to bend facts to the support of preconceived theories, that we are seldom if ever safe in drawing conclusions on any subject, until we have carefully compared the results of the labors of different investigators thereon.

These observations lead us again to the inquiry how our farmers and their sons are to gain all desirable information concerning the nature, composition and growth of the soils and vegetables which they cultivate? Something can be done for the latter, by the introduction of agriculture as a study into our academies and among the oldest classes in our district schools, and by the addition of agricultural books to our district school libraries. But it seemed to us that our state and county agricultural societies constitute the most direct and appropriate media, both for obtaining knowledge by well conducted experiments, and diffusing that knowledge through the whole community. That these societies have done, and are doing much to promote the interests of agriculture, there can be no doubt. But are they, to the full extent, fulfilling the object of their formation? In other words, are they doing as much as they might do, for the real advancement of agricultural science and practice? It is well known that the efforts of many of them are confined mostly to the getting up of an annual "Cattle Show and Fair," and the annual election of officers. These exhibitions have their utility; they bring farmers together to compare their products, and stimulate each other's ambition to excel, and should therefore be continued. But may not their utility be greatly increased by a little more attention? For instance, if every one who presents an animal or a specimen of farm produce for examination was required to present with it a written statement of the breed and manner of feeding in the first, and the kind and composition of the soil, mode of culture, manure used, &c., in the second, how much would the interest and value of these exhibitions be enhanced. And if all those accompanying articles on which premiums were bestowed, should be filed in the office of the secretary of the society, and published in the newspapers of the county, we should soon not only accumulate an invaluable store of facts, but the direct mental exercise thereby required would have the happiest effect in promoting a more thorough education throughout the farming community.

But let these things be as they may, there are three points that should receive the particular attention of every county society in the state, viz.: first, an exact knowledge of the origin and composition of the soil, and farm products growing therefrom, within their respective limits; second, a knowledge of the topography or particular situation of the county, as respects hills, valleys, moisture, dryness, marshes, streams, &c., &c.; and third, a knowledge of the insects and worms injurious to the vegetation, and the best means of destroying them. Every agricultural society in the country should have a standing committee on each of these subjects, which should be required to report in writing at each annual meeting; and, instead of bestowing all their funds in the form of premiums, each society should reserve a small amount to defray the necessary expenses of these committees. The first committee should always contain at least one good chemist, who should carefully analyze every unusual specimen of soil or unknown vegetable. The second should have the services of a good geologist;

and if their duties were faithfully performed, in pointing out the formation of different localities, the necessity and best mode of draining, &c., the knowledge thus obtained, taken in connection with that presented by the former committee, would lead to greater improvements in farming than all the cattle shows for half a century. Indeed we have seen money enough expended in injudicious ditching in a single year to defray the expenses of an investigating committee for three times that length of time. And still greater losses are sustained by wholly neglecting fields that ought to be drained. The third committee would be one of no less interest or importance. Insects and worms are annually attacking the crops and fruit trees of the farmer. And the injury they produce, often before their presence is known, or any remedy applied, is not unfrequently very great. As a sample of this we may mention the total destruction of the plum and cherry trees, in many orchards, during the last few years, by the plum weevil, or *rhynchenus neruphæ.* A vigilant committee in every county, to watch over and investigate every thing of this kind, would annually save the loss of thousands of dollars worth of property in the state. And yet the direct pecuniary gain derived from the labors of such committees would constitute but a small share of the benefits which would result to the farming community. The stimulus which they would give to intellectual pursuits and the cultivation of science, in connection with agriculture, would be of incalculable advantage. For agriculture, like every other human employment, can only be improved by improving the *minds* that control and practise it. I know it will be said that the proposed committees and investigations are impracticable, for the want of men in every county suitably qualified for the work. But the rule, that the supply is in proportion to the demand, is as applicable to men as to articles of trade. Let the agricultural community make the demand, and men of science will soon supply their wants. And not only so, but the example will no sooner be set, than we shall find the sons of our farmers as anxiously striving to qualify themselves for leading members of these investigating committees, and thereby becoming as proud of the position of scientific farmers, as they now are to leave the plow for the office of some lawyer or doctor. The truth is, there is a universal propensity in man which makes him desirous to exhibit his intellectual acquirements in some way. Hence it is, that the well educated young man almost uniformly desires to enter into some profession, rather than to engage in agriculture or the mechanic arts, although he may know that the labor required in the former will be twice as great, and the profits less than in the latter. Consequently, if we would ever confer the benefits of science on practical agriculture, our agricultural associations must not only exhibit bulls, sheep, corn, &c., but they must enter on a scientific examination of their work, and call for direct *intellectual* labor, and thereby take advantage of that principle of our nature to which we have alluded.

Binghamton, June 25th, 1846.

FERTILIZATION OF PLANTS.

BY PROF. J. DARBY.

The effect of the pollen on the pistil of the flower is called *fertilization* or *fecundation.* It is the end of a long series of arrangements so related as to aim at this express result. The structure of the flower seems in all its parts to be so adjusted as to ensure under given circumstances the contact of the pollen tubes with the embryo sac. It is in fact the great end of vegetation, the reproduction of individuals.

There is no topic in vegetable physiology of more interest to the phytologist, or of more importance to the agriculturist and gardener than fertilization. From the former it is receiving his best efforts, and from the latter it ought to receive sufficient attention to be understood in its relation to the influences that may aid or injure its operation, and to the condition in which it takes place, as in this function lie all the hopes of the agriculturist and all the interests of the cultivator of flowers. The gardener, it is true, has for a long time been acquainted with the practical operation of fertilization, as the splendid hybrids that adorn our gardens abundantly testify.

It is our intention to lay before the readers of the Journal, the present condition of science in relation to this subject. We shall state as concisely and clearly as possible, the views of the most eminent cultivators of this department of vegetable physiology, and give our own views where observation or experiment have enabled us to decide.

The subject of fertilization may be very appropriately discussed under three heads.

1st. The production and constitution of the pollen grains, or fertilizing powder.

2d. Its application to the stigma and means of contact with the embryo sac.

3d. The effect of the pollen on the ovules.

1st. The production of pollen from a mass undistinguishable from surrounding substance may very easily be traced. There is a period in the growth of a bud, when the calyx, corolla, stamens and pistils are in every essential respect exactly alike, and they differ in no respect from the buds. This of course is a very early stage of its development, yet they bear marks of embryo leaves. The peculiar hidden impulse or power which guides their future development has not yet been felt. The presiding agency that checks the elongation of internodes, that moulds the outer whorl into a rough and firm covering, that decks the adjacent circle with the gaudy colors of the rainbow, and forms the slender filament and knob-like anther, and fashions the receptacle of the future seeds in the centre is yet dormant. If we examine, by means of a good compound microscope, a bud at an early period of its development, we shall find the whorls of small bodies that are to become the future stamens, consisting of cellular tissue of the same kind as that which composes the other whorls. No indication of their future destination is at all to be discovered. If we watch the progressive development of the bud we shall very soon observe that the different whorls of organs are destined to different functions. If we keep our attention directed to the second whorl from the centre, in flowers where four regular whorls are developed, we shall observe the breaking up of the cellular tissue of the interior and forming cavities on each side of a middle line which continues unaffected. These cavities are filled with a fluid, or semi-fluid substance, which is to undergo reorganization and become developed into the peculiar organs that constitute an anther and its contents. A later examination will show us that a layer of small compact cells have been formed as a lining to the cavities, and that the cavities themselves are filled with large cells, much larger than the original cells which were broken up. These large cells are the generating cells of the pollen. At first they are filled with a semi-fluid substance which soon becomes turbid with minute grains, which associate in groups, forming granular nuclei. These nuclei increase in size and take on a membranous covering, and become pollen grains. As these enlarge the mother cells disappear, yielding their own bodies for the nourishment of their offspring. The perfection of the pollen grains requires not only the consumption of the mother cells, but much of the material that enters into the anther itself, bringing into operation one of those beautiful exhibitions of skill and design, which are so profusely scattered through every department of nature's works. The lobes of the anthers are covered by an epidermis like other parts of the plant, but beneath this epidermis is one or more layers of *fibro cellular* tissue, which extends over the interior of the lobes, with the exception of a line, usually running from the base to the summit of the anther, which is not covered by this tissue. The cells that compose this tissue are made up of an elastic fibre, enclosed and confined by a membrane. This membrane is absorbed to perfect the pollen grains, and it is the last portion of the anther absorbed, so that when the elastic fibres are freed from this confinement, the grains of pollen are perfect, and ready to enter upon the functions for which they were produced. As soon as the fibres are free, they exert their elasticity upon the walls of the anther, and by their combined action split the anther along the line of the cells, and expose the pollen to the action of external agents.

These pollen grains are the fine powder seen so abundantly in some flowers. Under the microscope they are seen to be, usually, of a spheroidal shape, and with a smooth surface; but from these characters there are numerous departures, assuming in different plants a great variety of form and surface. The contents of these grains is called *fovilla.* It is a fluid holding in suspension various kinds of molecules, one variety of which we need to notice. They are the largest bodies seen in the fovilla, and more or less cylindrical in form. They are recognized generally as the immediate agents of fecundation. They have by some been endowed with independent vitality, and have been said to exhibit, under particular circumstances, vital motions. But neither of these hypotheses is probably correct in the sense in which their authors apply it. With regard to their vitality as independent bodies, we know but little or nothing. But the motions they ex hibit are the result of physical, and not of vital forces.

The coat of the pollen grains consists of two membranes at least; the outer one unyielding without being ruptured, and comparatively firm, giving form and color to the grain. The inner one is very yielding, and will extend itself into tubes without any lesion. The grains are exceedingly hygrometrical. When placed on a moist surface, or in contact with water, they absorb moisture rapidly by endosmose action, and swell very much, and become nearly spherical, whatever their previous form might have been. The outer membrane gives way usually at the point in contact with the moist surface, and the inner membrane protrudes from the aperture in the form of a tube, which is filled with the contents of the grain. These are the *pollen tubes.*

2. The necessity of the contact of the pollen grains with the stigma, in order to the production of seeds, possessing vitality, is abundantly proved by experiment and observation, and may be most certainly inferred from the care which nature takes to bring about this contact in every case in which seeds are produced. The ancients seem to have had very imperfect notions with regard to the nature of the stamens and pistil, and of the functions they were destined to perform. We cannot consider the question of

the use of the pollen as settled much before the time of Linnæus. Tournefort denied the fertilizing power of the pollen, and considered the stamens simply as organs of excretion. Vaillant, in 1716, a pupil of Tournefort, demonstrated the necessity of the pollen in fertilization, and Linnæus, twenty years after, rendered the idea more universal, that the pollen was the fertilizing matter. For a century the generally received opinion was, that the stamens corresponded to the male organs of generation in animals, and the pistils to the female organs. This is the most prevalent idea at the present time, although it has met with many powerful opponents.

Schelver in 1812 advanced the singular idea that the falling of the pollen upon the stigma, so far from impregnating the ovule, only tended to hasten the decay of the surrounding parts, so that the whole force of the plant might be directed to the nourishment and perfection of the ovules already impregnated.

Turpin, in 1820, promulged the idea that the stamens were only rudimentary pistils, and the grains of pollen rudimentary ovules. These notions found few or no advocates, and they have already received their merited doom.

Were there any doubts remaining in the minds of botanists on the subject, a work published by Gāertner, in 1844, would entirely dissipate all lingering doubts. His numerous and well conducted experiments, set at rest this subject of so much interest. The contact of the pollen with the stigma or with the ovules, *must* take place.

The arrangements which nature makes for the accomplishment of this result, plainly show its necessity. In the great majority of cases the agents used to bring the pollen to the stigma are the wind, insects, and relative position. Linnæus remarked that those flowers in which the stamens were shorter than the pistil, were nodding, so that when the anther opened,-the pollen by its gravity would fall upon the stigma, and that those flowers were erect in which the stamens were the longest, so that by the operation of the same force the same end would be accomplished. In cases in which this simple arrangement could not avail, other circumstances are introduced to bring about these essential phenomena.

In the nettle tribe, *urticaceæ,* when the flower first expands, the filament is rolled inwards and the anther is near the centre and base of the flower, when all is perfected, the filament suddenly straightens itself, and the anther opens and a cloud of pollen is diffused in the air, to light upon the stigmas in the neighborhood. After the disengagement of the pollen, the stamen, as though exhausted by the effort, lies down flat in the bottom of the calyx.

In the recently expanded flower of the rue, *ruta graveoleus,* we observe eight or ten stamens lying horizontally in the bottom of the flower. Each stamen, one by one, and in an unvarying order, raises itself, and brings its anther against the stigma, disengaging at the same time its store of pollen. After it has thus paid its tribute, the stamen slowly returns to its former position, and soon withers away, having accomplished the end of its creation. Prof. Wydler, of Berne, has published a memoir on the physiological condition of this regular and curious arrangement of the rue.

Our kalmia affords an interesting object of observation in this respect. When the flower expands, the anthers find themselves engaged each in a little cavity in the bottom of the corolla. To extricate themselves would seem impossible, but the filament curves up, as we should curve up our arm if our hand was lying on a flat surface, and we wished to bring it nearer to us, and thus draws the anther from its confinement and raises it to the stigma. The above are the common and some of the particular modes adopted by nature to bring the pollen to the stigma.

The stigma is usually the summit of the style. It is a glutinous, moist surface, consisting of naked, spherical cells, there being no epidermis over this portion of the plant. When the pollen grains fall upon this surface, they are retained by the viscidity, and the moisture affords the means of producing the pollen tubes. These when emitted, which is usually from the under surface of the grain, penetrate the loose cellular tissue of the central portion of the style, and enter the cavity of the ovarium and the foramen of the ovule.

Some plants have appeared to offer exceptions to these general principles, and have presented difficult problems for solution to the phytologist. The order Asclepiadeæ presents examples of this kind. The pollen in this order is enclosed in sacs which do not dehisce, and which have the suture towards the stigma. How the pollen could act in a close bag, presented a question difficult of solution. This enigma remained unanswered till about 1830, when several observers noticed that the pollen emitted tubes, and that they passed through the suture of the pollen sac, and entered the stigma and passed to the ovarium, as in all other cases, thus adding another unanswerable argument in favor of the necessity of pollen in fertilization.

Besides cases in which arrangements to bring the pollen to act on the ovules, we might adduce many cases in which the ovules themselves were arranged in a peculiar manner, to facilitate the entrance of the tubes into the foramen, but what we have given is sufficient to show the importance nature attaches to the accomplishment of this object, and she permits no obstacle to defeat her design.

Although it is very generally admitted that the pollen is essential to fertilization, it is not as generally admitted that it acts by impregnating an ovule existing in the ovarium. The German physiologists generally advocate a different theory. Schleiden of Berlin, Endleicher of Vienna, and Unger of Gratz, are the principal supporters of the new theory, who agree in the main points, but differ in some of the details.

Endleicher says: " The pistil of the plant is not an organ that can be compared to the female sexual organs of animals; it neither furnishes the germ or embryo destined to the propagation of the species. It is simply an organ in which the embryo germ is borne, to develop itself and come to maturity. *The embryo is the* extremity of the pollen tube, which after having traversed the cellular mass between the stigma and placenta, penetrates into the cavity of the ovule by the mycropyle and arrives at the summit of the nucleus. It traverses the tissue of the nucleus, following the intercellular passages, and attains the summit of the embryo sac. It pushes before it this part of the sac, which, in yielding to the pressure forms a cavity in which the extremity of the tube is buried. The part of the pollen tube buried in the embryo sac passes successively through all the degrees of organization to that which constitutes the embryo."

This is the outline of the German theory, given in the words of its founder, as nearly as a translation can do it. It will be seen that by this theory the stamen is alone the organ of reproduction, and the pistil only acts as a kind of nurse to protect and nourish the embryo committed to its care. Endleicher modifies the above, by supposing the fluid substance of the stigma to fecundate the pollen and make the pollen tubes penetrate to the ovary. Unger thinks the pollen grains are fecundated before their emission from the anthers.

In France, England, and the United States, these views have been but badly received, and we believe the Linnæan notions of fecundation almost universally prevail out of the German states. It would be impossible to give within any moderate limits the reasons for these various opinions, and considering the purposes for which this article was written, not desirable.

Whichever theory we may adopt, we should not be led to infer that the quantity of pollen could exert any influence over fecundation; that is, we do not see why one pollen tube might not as effectually impregnate one ovule as though all the neighboring ones were subjected to the same influence. But this does not seem to be the case in some plants, at least. Kōelreuter says that fifty to sixty grains of pollen are necessary to fecundate the thirty grains of the *hibiscus trioneus*, and that no fewer will do it. Gāertner has made experiments on this subject, which seem to lead to the same result. He experimented on the *malva mauritiana*, the purple, ivy-leaved mallows, of the gardens. There are ten stigmas, and a single grain of pollen on each produced no effect. The flower fell off without any impregnation. Two grains on each stigma, or twenty to each flower, produced no effect. Thirty seemed to stimulate the organs, as the calyx remained on, persistent, but no grains or seeds were produced. Forty to each flower produced grains, but they were very small, yet perfect. They germinated and produced the characteristic flowers of the species, from which the pollen was derived, which was different from the species to which it was applied.

It would seem that a portion of the pollen was expended in some other way than in the direct act of fertilization. Perhaps the singular phenomenon of the elevation of temperature during impregnation, may be in some manner dependent on the action of the pollen. Although this phenomenon is not proved in all cases, and in fact in comparatively very few, yet it would seem to be probable that the imperfection of the instruments might be the cause. The thermo-electric needles of M. Bicefuerel have operated very satisfactorily in the hands of Schultz, Broghniart, and Dutrochet; and we may hope that by some such means this elevation of temperature during fertilization may be proved to be a universal fact.

Experiments on the subject are very liable to be vitiated by the unnatural circumstances under which the subject for experiment is placed. In experimenting on the tomato in relation to its fecundation, during the winter and early spring, the plants were of course grown within doors. They grew vigorously and bloomed abundantly, but fertilization did not take place at all. The pollen was abundant on the stigma, but no pollen tubes were emitted, and of course the flowers decayed, turned yellow, and fell off. We suspected the cause of failure, and after allowing the plants to bloom and cast their fleece till they could be removed into the open air, they were put out, and every flower that opened after such exposure on examination was found to contain pollen that emitted tubes, and then undisturbed produced fruit and seeds. In this case the atmosphere in which they grew was too dry, and the stigma did not yield moisture enough to burst the pollen grains, as they would burst readily-on a wet surface, under the microscope. Similar causes of failure may be frequent, and we may be assured that unless the natural conditions of the plant are supplied, it is in vain to expect perfection in vegetation.

3. The effect of the action of the pollen on the embryo is im-

mediate and decided. The whole flower shows at once that fecundation has taken place. Some parts wither very rapidly, while others increase and expand with uncommon vigor. The calyx is sometimes adherent with the ovary when it increases and grows with it. The corolla soon fades and withers. The stamens, style and stigma, having accomplished the end of their existence, wither away. The ovarium, containing the impregnated ovules, becomes the centre of all the vital energies of the plant, to perfect the seeds committed to its care. In many plants we see them laboring for a long period to provide food for the perfection of the seed. The common beet spends the first year of its existence in providing food for the perfection of its seeds of the next, and so of many other plants.

WATER, ITS PROPERTIES AND USES.

Water is a compound of two gases, oxygen and hydrogen. Although existing when pure, only in the form of gases, yet in nature they are never found pure, and consequently never in this form. They are always either combined with each other in the form of water or with some other substance. In water they always are united in the proportion by weight of eight parts of oxygen to one of hydrogen, or by volume, one of oxygen to two of hydrogen.

Nearly three-quarters of the surface of our globe is water. The vast oceans that surround and separate the two great continents, are themselves equal to about two-thirds of that surface. But the large inland lakes and seas with the numberless lakes and rivers that intersect the land in all directions greatly increase the amount. From this great quantity we should naturally be led to expect corresponding uses. These are indeed great and various, and, in agriculture alone, quite indispensable.

The uses of water are two-fold—chemical and mechanical.

1. Chemical. From the well known composition of plants—about 90 per cent being carbon, oxygen and hydrogen—it will

be perceived at once that water is capable of affording two highly essentive elements of the vegetable system. We find in fact more than one-half the weight of all vegetables, when freshly gathered, is attributable to this fluid. Whether it is all actually existing in the plant as simple water may be questioned, but the two gases are there and in precisely the proper proportions to form it. Thus starch, gum, woody fibre, sugar, &c., all proximate principles of vegetable matter, may be regarded as compounds of carbon and water, for they consist of carbon united to oxygen and hydrogen in just the atomic proportions to form water.

During combustion of vegetable matter, a certain variable portion of the bulk escapes as water. This may be seen by holding a glass vessel as a tumbler, perfectly dry, over a fire or burning lamp or candle. The fluid will immediately be seen collecting upon the inside of the vessel.

Now it is admitted that the water in these instances may be generated by the process of combustion, by the direct union of the gases. The hydrogen was there, and being burned in the atmosphere which contains oxygen would be converted into water, even if none of this latter gas were existing in the plant. But it must not be forgotten that there was a quantity of oxygen just sufficient, with the hydrogen, to form the same amount of water, and we are only able to account, rationally, for the disposal of this, by supposing it to be united with the hydrogen, and being already in the form of water in the plant before it is burned.

A trifling experiment will seem to demonstrate this to be the fact. If a small stick of wood is subjected to the action of sulphuric acid, the water is separated, by its action, from the woody fibre, and charcoal is the residue. This result is owing to the powerful affinity existing between this acid and water.

It is not then certain that the water, which growing plants absorb and appropriate, is changed in any respect, in entering into the composition of the body of the vegetable, but may be still the same, though having but its former sensible properties and its fluid form by union with a third body—carbon—and we may safely consider those proximate vegetable substances, which consist of carbon and the elements of water, as actually compounds of carbon and water.

Water is then a highly essential part of the vegetable economy, and enters largely into the composition of plants. Its chemical relations are however far more extensive than we have thus far seen. Almost every change which takes place in the soil or in the plant in preparing food or appropriating it to these purposes of nourishment, are more or less dependant upon this fluid. Indeed without this, or some other substance capable of supplying its place, all solid matter must remain almost unchanged and inactive. It is to its solvent power that the vast and varied changes constantly taking place around us and within us are owing. Let us examine for a few moments this power.

Water is capable of absorbing gases and many solids. Our readers need not be informed, in this age of scientific knowledge, that the food of plants is mostly derived from the air and earth in a liquid form, and that that portion which the roots absorb from the earth is necessarily liquid. The leaves *may* imbibe gases, as such—the roots cannot. Here water is absolutely necessary to render them available as food. The power of absorbing different gases varies much. Thus water will absorb more than its own bulk of carbonic acid, and more than six hundred times its bulk of ammonia, and is thus capable of supplying a large amount of food to growing vegetables. In the form of rain descending from the clouds it absorbs the gases which have mingled with the atmosphere, and carries them down to the roots of plants. In this manner it purifies the air for our use, while it affords nourishment to the vegetable world.

It is not in the form of water alone that it is capable of absorbing these gases, but it is found that in the form of ice and snow it absorbs them with astonishing rapidity. A certain quantity of ammonia is generally found in freshly fallen snow. This fact was first noticed by Liebig, and has since been confirmed by numbers of others. The quantity will of course vary with the amount of that gas in the atmosphere at the time of the falling of the snow. The portions of snow which fall first through the air, will of course absorb the most of the ammonia, and consequently it is found that those portions also nearest the ground contain the most. The stimulating properties of this gas as food for plants, are well known, and if the idea be true, which is a very common one among farmers, that grain grows under snow, it may be owing to the presence of this gas, carried down to the roots by the first snow that melts, and absorbed by them. Other gases are also absorbed by snow.

It will not be out of place here, to notice some other effects of ice and snow upon vegetation, and the soil. Snow forms a covering for the grain fields of the farmer, of a kind which is almost if not entirely a non-conductor of heat. Thus the temperature of the surface of the earth is maintained in a uniform condition, and the delicate texture of young plants is not exposed to the sudden and fatal mutations of temperature which destroy them if unprotected. This is owing to the non-conducting properties of the snow as well as to the fact that it is light and porous, and contains air, which is also a body almost incapable of conducting heat.

Plants in the temperate zone are not liable to be destroyed by mere intensity of cold. The cause of their being winter killed, is their being exposed to great changes of temperature, by which the fluids of the vessels are suddenly expanded and burst. If a plant is frozen and then thawed out by the application of cold water, there is no danger of destroying its life. In this way plants which lie all winter under a mantle of snow, are safely thawed by the gradual melting of the snow, before they become exposed to the warm rays of the sun. But in winters, during which little or no snow falls, vegetation is constantly affected by the warmth of the sun, and again exposed to the intense cold of the winter night. These changes of temperature destroy them.

Water possesses a peculiar property, during the process of freezing, which is of great use in agriculture. Unlike other bodies, it does not follow the law of contracting by decrease of temperature. It observes the law till it sinks to the temperature of

40 deg. Fahr., when it begins to expand, and continues to do so till it is frozen. We do not stop now to inquire the cause. We would only refer to the practical use of this fact. And this is principally in the renovation and reproduction of soils and the reducing of rocks to a fine state preparatory to their being converted into soil. The pores of the earth, baked and packed by the heat of a summer sun, become in autumn replenished with water, which freezes, and by its expansion breaks up the soil, and renders it porous and fine. All the parts are separate from each other, and being finely divided are reduced to a condition for the more ready control of the chemical affinities which are to reduce them to the state of a fertile soil.

The crevices of rocks are permeated by water, and its smallest openings absorb that fluid, which freezes and cracks them, and breaks down the solid material into small fragments, or even into a fine powder, reducing it at once to almost the condition of a soil. This is the result of the simple mechanical action of water during the process of freezing. Its agency does not end here. No chemical change, with very few exceptions, can take place without the presence of water. It brings the materials into a fluid state, the state most favorable for the action of chemical affinities. It is largely composed of oxygen, a substance whose affinities have an almost infinite range, and by these two attributes it is enabled to reduce the rocks from which soils are formed into the elements of vegetable food; but its offices extend still farther. By the growth of vegetables in the soil, these elements are exhausted, and here water again is of use to restore the action which is to renew fertility and restore productiveness. In relation to manures the case is the same. Buried in the soil, and unwet by this fluid, they might lie for ages unchanged. It is by the decomposition brought about by the agency of water, that they are rendered available as nutriment to growing plants. So that, whether as the medium through which the food is conveyed to the roots of vegetables, or as the origin of those changes which prepare the food, water is an indispensable agent.

The effects of water in its different states, upon the temperature of the earth and atmosphere, is a matter of considerable importance to the agriculturist. It is a law well understood, that by evaporation of water, cold is produced, or rather heat is abstracted from other bodies in the vicinity. It is owing to this principle that many soils are called *cold*, and these are the soils which consist largely of clay, and retain the water which falls upon them, giving it off to the atmosphere by a gradual process of evaporation. The soil which is dry is in a condition to absorb the genial rays of the sun, and become warmed for the proper growth of vegetation, whilst in wet soils the sun's heat is all absorbed by the water, and is expended in converting that water into vapor, with which it ascends into the air. There may be no other difference in the two soils of neighboring fields than this, and one will produce nothing but moss, and coarse grass, and weeds, whilst the other will be highly fertile. From the presence of too much water, the temperature of the one is kept so low that decomposition of the materials of food does not take place, and if it does, there is not heat enough to sustain the vital energies of the plant.

This cause is the origin of the immense bodies of peat which occupy the low grounds of so large a portion of this country. Carried with water whilst the vegetable matter is collecting, the cavity becomes gradually filled with a soaked and spongy mass which soon becomes dry, but only undergoes a partial rotting under the water. Such places, although the surface may be dry a portion of the summer, can never be made productive as long as they remain wet.

Here then, a practical rule suggests itself, and which has been worth more to the agricultural interests of some entire nations, than all the other aids that science has offered. We refer to draining; not to the old-fashioned ditching which was once called draining, but to the thorough drying of the soil, by thorough draining, which has been practised in Britain to the almost entire renovation of agriculture there. Thousands of acres which before were considered as good for nothing, have been reclaimed and made among the most productive lands of that kingdom.

What would be thought in this country of a man who would buy a farm of 130 acres, and have immediately dug on it eighty or ninety miles of drains? And yet such is not by any means a solitary fact in England.

This process may not be as extensively necessary in this country as in Great Britain, and yet there is no soil which is not improved by making it of such mechanical condition as to readily discharge any superfluous water which may otherwise stagnate upon it. This is perfectly consistent likewise, with the doctrine of irrigation, where the water from running streams is made to flow over the land and saturate it. If the soil in this case be not perfectly permeable to the water, so that it may readily pass through, more injury than good will be the consequence. The intention in irrigating land is to flow it with water holding in solution salts and gases, and decomposed matter of organic origin, part of which substances will be deposited in the soil. All water of creeks or rivers or springs, is charged with the soluble substances of the soil and rocks over which it passes, and the gases of the earth and air. These are all conveyed directly to the roots and into the circulation of plants.

Another effect of water in regulating the temperature of the air, may be found in those countries which lie contiguous to large bodies of water. Maritime countries—islands of the sea—indeed all lands near large waters, have always a milder climate than more remote ones. The fact is well known that the banks of our large rivers for some distance interior, are protected from early frosts by the heat given out by water during the process of freezing.

A fact may be mentioned here of some little singularity, and depending upon this cause. In the fall of the year, at evening, when the ground freezes for the first few times, it will be found that a thermometer suspended a few feet above the earth's surface will indicate a degree of heat from 1° to 3° above the freezing point, so rapidly is heat given out by freezing water.

The atmosphere is always charged with the vapor of water, and thus aids vegetable life and serves important purposes in the economy of plants. Some have thought that they required water only to live and thrive. This, however, is not so. And yet without it, the hopes of the husbandman would fail. It is the great agent in supplying plants with food, and as we have seen is itself a large constituent of all vegetable matter.

AMOUNT OF RAIN IN WILLIAMSTOWN, MASS., IN 1845.

You have, once or twice, requested some statistics, relative to the amount of water which annually falls here. It is not until rather recently that I have obtained results altogether satisfactory, taking the whole year together. During the warm months the depth of rain can be easily estimated; but in the winter, or whenever the moisture falls in the form of hail or snow, the precise quantity can not be ascertained so easily. My present method, and one which appears to answer the purpose very well, is to bring the water into a green-house attached to my study. A single pane of glass is taken from the roof, and a tunnel inserted. The lower surface of this, being constantly exposed to the warm air of the room, melts the snow and sleet, as they fall. In this way the difficulty above referred to is obviated. I have measured the quantity which has fallen in a graduated tube. I should a little prefer to let the water fall into a vessel attached to one arm of a balance, and thus find its weight. At present, however, I adopt the other method. I will now give a *comparative* view of the quantity of water which fell here during the year 1845.

January, - - - -	80 inches.	July, - - - - - -	136 inches.
February, - - -	63 "	August, - - -	93 "
March, - - - - -	72 "	September, -	122 "
April, - - - - - -	49 "	October, - - -	57 "
May, - - - - - - -	62 "	November, -	92 "
June, - - - - - - -	49 "	December, -	75 "

The largest quantity, at any one time, was on the evening of the 18th of September: comparative number, 44, nearly as much as during some of the months. This fell in the course of an hour or two, accompanied with sharp lightning.

It will be seen, from the table, that the spring months were comparatively dry. The month of June also turning out dry, vegetation began to suffer after the middle of that month. This was relieved, here, by heavy rains early in July; but south of us, through Berkshire, at least the southern towns, the drouth was excessive. Springs and wells were dry which have not failed for thirty years.

I will now give the perpendicular depth which fell during the year, 37.489 inches.

These facts are at your disposal, and if at any future time you wish for similar statements I shall probably be able to furnish them, and shall be happy to do so.

Yours respectfully.

A. HOPKINS.

William's College, July, 1846.

NEW PUBLICATIONS.

AGRICULTURAL STATISTICS.

Abstract of the Returns of the Massachusetts Agricultural Societies: pp. 198, 8vo.

Statistics of the Condition and Prospects of certain branches of Industry in Massachusetts, for the year ending April 1, 1845: pp. 391, 8vo.

The volumes the titles of which we have copied above, are the first of a series of volumes whose publication has been authorized by acts of the legislature. The first volume contains or is made up of abstracts of the doings of the state and county agricultural societies, and embraces a variety, as well as a great amount, of useful information on husbandry in general. The object of the law requiring the publication of matters of this kind is highly important and useful, as it is only by this mode that practical information on the best modes pursued by the profession, or in the respective branches of husbandry can become at all widely disseminated.

Both publications were prepared by the Hon. J. G. Palfrey, Secretary of the Commonwealth. We propose enriching our columns with extracts from these works.

The most complete report is that of the Essex County Agricultural Society. The first committee's report relates to the economy of plowing with double teams, in which they give it as their opinion that those plows are the best which lay the furrow slice flat and even, especially where the ground is to be laid down to grass. The plowman should not attempt to cut a furrow slice wider than the plow was intended to cut.

Another committee recommends plowing with a single yoke of oxen, and to cut a furrow less deep, and if advisable to increase the depth to employ a second pair of cattle before a subsoil plow. A single pair of cattle with one man can plow one acre of land in four hours, or two acres in one day. The premiums for plowing are limited by the Worcester County Society to single teams, without a driver.

Subsoil plowing is finding favor with the societies, and it is considered that Howard's plow, with a double wing, is an improvement, as it gives steadiness without increasing materially the draft.

The premiums which were awarded for dairy cows belonged to the native breed. The following is a statement of the produce of the cow receiving the first premium of the society. She belonged to Henry Cressy, of Salem, and was six years old. She calved the 21st of May, and gave milk as follows:

From 21st of May to 21st of June,- - - -	1,469lbs.	4oz.
21st of June to 21st of July,- - - -	1,264	0
21st of July to 21st of August,- - -	1,127	8
21st of August to 21st of Sept.,- -	956	8
Total,- - - - - - - - - -	4,817lbs.	4oz.

It required 19 pounds of this cow's milk to make 1 pound of butter. She was kept mostly on grass, but received during seven weeks two quarts of shorts per day.

The second premium was awarded to Warner Averill, of Ipswich. This cow was six years old, and gave on an average through 4 months, 35 pounds of milk per day. After she calved she received two quarts of meal per day for about six weeks. During September she received one quart of rye meal every night.

A seven year old cow belonging to William Williams also received a premium. She calved Feb. 6, 1845. This calf was sold to the butcher for ten dollars when six weeks and three days old. After the calf was taken from her she gave from 14 to 15 quarts of milk per day for about four months. In September she gave 8 quarts per day. The first two weeks after she calved she gave 10 quarts per day more than the calf could suck.

On the Dairy.

Butter exhibited for premiums was in pound lumps, in tin cases or boxes, so constructed that the whole was kept cool by lumps of ice in the centre box.

The process for making the first premium butter was as follows:

The milk was strained into tin pans, in which it stood from 36 to 38 hours. It was then skimmed, and the cream was then put into tin pails, standing on the bottom of the cellar. A little salt was put into the pails before the cream, and stirred when cream was added. It was the practice to churn twice a week. The buttermilk is worked out by hand, without the addition of water. The buttermilk being thoroughly worked out, the butter is immediately salted with 1 oz. of ground rock salt to the pound, and after 24 hours is reworked, packed in layers of five pounds each, and salt sprinkled between them.

The second premium butter—the process pursued was to strain the milk into tin pans, and place it in a cool stone cellar, where it stood from 36 to 48 hours, when it was skimmed and the cream put into stone pots. Churn twice a week. When churned, the buttermilk is drawn off, and the butter washed twice with cold water. A mixture of rock salt and sugar is used in the proportion of one-fourth pound sugar and three-fourths pound salt, and one ounce of the mixture used for every pound of butter. After 24 hours the butter was reworked, and weighed in pound balls. The tin marketing boxes have ice coolers in the centre.

The third premium butter was made as follows: The milk strained into tin pans and placed in a cool cellar. Previous to churning it is lowered into the well and cooled. It is then churned, after the churn is soaked over night in cold water. The Randall cylinder churn is recommended. Churning once a week. Buttermilk removed wholly by the hands, and is never rinsed with cold water. The next day it is worked into pound lumps for market. It is salted with about three-fourths ounce salt to the pound, to which is added some sugar and saltpetre.

The fourth premium butter was made as follows: The milk was strained into pans in which it stands from 24 to 36 hours in a cellar; the cream is kept in tin pails; churning performed once in four days in the early part of the season, and once a week in the latter part. The cream is strained through a cloth into the churn. The time required for churning averages only seven minutes. The butter is put into an earthen pan and water added and repeated till the buttermilk is thoroughly rinsed from the butter, or until it returns colorless. The butter is then worked over. Then it is put into an earthen pan and salted with one ounce of salt to a pound of butter. It is afterwards worked over again, piece by piece, and made into balls and put into the cellar till sent to market. One cow made from 20th day of May to the 20th day of September, 211 pounds and two ounces butter.

The fifth premium butter was made much as above. Water was employed in forcing the butter from the buttermilk. It was salted with one ounce of salt and one-fourth ounce of loaf sugar to the pound.

The Essex society awarded one premium on bog or swamp land, which had been reclaimed. In connection with this award the committee make the following important suggestions, and recommend the employment of a competent person to make a survey of bog and swamp lands with the view to the best mode of reclaiming them. They say that some meadows are flooded with springs from the neighboring high lands, others from springs coming up from beneath; some are simple basins with hard, impervious bottoms, and others still are combinations of the above, and hence considering the variety of causes which combine in producing swamp land, they recommend that these lands in the county should be surveyed by a competent person who may discover the best and cheapest means of meeting any particular case.

We find a statement of the cost of clearing an acre of swamp, which may be of some value to some of our readers. One acre partly covered with stunted bushes was cleared by the proprietor, afterwards the stumps and hassocks and leveling was performed by contract for $20.00. It was afterward covered with loamy gravel to the depth of one inch, requiring five days' work of two men and a boy and two yoke of oxen. This work was done in the winter when the snow was two feet deep. A light dressing of manure was then added, and sowed to grass April 15. The crop of grass the first year was only one and a half tons. The second year it was three tons of prime quality.

Premium on Fruit Trees in the Nursery.

This was awarded to Joshua H. Ordways, of West Newbury. The following statement contains a valuable account of the mode pursued by him in planting and rearing his nursery. The soil is a hard gravel and slate, sub-soil clay. This was plowed in the autumn eight inches deep, after corn, and two loads of fine barn-yard manure on the surface and harrowed smooth. Then drilled three feet apart, into which was scattered pumice. The seed came up well and were hoed several times, during which the unhealthy saplings were removed. At two years old they were transplanted (first cutting off the tap root) in rows four feet apart and ten inches from each other. Those of the same size and vigor were set together, or in the same nursery. In August they were budded after the T mode on the south side of the tree, for reasons obvious to any one.

It is recommended in manuring nurseries that it be spread upon the surface, and not plowed in. Compost is preferred of hog or barn-yard manure and muck or turf. The manuring may be required once in three years. Does not recommend much pruning, and transplants trees early in the spring.

Accompanying the transactions of the Essex agricultural society, is a statement of the mode of composing a compost heap, by David Wood, of Newbury.

46 loads of strong manure, principally from the hog yard.

71 do. salt meadow sods.

8 do. loam, top soil, from the road side.

5 do. lime and hair from the tan pits.

6 do. decayed chips from a ship yard.

2 do. anthracite coal ashes.

15 do. potato vines.

2 do. refuse sizing.

2 do. carcases of dead horses.

2 hogsheads of urine.

10 do. of soap-boiler's ley. The whole forms 150 loads of well-rotted matter, which has been made at an expense of $50. [Any thing organic may be used in the compost heap.]

Another mode of manufacturing manure is given in the Middlesex county society's transactions, by Augustus Tuttle, of Concord. From 50 to 100 loads of peat are thrown into the lane leading from the barn-yard to the pasture, and over which the cows pass. This, when pulverized by their treading, is taken into the cellar of the barn, when it is mixed with the droppings and urine of the stock. Ashes and lime, as well as fresh mud, are also added at times.

Worcester Society.

A premium is awarded to Moses Gill, of Princeton, for the best native bull calf of six months, and weighing 600 pounds. He has had only his mother's milk, and she has been fed on grass.

Butter.—The committee recommend strongly to the farmers due attention to the choice of cows, frequent change of pasture, sufficient salt for the stock, pure water—kind treatment—systematic milking and speedy straining of the milk after the milking, &c. Premiums on carrots were awarded to Orrin Fairchild and D. Waldo Lincoln. Mr. Wheeler grew carrots successfully on a piece of land for three years, which is an unusual course—yielding the first year 361 bushels, at a cost of $78.75. The second, 710 bushels, at a cost of $85.25, with the nett profit of $92.25. The third year, 736 bushels, at the cost of $135.00, valued at 25 cents per bushel.

Mr. D. Waldo Lincoln raised at the rate of 710 bushels of carrots to the acre, weighing 56 pounds, at the cost of $28.75, on one-fourth of an acre. Mr. Fairbanks grew on 68½ rods 181 bushels, of 56 pounds, at a cost of $19.48, valued at $50.68, leaving a profit of $31.20.

Hampshire, Hampden and Franklin Agricultural Society.

The committee on stock, eulogizes the ox for his usefulness to the New England Farmer, and gives him a preference over the horse. The first premium bull was a full blooded Durham, three years old, and weighed 2010 pounds.

The Hampden agricultural society gave four premiums on milch cows: the first to G. W. Sizer, who stated that during seven days in June, his cow gave 426 pounds of milk, averaging 61 pounds per day; greatest quantity $66\frac{3}{4}$ pounds: keeping, hay and grass, with one quart of bran per day. (Not informed what breed she is of.) Carlton Thayer's cow winning the second premium, gave 63 pounds per day from the 10th to the 20th of June, and 45 pounds from the 10th to the 20th of September. Josiah Brownell won the third premium. His cow produced 60 pounds from May to the 20th June, and 40 pounds from the 20th August to the 20th September. Keeping hay and grass alone. Miner Hitchcock's cow produced 55 pounds of milk per day on grass alone during the month of June, and $17\frac{1}{4}$ pounds of butter from 10th to the 21st September. Other excellent cows were exhibited, one of which belonged to Dr. W. H. Cleveland, of Springfield, and which furnished milk which sold in sixteen months, amounted to $234.55.

Another receipt for compost, and cost—135 bushels of leached

ashes, 62 cents per load,- -	$6 25
40 loads shell lime,- -	8 00
10 loads of peat,- -	6 25
$1\frac{1}{4}$ cords of chip dirt,- - - - - - - - - - - - - - - - - - -	2 50
6 hogsheads of refuse liquor from paper-mill,- -	3 00
38 loads cost- -	$33 25

For making poudrette, the gentleman says, take a hogshead or barrel with dry peat and add old fish brine and unleached ashes, and saturate with human urine. It is considered the best and cheapest manure which is ever used, being adapted to every kind of soil.

Berkshire Agricultural Society.

The Berkshire Agricultural Society held its fair on the 1st and 2d days of October in 1845. The first day is devoted to the exhibition of animals, domestic manufactures and agricultural implements. The plowing match came off on the morning of the 2d; after which the address was delivered, by the Hon. Asahel Foote of Williamstown, the president of the society.

Agricultural products.—There is a growing spirit to cultivate wheat; and it is the opinion of the committee that it may be cultivated with success. Seven pieces of winter wheat were entered for premium which were apparently as good, in berry and yield, as the same crop at the west. The secret of success is considered by the committee to consist in sowing upon a warm quick soil; summer plowing; fall cross plowing; early sowing, and to seed heavy, using two bushels of seed to the acre. The same plan to be followed mainly in the cultivation of spring wheat. Mr. Millard, of Egremont, received the first premium for winter wheat. The piece was five acres, and was judged would yield 30 bushels to the acre. It was well filled, clean and of a heavy growth. It was summer plowed, cross plowed in the fall; had a light top dressing, with fine manure; sowed in September, with two bushels of seed to the acre. Five crops of meslins were offered. These were considered valuable bread stuffs. Many consider barley a valuable crop for provender, and the best for stocking land. Five pieces were viewed, which would yield from 40 to 60 bushels to the acre. Twenty-eight pieces of corn and fourteen of potatoes were offered for premium. The committee were particular in observing how many hills to the rod, and the quantity each rod produced. Abstract below: the opinion expressed is that about 34 or 36 hills is the right number.

Table of potatoes.

Cases.	No. of hills.	Bushels.	Quarts.
	36	2	00
	35	1	08
	50	3	00
	29	1	07
	44	2	00
	40	2	16
	44	2	24

Table of corn.

Cases.	No. of hills.	Bushels.	Quarts.
	32	1	06
	31	1	09
	40	1	01
	50	1	06
	45	1	10
	24	1	06
	30	1	16

Cases.	No. of hills.	Bushels.	Quarts.	Cases.	No. of hills.	Bushels.	Quarts.
	44	3	06		31	1	08
	36	2	08		29	1	14
	44	2	03		37	1	17
					30	1	15
					25	0	29
					36	1	12
					33	1	12
					35	1	16
					42	1	17
					42	1	18
					31	1	22
					38	1	17
					36	1	19

The cost of reclaiming a swamp, wet land, covered with bogs, stump and hard hacks, was as follows:

For 22 rods of underdrain ditch,-----------	$8 80
Cutting brush and burning,---------------	12 00
Plowing and harrowing,-----------------	5 36
	$26 16
By ashes obtained,---------------------	11 00
Cost.----------------------------------	$15 16

The land, which was valueless before, is now considered to be worth $75 per acre. Another swamp was cleared at an expense of $40 per acre, and is now worth $100.

Herd's Grass Seed.—On this the committee remark justly, that every farmer should raise or save his own grass seed, as much as his oats. Thorough and liberal stocking is recommended strongly.

Plowing Match.—The plowmen are required to plow quarter of an acre, in 50 minutes. Work well done is encouraged and rewarded rather than speed. An ox team once plowed a quarter of an acre in 25 minutes. The rule is that the furrow slice should be five inches deep, and not over eleven inches wide. Deeper plowing is recommended. The time varied from 40 to 50 minutes.

Plymouth Agricultural Society.

This society offered premiums for the most extensive forest trees of any kind suitable for timber. These were claimable in 1845. Two claims were entered, and two were awarded, the first to Hon. Morrill Allen of Pembroke, and the second to Mr. Pardon Keith of West Bridgewater. Remarkable success seems to have attended the efforts to cultivate forest trees, inasmuch as the soil was perfectly worn out, and almost worthless. The growth has been rapid. The result of both experiments is such as to demonstrate that all the sandy plains and barren fields may be sown with the seed from forest trees, the white birch, white and yellow pine, locust and white oak, all have succeeded. Seed may be sown in the fall, and left upon the top of the soil. It is said young pines are injured by pruning the living branches.

The committee on produce awarded a premium of $15 to B. Hobart, of Abingdon, for the best field of winter wheat. Produce 22 bushels to the acre. Land was well prepared, but the committee express some doubts as to the profitableness of the crop, except in rich lands. A premium was awarded to Daniel Alden, of Middleborough, of $8, for oats. The yield as given under oath, was 71 bushels!! to the acre. Soaked the oats 24 hours in water and then rolled them in ashes. Two bushels and three pecks were sown to the acre and forty-seven rods; less seed than farmers generally use.

Three premiums were awarded on corn. The produce of the first, weighed 59¾ lbs. to the square rod; of the second, 55¾ lbs.; of the third, 48½ lbs. to the square rod. The potato crop which received the first premium, equalled 320 bushels to the acre.

Statement of Joseph Kingman of the mode and cost of reclaiming a quantity of swamp land, on which the soil or muck was from six to fifteen inches deep, resting on a hard pan of gravel clay. The field was stony.

Digging out the stones and removing them, - - -	$25 00
Sixty-five rods ditching, - - - - - - - - - - - - - - - - - -	12 00
100 loads sand, and spreading, - - - - - - - - - - - - -	12 00
25 " compost, -	13 00
Grass seed, -	1 50
Sowing and bushing, -	1 00
	$64 50

The pieces contained one acre and nineteen rods; cost per acre, $56.90.

Statement of Henry Alden on Salt as a Manure.

Mixed April, 1843, two small loads of barn manure, with the same quantity of peat and one bushel of coarse salt. Another heap mixed without the salt. These heaps were put on to two pieces of land of 20 rods each, planted with corn and potatoes the 18th of May. The corn failed and did not come up well. The salted potatoes were dug in October, and weighed, making 14 bushels and 5 pounds. Those not salted amounted to 12 bushels and 56 pounds. The next ground which was salted broad cast, produced 2 bushels and 3 pecks on salted ground. On the same on unsalted, but the oats were 4 pounds heavier to the bushel.

Where grass land had been salted, the hay weighed, - -	156 lbs.
Unsalted, -	133 "

Statement of Paul Hathaway on the Cost of Subduing a Foul Pasture abounding in bushes and stones.

12 days work with 5 yoke of oxen, - - - - -	$22 00
8 days labor and 1 yoke, - - - - - - - - - - - - - -	12 00
Cost the first year, - - - - - - - - - - - - - - - - - - -	$34 00
Labor the second year, - - - - - - - - - - - - - - -	37 00
The whole cost of subduing 2 acres, 3 quarters, 8 rods, -	$71 00

Statement of Leonard Hill on his Corn Crop of one acre.

Plowed May, 1845, eight inches deep; spread 3½ cords of good stable manure, and plowed it in; then furrowed it, three feet apart;

in the furrows put two cords of the same kind of manure, and then planted in hills twenty inches apart, three or four kernels of the large white smutty corn, on the 13—15th May; June 10th hoed, and 20th second time; topped the stalks, middle of September, as it did not stand up well. Expense:

Plowing,	$2 75
5½ cords manure,	22 00
Hauling on and plowing,	4 50
Planting,	4 75
Seed corn,	42
Hoeing,	4 75
Killing weeds,	75
Topping stalks,	2 00
Harvesting,	8 00
Total,	$49 92
Yield, 118 bushels — Value,	$76 65
Stalks,	10 00
Butts,	8 00
	$94 65
	49 92
Profit of one acre,	$44 73

Josiah Whitman raised 103 bushels of corn upon an acre, at a cost of $55.

Value, at 60 cents per bushel,	$61 80
Corn fodder,	12 00
	$73 80
	55 00
Profit,	$18 80

Barnstable Society.

Farms.—Successful cultivation of a small farm, by James H. Knowles, of Eastham. It contains 20 acres, two of which are covered with salt works. Produce of 8 acres under cultivation in 1845: Corn, 90 bushels ; rye, 85 ; oats, 100 ; potatoes, 150; besides beets and other roots. The remaining 12 acres produced 12 tons of English hay; one acre of which yielded 4 tons and 166 lbs. Pastured 15 head of cattle and 2 horses. Has made this year 418 loads of manure, by composting loam, muscles, mud, rock weed, peat, sea weed, and mixing therewith one cask of lime.

Statistics of the Condition and Products of certain branches of Industry, for the year ending April 1, 1845.

Massachusetts has a territory of 7,500 square miles, which is divided into 309 towns. Returns of the products of the various kinds of industry were received into the Secretary's office on or by the first day of October, for this year. These returns seem to be as complete as it was possible to be procured under existing circumstances. The errors which probably exist in the tables are probably not very important. They represent a less amount of capital and a product less than is realized by the owners, arising from a mistaken notion that the intentions of the government in procuring the returns were to form a basis for taxation.

The population of the Commonwealth is 737,700; that of Boston, the capital, 93,383. There are are 14 towns whose population is about 5000; 4 of about 10,000; 1 of 15,000 (Salem); 1 of 20,000 (Lowell). Most of the population reside in country towns and villages, whose population is above 1000, and less than 4000.

Of the 737,700 people in Massachusetts, it appears that 152,766 are employed in some mechanical industrial pursuit. This number is set down as hands employed, which in some cases would have been returned as operatives. The capital invested in these pursuits is $59,145,767; whose value in the returns is stated at $114,478,443.

The number of cattle is	276,549	Value, $5,327,199
Horses,	65,181	3,451,118
Sheep,	354,943	558,284
Swine,	104,740	917,435
Asses and Mules,	47	2,785
Total,	801,460	$10,256,821

The business which employs the greatest number of hands is the shoe business; there are 45,877 persons in this manufacture alone, the whole value of which is returned at $14,799,140. The cotton manufacture, or manufacture of cotton goods of all kinds, employs 20,710 hands, with a capital of $17,739,000, whose value is stated at $13,193,449. In the manufacture of calico, 2,053 hands are employed, with a capital of $1,401,500, in value $4,779,817. In woollens, 7,372 hands are employed, with a capital of $5,604,002, and in value $8,877,478. Value of wool, $365,136; silk, $151,429. In the whale fishery, 11,378 hands are employed, with an invested capital of $11,805,910, in value $10,371,167; and 7,866 hands in mackerel and cod fishery, with a capital of over a million of dollars; in the manufacture of palm leaf hats and braid, &c., 13,311 hands are employed, whose value is $1,649,496.

Value of Exports.

Domestic produce, $7,756,396. Foreign produce, $2,594,634.

Value of Imports.

Domestic and foreign produce, $10,351,030.

In American vessels,	$18,150,295
In Foreign vessels,	4,630,729
Total,	$22,781,024

The following objects were encouraged by offers of premiums by the societies of the state. Bulls, milch cows, heifers, working oxen, steers, fat cattle, greatest number of working oxen from any one town, horses and colts, sheep, swine, plowing (double teams; single ox teams) horses, subsoil plowing, effects of subsoil plowing, management of farms, reclaiming wet meadows, subduing bushes in pastures, irrigation, experiment in manures, turning crops as a manure, preparation of compost manure, application of of compost manure, application of sea weed, butter, cheese, honey and bee hives, maple sugar, grain crops, root crops, bean crop, hay crop, hay seed, fruits and vegetables, cranberries, forest trees, fruit trees, live fences, mulberry trees and silk, cocoons and silk, introduction of new and valuable grass, comparative value of crops as food for cattle, fattening cattle and swine, experiments for determining the proper distance to plant corn and potatoes, implements and inventions, domestic manufactures.

ANNUAL REPORT OF THE COMMISSIONER OF PATENTS.

This valuable document has been placed upon our table, and we intend to notice hereafter those parts which we deem the most important to our readers. It is a full and able statement of matters relating to patents. We should, however, advise that some discrimination should be used in the selection of agricultural information, and that abstracts from communications upon the subjects of farming be made still less voluminous than they appear in this year's report. Thus we would recommend the omission of all newspaper matter which is incidental or is merely conjectural. Of this kind of conjectural matter there is too much. Notwithstanding these objections, which by no means are injurious to ourselves, the document is extremely valuable, and we hope that Congress will still permit the Commissioner to issue his report as heretofore.

We have space only for the following summary of the Commissioner in regard to the potato disease and its proposed remedies:

1st. That all the detailed appearances cannot be considered as legitimate effects of any *one* cause.

2d. That *many* of them are *merely accidental*, and that their presence or absence would prove nothing as to the nature of the cause of that evil with which they are associated.

3d. That we have reason to believe that the *cause itself*, and its *mode of development*, have often *been confounded* together, or mistaken one for the other.

4th. That there is great reason to doubt whether the *immediate* effects of the latent cause have been so far subject of observation, that an accurate and sure opinion can be formed respecting it.

5th. That, whatever be the cause, there are different *stages* of its development—*degrees* of its power; and that these depend on a variety of adaptations in the circumstances of the crop.

6th. That the *rapidity* of *development* also corresponds with the aid derived from extraneous circumstances; and hence some, if not all of the evil results may be remedied.

7th. That it is doubtful whether any remedy suggested has been sufficiently tried to enable us to pronounce it a *certain* or *sure* one.

8th. That it is important to study more accurately the influence of *soil, seed, culture, temperature* and *condition of the atmosphere* on this crop; and that it is only by a series of careful and discriminating observations that we can clearly decide on the probable origin and most fitting remedy.

9th. That many of the preventives or checks recommended have, in their favor, so good proof of a *degree* of efficacy, that, till better are discovered, they may be safely adopted, suitable regard being had to the similar or different circumstances of their application.

We believe there has been, as usual, injury sustained to the potato crop of the United States by the prevalence of ordinary and common causes, such as must be expected, more or less, every year. We do not doubt, also, that there has been an extraordinary loss of this valuable product; but whether it be owing to some before known cause, which, from the peculiarity of the season or some unknown circumstances, has exerted an unusual influence, and thus a new development, or to some hitherto unexperienced cause till within a short period past, we cannot say. Whatever it is, its progress is not yet fully traced, and it is only till more light is shed on the subject that we can confidently pronounce in favor of any one theory; and it seems probable that there is a combination of the views that have been suggested necessary, in order to account for its various phases, as we cannot resolve all the great features into one, entirely independent of all others. It so happens, however, that we have it in our power to make a comparison as to the aspect of the evil among ourselves, and in those countries where it has prevailed.

FARMERS' MISCELLANY.

RURAL LIFE.

BY C. N. BEMENT.

The first wish of childhood is rural happiness; nor is that ever lost sight of, except where some turbulent and restless passion depraves and hurries away the soul. In every period of life it animates virtuous and ingenuous minds. The idea of a rural retreat in the evening of his days, accompanies the mechanic to his shop, the merchant to his counting-room, the lawyer to the bar, the physician to the sick bed, and the divine to the pulpit, who sees, even there, his earthly paradise upon the confines of heaven, and hardly wishes to enter the celestial mansions by any other path.

The middle age, when the effervescence of youth is over, when the body retains its strength, and the mind enjoys its greatest vigor, is the period best adapted to the useful labors of agriculture; but unfortunately this is also the age of ambition, which hurries us away from the peaceful path, where every step is strewed with flowers, to lose ourselves in the endless mazes of politics. But the intriguing politician and the wordy orators of the present day will be buried with their principles and their parties in eternal oblivion, when the man who has introduced a new plant, or eradicated a destructive weed, who has taught us to improve our domestic animals, or to guard against the ravages of noxious insects; who has invented a new implement of husbandry, or simply determined the angle the mould-board should make with the plowshare, will be remembered with gratitude, as the benefactor of society.

In almost all professions and pursuits of city life, the majority are looking forward to the day when they shall have acquired property sufficient to enable them to leave the cares and anxieties of business, and purchase peace and enjoyment in rural retirement. Many favorites of fortune, in our city, have acted wisely in making secure what they had gained, and have retired to the country. Some have selected places on the banks of the noble and majestic Hudson, while others have retired to the more quiet and secluded shade, of hill and dale, darkened forests and golden fields; around their dwellings the delicate and gay of Flora's kingdom have displayed all their beauty and richness; the cool and refreshing shade, the luscious and fully ripened fruit, the growing grass, the waving fields of golden grain, the bleating flocks, the lowing herds, have all lent their aid in the purchase of happiness. But, alas! a void is often felt in the restless heart of the possessor, and this feeling too generally prevails. The active merchant finds the routine of country life too dull, he must either return to the city, run the risk of mercantile speculation, or he must support a house in town for occupancy in the winter months. In nine cases out of ten, they often lose all and die in want. But, let me ask, why is it that country life is so insupportable to families grown rich in the city? Has rural scenery lost its charms? No: not to those of properly cultivated minds.

Within a few years the occupation of a farmer has been elevated in general estimation; a residence in the country has become more desirable among those who have accumulated fortunes in other pursuits, and a taste for useful and ornamental culture evinced, which are full of promise for the future.

The enjoyment to be derived from a residence in the country depends principally on a knowledge of the resources which a farm, however small, is capable of affording. The benefits experienced by breathing air unconfined by close streets of houses, and uncontaminated by the smoke of chimneys; the cheerful aspect of vegetation; the singing of birds in their season; and the enlivening effect of finding ourselves unpent up by buildings, and in comparatively unlimited space, are felt by most people; but it requires some little knowledge of the process or decline of vegetation throughout the year, and of rural nature generally, to be enabled to derive much enjoyment from the recurrence of the seasons, and their influence on plants; and much more knowledge of vegetation, botany, natural history, and the art of husbandry, to derive the greatest amount of advantage which a farm and garden are calculated to afford.

The common idea associated with a residence in the country, is that of profit; that an income should be realised from all expenditures there made. But why, it may be asked, make this distinction, so unfavorable in its effects, to the prosperity and improvement of the country? Are the splendid edifices, costly furniture, and luxurious indulgences in cities, sources of income? Are they not rather intended to administer to the comfort and gratify the taste of the proprietors, without any regard to the cost, or any expectation of revenue? Why, then, should it be urged, that such investments should yield an income, because the location is on the border of a river, in the midst of a forest, or embowered in some secluded vale? The answer is difficult. Yet on the other hand it can be shown that a less extravagant expenditure in the country will produce infinitely more interesting and imposing results. It is not in buildings that money should be expended. The more simple and neat their structure, the better will they comport with our laws of distribution of property, the genius of our government, and the habits of the people, Here architectural taste should be guided by economy. It is the improvement of the grounds which surround the establishment that is so much required, to render the country desirable as a place of residence. Here it is that wealth, and intelligence and taste can do much, can produce such striking effects, and contribute, more to the enjoyment of life, than it is possible to accomplish in the midst of a city, even by the most lavish expenditure.

Is not a garden, entensive grounds, umbrageous walks, verdant lawns, and sparkling cascades, quite as interesting objects as the massive walls of brick and stone, which are wedged in continuous ranges, in the thronged and dusty streets of a city? Is not the distant landscape, whether radiant in the rich and various tints of vernal luxuriance, or clad in the gorgeous draperies of autumn—the melodious concert of the birds—the sunset splendors of the western sky—the congenial serenity of summer's bland and dewy eve—quite as elevating to the mind, soothing to the soul, and congenial to the heart, as sublime and inspiring as "the stir of the great Babel," and the deafening surge of the living deep, which resounds through all her gates?

There is a great deal of enjoyment to be derived from performing the different operations of gardening and farming, independent altogether of the health resulting from this kind of exercise. To labor for the sake of arriving at a certain result, and to be successful in attaining it, are, as cause and effect, attended by a certain degree of satisfaction to the mind, however unimportant the results obtained.

It is not only a condition of our nature, that in order to secure health and cheerfulness, we must labor, but we must also labor in such a way as to produce something useful or agreeable. A man who plants a tree or sows a grass-plot in his yard, lays a more sure foundation for enjoyment, than he who builds a wall or lays down a paved walk.

To dig, to hoe, to plow and to rake, are not operations requiring much skill; but their value consists in preparing for crops, or in encouraging the growth of crops already coming forward.

One of the greatest of all the sources of enjoyment resulting from the endless variety which it produces, either by the perpetual progress of vegetation which is going forward in it to maturity, dormancy, or decay, or by the almost innumerable kinds of plants which may be raised in even the smallest gardens. Even trees are undergoing perpetual changes throughout the year; and trees change also in every succeeding year, relatively to that which is past, because they become larger and larger as they advance in age, and acquire more of their characteristic and mature forms.

Those who are partial to the country—and where is the man of genius who feels not a pride and delight approaching to ecstacy from the contemplation of its scenery, and the happiness which its contribution affords?—those who have paid attention to the process of agriculture, and view its occurrences with interest; who are at the same time alive to all the minutiæ of the animal and vegetable creation; who mark "How nature paints her colors, how the bee sits on the bloom, extracting liquid sweet," will derive from the study of nature a gratification the most permanent and pure.

Writers of all ages have been lavish of their praises of a country life. The pleasures of rural nature are consistent with every period of our lives; and they certainly approach the nearest of all others to those of the purely philosophical kind.

But let us for a moment point out the causes that render a country life unequal to anticipation.

For those who have been accustomed to the activity and society of a city, a retired country seat, however beautiful and desirable the situation for rural scenery, is not calculated to afford the expected enjoyments. There are very few minds that can be continually pleased and contented in communion with inanimate objects, and the brute creation. The frequent company of our fellow creatures, the numerous offices of friendship and duty attending the compact of society, must still form a considerable portion of daily incidents, independent of those of our own family circle, in order to keep up the elasticity of the mind, and the vibration of hope and fear. If, then, the frequent presence of our neighbors is necessary to brighten up the countenance, in choosing a country residence, he who had spent most of his days in the city should not locate himself on some lonely bank of the Hudson, but in some little village, in which live a good parson, a learned physician, and an intelligent schoolmaster. It tends very much to deprive a long storm of its tediousness, by stepping into the doctor's now and then, for a little chit chat; or having the clergyman, wife and daughter, to run over at a slack of rain, and keep up the zest of social life, while roars the howling wind and rain without.

Another reason why a country life often fails of being agreeable, is, a deficiency of a cultivated and scientific acquaintance with the animal and vegetable kingdoms. Some knowledge of physiology, a degree of familiarity with the terms and classification of botany, and knowledge of the habits and anatomical structure of animals; all, or much of this should be acquired previous to leaving the city, where the facilities for such information, in part, are incomparably greater than in the country.

It is not my intention or desire to damp the sanguine expectations of young men, but there are sedate and reflecting minds, even among such, who will profit, as they go along, by experience, and take caution from the mistakes of others, their neighbors; rural pursuits will also become agreeable to such, and a strong inducement to reside in the country, and at the same time afford employment and livelihood to those about them. Besides, to such persons there is a constant variety in looking after the trees, shrubs, fruits, and crops, &c., which they plant, and see grow and flourish under their care; and which are presenting themselves always under some renewed form, rendering agriculture the most agreeable and least tiresome of human pursuits.

Unless a man has a fortune at his command, sufficient to bear him through, (when he may be at liberty to please himself,) let him not be led into whimsical or extravagant expenses; neither should the man of fortune deceive himself by visionary profits, estimated or anticipated, and which are not to be realized.

" Agriculture," says an ancient writer, " is the most certain source of domestic riches. Where it is neglected, whatever wealth may be imported from abroad, poverty and misery will abound at home. Such is and ever will be the fluctuating state of trade and manufactures, that thousands of people may be in full employment to-day, and in beggary to-morrow. This can never happen to those who cultivate the ground. They can always by industry, obtain at least the necessaries of life, and the fruits of their own labor."

LETTERS ON THE ADAPTATION OF FARMING TO CIRCUMSTANCES.

BY AGRICOLA.

LETTER No. I.

Gentlemen,—An article which appeared in the April No. of your Journal has arrested my attention, on the impossibility of the East offering any competition to the West in the ordinary products of the farm, and if I had time, I should take pleasure in investigating the matter at large, in some important points which I think the author of that communication has neglected. The fact is a very important one, that farmers in the middle and eastern states are wasting their energies, and throwing away their resources, in the hopeless effort to produce the same articles that are grown in the new states, and to sell them in their own markets at a price which will *pay the interest* on the value of their land—then, the *expense of cultivation*—and lastly, the cost of *getting them to market*—and after all this, yield a *fair profit.* These four particulars must strike you, as they perhaps often have, as obstacles of no small magnitude in the way of the eastern farmer.

The greatest of them is unquestionably the first, and is fairly and satisfactorily examined, quite at large, by your April correspondent, Col. T. J. Carmichael. In fact, he has done justice, as far as possible in the short space he employs, to all these hindrances, and it really strikes me that if our farmers would now "*think* on these things," a change of immense magnitude would be brought about.

It seems to be a settled conviction in the minds of all our agriculturists now-a-days, that, if a farmer does not grow a certain article for the market, yet, if he is a consumer of that article, he must at least grow as much as he consumes. No idea can be more false, nor founded upon more fallacious grounds, as may be shown in very few words, not in the shape of argument, but appeal to every man's own practices in his pursuits. It would be considered very ridiculous for a farmer to tan his own hides, and make his own shoes, simply because he is obliged to wear them. There was a time when our farmers' wives carded and spun and wove, oftentimes, the materials for their husband's coat and pantaloons. But they did it because they were obliged to, and because they could do it cheaper than they could buy the materials. There are few or none who do this now, and they would be set down as possessed of little prudence or economy if they were to do it. They would be throwing away their time, which could be employed to better purpose. They would be throwing away the materials, which they could sell for more, in proportion, than they are worth in their homespun fabric. They know they can sell the material, and employ their time and labor in the production of other things, which will purchase the clothing they used to manufacture, and will leave them a handsome profit. This is a view of the case perfectly on a parallel with the farmer who continues to raise, at the present day of universal and far-reaching competition, an article of food simply because he is a consumer of that article. He is infinitely more foolish who grows an article *for market*, when he can buy it cheaper than he can grow it, or can raise an article which he can barter for it, at a large profit. As well should the cotton manufacturer be also a manufacturer of linens, and woolens, and silks, only because he wears shirts and pantaloons, and his wife and daughters wear dresses of the latter material.

Must you sow no wheat? Not a bushel. No rye? None. No corn? No, nothing that another can raise cheaper than you, while at the same time you can raise on the same amount of land anything else which will purchase all you want of these and leave you a profit. If you do, you show a lamentable want of foresight, and it is not to be wondered at that you are not making money, and that your farm is getting behind hand. You need not run away to the west to avoid the evil, as so many have already done. You have the ability—the skill—all but the enterprise—to revolutionize your business and put yourself at once in the way of becoming a rich and thriving farmer. And how? That is the question we are about to answer, and we hope to do so in a way to open your eyes to the truth.

The products of a farm must be adapted to the peculiar circumstances under which it is situated—its value in money—its contiguity to, or remoteness from market—the cost of growing, and the price in market, &c. And here is the point where our leading, or would be leading men in agriculture, have missed the mark. I have already made it sufficiently manifest that, because a man owns a farm and cultivates it, is no reason why he should raise every product which will grow under his latitude. Better by far would it be for him, if he would grow some one product which would pay him.

The character of the soil—its chemical and mechanical properties, are important to be known and understood, but the character of the market is a matter of greater moment. By the proper application of manures, and good cultivation of the soil, a man utterly unversed in the science of the thing, may gather large crops and remunerating ones, if he has an eye to the market he is to sell in, otherwise he will find it a losing game. It should be the object of leading men, to show the practical farmer the true extent and the proper bearing of his resources, before anything else. If, in the state of New York, the same efforts had been made to induce farmers to adapt their labor and skill to the circumstances under which they live, that have been made to induce them to become scientific men, we should now probably see a large part of the state a garden, compared with its existing barrenness. There has been too much loose and indefinite and unpointed direction to the business of farming, for a few years past. Instead of pointing out distinctly the direction in which the labor of the farmer can be applied so as to be most productive; instead of investigating dispassionately the condition under which the farmers in the different parts of this widely-extended country are placed, all efforts to improve his position and to advance the art have been a sort of vague inducement to him to try to increase and improve himself in the production of those very articles in the production of which he has to compete with new soils and cheap lands, and every other disadvantage. It appears to me that the first step to make our farmers improve, should be to persuade them to give up the growing of such articles, and enter upon the cultivation of such as they have a manifest and real advantage in. And what are these articles?

In answering this question, I might enumerate a long list of what may be called *perishable* products of the soil, which I think will exclude all our grains, and the growth of wool, and in connection with them I would also include the raising and fattening of animals for the butcher, and perhaps, collaterally the growth of the mulberry and the raising of silk worms. I say collaterally, because I think this business may be made profitable to the farmer, as a secondary occupation for his family during hours which they can readily spare for the care of worms, without intefering with other avocations, and that in at least some cases, it may be a valuable addition to the labor of the farm to fill up actually vacant time, when the farm is devoted to such objects of culture as do not fill up the whole time. Such will be preëminently the case in the instance of farming under the necessity of circumstances which I am about to mention, and which it strikes me is the species of farming adapted to the Hudson river valley, and the other great valleys and thoroughfares of this eastern part of this continent, which have ready—easy—and rapid communication with the great markets of the country, and especially with foreign markets. But I am an Orange county man, and I am looking now principally at the interests of the river valley in which I live. If my views appear to those farmers who live in other sections as applicable to their condition and circumstances, it is the easiest thing in the world for them to apply the suggestions, which I can assure them they are fully welcome to, with the wish that they may profit by them. But, gentlemen, my pen is somewhat like my tongue, and I have overrun more room already than I intended to use in saying all I had to say when I sat down. I will say the rest in another letter.

Newburgh, July 1, 1846.

LETTER No. 2.

In my last I spoke of regulating farming according to the circumstances in which a farmer is placed. In this I will not include the character of his soil, for he may make his soil what he pleases. Yet this might be, and actually is a circumstance of considerable importance. But I shall have special reference to the farmer's proximity to market, including of course the value of his land and the cost of producing. And these circumstances alone should demand a serious consideration in the mind of any man who makes the Hudson river the means of transporting his produce to the market in the city of New York. It has been demonstrated, I think, that he can not grow wheat and offer any reasonable competition to the west. He may *live* by rasing it, and that he could do if he had no market. But his object is to sell and make money, and he should not be content to do this at a disadvantage. What then shall he grow?

I must divide my answer in order to suit my circumstances. And in the first place a large portion of the early vegetables which are consumed in the city of New York are brought from a great distance, compared with many places on the river, where they might be grown to advantage. There is scarcely a little village, or landing place, which has not its market vessels, running a week or oftener, to market with the products of the neighborhood. Whenever, then, the place is in such proximity to the city that vegetables can be gathered in the afternoon and sent to market by day light next morning, a considerable portion of the land and the industry of the inhabitants should be diverted to the growth of such articles as are now raised in the gardens about the city, to be sold as green vegetables.

I know that some will open their eyes in alarm, and tell me at once that I will have the market glutted and the produce all thrown into the river. I will have no such thing. A contingency of this kind may happen, that if all were to enter upon this branch of husbandry at once, the first year might exhibit a glutted market, for the population of our large cities are not prepared for a sudden expansion in the quantity of any article of food. But as soon as it is ascertained that the amount in market is greater, and for sale cheaper, the demand will be increased, and prices will again become firm and profitable. The fact now is that far less of wholesome vegetables, in the spring of the year, find their way to the large cities than the health of the population demands, and with the health are implicated still more important considerations, of morals, &c. A vastly increased quantity might be consumed, and would be, if it were to become so plenty as once to become more necessary than it now is. The city of New York now depends for its usual supply of fresh vegetables for its vast populace, upon the few acres of ground cultivated for this purpose in its immediate vicinity. It is capable, with advantage, of absorbing a much larger amount, and it would afford a profitable and endless market for thousands of acres of land within sixty miles.

Again, the supply of articles for winter food is gathered from all parts of the country. The production of these is not even confined to the state, but they are brought from the far west, and with all the apparent abundance there is actual need for more. When we see the single article of potatoes alone, brought from all parts of this country not only, but even imported from Ireland and France, we ought to be stimulated to greater energy in our agricultural affairs. If the fields in the Hudson valley, now bearing a profitless and foolish harvest of wheat and rye, were planted with this great staple, as it may be called, the growers would find their pockets heavier after they send their produce to market this fall. See Col. Carmichael's article in April No. for proof. But I have what appears to me a far more important and profitable article to mention, and that is *fruit.* The raising of fruit for the supply of our great markets at home is a business of no little consequence, and it is not half done. Half do I say? The beginning is hardly made. Look for a moment at the quality of fruits with which the markets are supplied. They are by no means of the best character. Thousands of barrels of poor fruit are, every year, sold and bought in the city of New York alone, because the purchasers can get no better. Good fruits are always saleable. The market is never glutted with them. There is never enough. I have heard Doctor Underhill of Croton Point relate his experience in the cultivation of the grape for the New York market. His friends endeavored to dissuade him from going so largely into the enterprise, for fear of glutting the market. But he was too farseeing for that; and he has not been disappointed, the fact being known that good grapes could be had, and there are not yet enough to supply the demand, though the doctor sells many thousand dollars worth every year. The people only want to know that they can get good fruit, and it seems as if the more you send to market, the more is wanted. There is no such thing as glutting the market now-a-days. Suppose our large cities will not consume all: suppose such a thing to happen; what will be the consequence? Simply this: the communication with Europe is so speedy now, that many fruits, deemed now too perishable to send so far, would be exported to England and other countries in a fine state of preservation. To some of our good fruits the market of the world is open, and the quantity to be consumed is unbounded.

I wish therefore to call the attention of farmers on the Hudson river, every one of them, to the cultivation of the best fruits they can raise. There is no sort of danger of overdoing the matter. The whole river valley would not grow more than can readily be sold, and no crop can be raised which is so profitable. The objection urged by many that trees are slow in growing, and that it will be a number of years before they become productive, is no argument against me. The difficulty may be obviated in many ways, which will suggest themselves to the mind of any thinking man; as by going gradually into the business; by growing those kinds which come soonest to maturity, and soonest fail, in the intervals of those kinds which are intended to form the permanent orchard; or by connecting with the business some other kind of husbandry, which becomes immediately profitable. In any of these ways, and in others which will suggest themselves, the difficulties may all be obviated.

I know of no branch of husbandry which can be so profitably connected with fruit growing as the silk business. I can not enter into its consideration at large, here, but I will say that while his fruit trees are growing, the farmer will find it profitable, and afterwards he can give it up to his wife and children. I hope to say more about this hereafter, and also something in reference to the duties of young farmers in entering upon this business. I shall feel gratified if I have been the means of opening the eyes of any one to his interest. The truth is, agriculture on the Hudson river will never pay as it ought, till it is conducted with strict reference to circumstances. And I am satisfied that here fruit growing offers decidedly the greatest profit. Yours.

AGRICOLA.

Newburgh, July 4, 1846.

THE DAIRY.

Most of the cheese of this country is made by guess, and yet much excellent cheese is made. Still proportions may be determined which shall not only increase the product, but improve the quality. Every one who opens a book on chemistry, learns that every kind of compound matter is made up of elements combined in certain definite proportions. Every substance in the mineral kingdom and every manufactured material in the arts, which has homogeneity must be composed of certain elements united in exact proportions. So cheese being a homogeneous compound, its elements must be as exact in kind and proportion, as water, marble, or any other natural production. The natural productions however, differ among themselves in certain particulars, which it is important we should briefly notice. Some are fixed and stable and may remain the identical thing forever; while others, not less definite and fixed in their elements, undergo changes and become in a short time, things entirely different in kind and in proportion from what they originally were. Bodies derived from organic matters, are the most liable to undergo these changes, and hence it is a great desideratum to discover by what means they may be fixed and preserved in the state and condition we wish.

A cheese for instance may be formed of proper materials, and yet if placed in certain circumstances will undergo those changes which will entirely destroy it. In cheese making there are two great objects to be studied; first, how to make it, and second, how to preserve it.

1. *How to make cheese.* The preliminary points to be attended to are, to secure quiet cows whose milk is easily obtained. It should be milked into clean pails and strained as soon after milking as possible through a strainer covering the tub, and properly supported on a ladder. In small dairies where only one cheese is made per day, of from 30 to 35 pounds, the milk remains over night in the tub, and the cream which rises in the night, is skimmed for butter. The morning's milk is afterwards added. The milk being procured it ought to be immediately set for the cheese. The first step in the process is to bring the whole to the temperature of 85° Fah. If it is raised to 90, the cheese may be too hard. If however it is designed for distant markets, it will be safer to raise it to 88, or perhaps even 90. In June, July and August, if the morning's milk is strained into the night's milk without much delay, the temperature will be very nearly right; but usually from 10 to 20 quarts of milk, sufficient to make a cheese between 28 and 50 pounds, must be warmed over coals, or what is better with a water bath sufficiently to raise the temperature of the whole to 85°. The proper temperature to which this part must be raised, may be determined by calculation on the principle that two liquids in equal quantities, and of the same kind though of different temperature, if mixed will produce a mean of the two. Ninety-eight degrees is blood heat, and hence when the liquid is 85 it will still feel cool. The dairyman ought to be cautious and not suffer a blaze to pass up around the kettle, as it may impart a bad taste to the milk in consequence of burning it.

After the temperatuie is obtained, the next step is to add the rennet, and it is still a desideratum in cheese making to determine hwmo uch of this substance is required for any given amount of milk. Unfortunately there is a diversity of practice prevailing, and this part of the process is left to the judgment of the maker. A piece of rennet one inch square, infused in a wine glass of water will fetch 35 lbs. of curd. This is not, however, the mode usually adopted. The following mode of preparing rennet is commonly adopted in Berkshire, Mass. Saturate two gallons of boiling water with good salt, let it stand, cool and settle, and pour off the clear and infuse two rennets for two or three weeks, when it is fit for use. Of this liquid two table spoonsfull will bring 35 lbs. of curd. When added it requires very thorough stirring in order to secure a perfect and speedy mixture, that the rennet solution may act upon the whole of the milk at once. It must now stand and remain entirely undisturbed until the curd has sufficient consistence to be cut. When this consistence is sufficient, the knife passes through with some resistance, and leaves the curd distinctly divided and showing the whey between the cuts. It is cut by transverse strokes into squares of 2 and 2½ inches across. It must remain still longer, to allow the perfect separation of the whey, during which the curd continues to contract and grow firm. When pieces can be lifted up without breaking, a strainer is pressed down upon the curd and the whey rises up; a pail full may be dipped into a brass kettle and heated to about blood heat, or perhaps to 100°, when it may be poured over the whole curd. This causes a still firmer curd. If it is slightly brittle, the whey may soon be dipped off preparatory to salting. The quantity of salt is about a tea cup full for 15 lbs. of curd, or, to be more exact, one pound of salt for sixty pounds of cheese, after it is cured. This is the Herkimer county rule — though some diversity of practice exists in the best dairy dstricts. In England (in Gloucester) the salt is not mixed with the curd, but put upon the outside, and about 3½ lbs are used to 100 lbs. of cheese.

In our dairy districts the curd is salted and then broken fine in the hands after the greater part of the whey is dipped out. This practice is objectionable, as the squeezing to which the curd is necessarily subjected removes a portion of the cream, and hence it would be better to tear it to pieces by some machine than subject it to pressure in the hands. When the curd is broken fine it is then placed upon the strainer, where the whey is suffered to drain out; it is afterwards gathered up, surrounded with the cloth, and placed in the hoop for pressing, when it is necessary to attend to the evenness of the press, that the cheese may possess a uniformity of thickness. The time which a cheese ought to remain in the press varies with the size. One which will weigh 35 lbs. should remain two days; one of 60, three days; and one of 100, four or five days.

It requires turning twice a day, morning and evening, at which time the cloth should be renewed. Care should be taken in removing it to preserve the surface of the cheese entire. The cheese being taken from the press is far from being finished. It requires to be turned daily, and rubbed over with melted butter, in which a small quantity of annatto has been dissolved. The whole is put on by a soft cloth, by carefully going over the whole cheese. If too much butter is used, the cheese does not cure so fast. What is required is to fill up inequalities, free the surface from incipient mouldiness, and procure a smooth surface. The cheese room should have a temperature of 55° or 60°, and be kept perfectly clean, and dry as possible. It is necessary to keep it dark, on account of flies, but a free circulation of air is always important. Where cheese have not been pressed sufficiently, or where the curd has been scalded too much, holes are common, and whey leaks out; in such a case it is difficult to prevent the fly from depositing its eggs. When skippers are found they must be cut out and removed, and the vacant place filled with a mixture of fine lime and butter or tallow, and the place well coated over with the usual dressing. In warm sultry weather the dairyman must attend to his cheese room incessantly; a neglect of one day might spoil or injure several hundred weight of cheese. The business is laborious, and is better suited for men than women.

The secret in making rich cheese depends upon the success in preserving in mixture with the curd the cream, for the cream of the milk is not coagulated by the rennet, and hence more or less of it runs out with the whey and is lost. When this is the case the cream will be found upon the whey, and may be skimmed off and made into butter and used for dressing the cheese. It is more oily than butter made from common cream, and hence is better adapted to this use than common butter.

When rennet is added to cream it thickens it slightly, and the small quantity of milk which is necessarily mixed with it appears in small coagulated granules. By standing, the thinner parts separate, but no farther change takes place in the cream than what is observed on the instant that the rennet is added, which amounts only to a slight thickening. Now the cream which rises upon the milk during the night, when both morning and evening milkings are mixed for the cheese, ought be to skimmed off. It would be no saving to the cheese to let it remain; it would, most of it, flow out with the whey, and we believe that it is only the cream which remains in the milk which goes into the cheese. Hence it would be of no use to add cream to the milk, notwithstanding the fact that it is estimated that one pound of cream will make two or two and a half pounds of cheese; the true quantity being proportioned to the care with which the curd is broken for the press; and we may add here that in working it, it should be cut first with great care, making even cuts without tearing; and that it should not be cut till it has firmness enough to keep itself in sharp square pieces into which it is divided; it being understood that the cream is retained mechanically merely in the coagulated mass, hence, in a certain stage, the rich matter might be squeezed out entirely, for the tendency of casein, or cheese, is to come together by itself, to the exclusion of the other proximate principle, the butter.

We have dwelt now upon some of the essential points in cheese making at considerable length, with the hope of benefitting some of our readers, who may be in the midst of their harvest. Cheese are cured by drying. To secure it from injury during this process it is indispensable it should have been pressed, so as to expel the whey; otherwise, it will remain in a leaking state, with a moisture inside, which will prevent its drying; and what is more impart to it a tendency to decomposition. Large cheese, even if pressed properly, consume a long time in drying, and are extremely liable to undergo decomposition in the centre; hence cheese, it seems to us, are full large enough when they weigh 60 to 65 pounds, and for small families still better at 30 pounds. They ought to stand on clean dry shelves, in an airy room, with a current of dry air passing through it. Daily turning and dressing is indispensable, until near the close of the season.

We will sum up, in conclusion, with the following important hints:

1. Rooms for cheese should be cool, dry and perfectly clean: temperature not over 60°.

2. Milk to be strained immediately after milking.

3. Milk should be set at 85° of Fah., and the less scalding of curd the better; it will affect the rich part, the butter or cream, and make the cheese puffy, or else too hard and tough.

4. Cows should never be driven home by dogs for milking, or they should not be worried and run by dogs or unruly boys: they should be milked as soon as possible after they are yarded.

5. Cows should not be fed upon rank grass; fine herbage or coarse herbage will do, so far as the flavor of cheese is concerned. Hilly pastures, with running water, are better than meadows for the dairy; and much as farmers hate the white daisy of such pastures, it is good for cheese, as we know from observation and the experience of our early days.

6. Let not the dairyman be very anxious about Durham cows. Our native breed will make as much cheese, and as good as the Durhams taken together. Good cheese does not depend at all upon the breed.

The law of obligation is a necessary constituent of our moral nature. Its existence is proved by the inward impulses, perhaps by conscience: it is supported by the kind feelings of benevolence. It has a reflex operation—we feel that others have claims.

MR. GREEN'S ACCOUNT OF HIMSELF AND OF HIS NEIGHBOR SOLES.

In the month of May I bade farewell to bricks and mortar and pavements and the narrow street in which I made my money, and established myself and family in the vicinity of the pleasant village of Grassdale. The farm of which I was the proprietor, and intended to be the manager, had been put in complete order by my agent. The old house had been repaired by an architect from the city, at an expense not greatly exceeding the cost of a new and larger one. An upholsterer, who had been sent on an embassy thither before our departure from the city, had displayed his skill and consulted his interest in arranging articles of furniture in his line. A portion of the furniture of our city residence was despatched in advance, and suitably arranged; so that when we arrived we found all things in order.

But we found that which we supposed to be our wisdom in in this matter was our folly. We had nothing to do. We had deprived ourselves of the pleasure of putting things in order. After a few dark "days of nothingness," my wife actually proposed to turn everything upside down, in the house, that we might enjoy the pleasure of setting them "to rights," as the phrase is in Grassdale. But after mature deliberation this plan was abandoned.

I found that what we had thought to be our wisdom in this matter was our folly in another respect. I was very desirous of being on good terms with my country neighbors. I am not certain but that the idea of being justice of the peace or having a seat in the legislature may have mingled itself with my visions of retirement. Now if I had come on with my furniture and family at the same time, and had called on my neighbors for assistance and advice, they would have rendered it copiously and joyously. Half the men and all the women in the vicinity would have been on the spot; every package would have been opened simultaneously; every article carefully examined, by all present, to see that it had received no injury in coming. The furniture in every room would have been put in order in outline. I should thus have acquired a large capital stock of popularity at the outset. My neighbors would have retired with their ruling passion gratified, and with ample materials for conversation for a week. We should have had employment for a week in filling up the outline of which I have spoken. It would have been most conclusively proven that we were not proud. The supposed superabundance of our furniture would have been set down to the score of our ignorance, not our pride.

Alas! that we should have foregone all these advantages—but so it was. Our house was in order. What the chambers and closets contained could only be the subject of conjecture. I entered upon my new course of life with a reputation for exclusiveness and pride.

Weeks passed on, and I began to think I should have to live "alone in my glory," in Grassdale. No body came near me but a few weasel-faced fellows, to sell me certain articles, for which I was sure they demanded double what they were worth. If I asked their advice for my farming operations, I perceived it was always so framed as to involve the necessity of giving them a job. I began to grow very suspicious, and half wished myself back in Montrose Alley. My nearest neighbor was Mr. Obadiah Soles, whose farm was contiguous to mine, and whose house was about one-fourth of a mile distant. He was very industrious and energetic. I had called at his house several times, both in the morning and afternoon, very sagaciously fixing on the same hours which I should have chosen to call on a business man in the city. I never found him in, but was always told that if I had any business with him they would tell him, and he would come and see me. Of course I always remarked I had no business, but merely called to see him. I subsequently learned that he was always in at meal times, and also from after dark till nearly daylight.

I sometimes passed him in the street, but he always seemed in a hurry. Once as he was going by, and I stood in the street in front of my house, he asked, without slackening his rapid pace at all, or waiting for an answer, "Got things set pretty much to rights?"

During a tempestuous night a portion of my fence was prostrated by the wind, and my clover thereby exposed to the assaults of several cows, who were practical believers in the community of grass. As I looked from my window I saw neighbor Soles drive out the cows and commence repairing the fence. The rain fell in torrents, but he kept at work till the fence was more substantial than before its fall.

I was pleased to see my clover field rendered safe from depredation, and my complacency expanded itself somewhat on Mr. Soles. Still, with common amiability of human nature, I began to speculate on his motives, and came to the conclusion that he had a keen perception of his interest, and that ere long he would entertain me with an exaggerated account of his services, accompanied with an exaggerated bill.

But day after day passed, and no call from neighbor Soles. I began to think it was best to call on him, lest his bill should "have an account with time."

Before it was convenient for me to put this purpose into execution, I was met in the street one day by Mr. Soles, who informed me that my clover was receiving damage through want of being cut. "Ah ha!" whispered my knowledge of human nature, on which I prided myself, "he wants another job." Still, as I wished to be on good terms with my neighbors, I resolved to let him have his own way. I had made up my mind to be cheated now and then, provided it contributed to my popularity.

I thanked Mr. Soles for his information, and asked him if he could cut it for me. "Bless your heart no," he replied, "I've near a dozen acres of my own spoiling — all I can do I can't get along fast enough"

"Can you tell me of any one that I can get to cut it?"

"I can't for the life of me. I've hired every man that I could. I guess you will have to mow it yourself. It wont do you any hurt. It will let folks see that you are not above work. All men want to be on good terms with the people they are going to live with."

This was said rather bluntly to be sure, but kindly, and without any assumption of superiority.

"What can I cut it with, a carving knife?"

"I think it is likely you are better acquainted with the use of that edge tool than any other," and I thought he looked at the whiskers which I had spared for years "but there is old Mr. Rodgers, he will sell you a scythe, and rig it for you, and will come and show you how to mow, if his rheumatism isn't too bad. I must bid you good day, for I'm in a great hurry"— and he shot off like an arrow.

I was now pretty well convinced that I had made a mistake in my estimate of Mr. Soles' character. I determined that he should not have cause to conclude that he had made a mistake in taking me for a gentleman. I therefore took an early opportunity to call on him one evening for the purpose of expressing my obligations to him for his kindness in repairing my fence, and of asking him for his bill. I had scarcely mentioned the subject when he said,

"How did you know I put up your fence?"

"I saw you from my window."

"Well, I thought I got through with it before you were stirring, as you never said any thing about it."

"I was expecting to receive a call from you."

"Well, I don't know but I ought to have called and told you, but I thought I had done about my part in putting up the fence."

"I expected you would call and let me pay you for it, and that is what I have come to do now, besides thanking you."

"What do you reckon it is worth?"

"I do not know. I shall be quite willing to pay you whatever you think is right."

"You mean well," said he after a little pause, "but if we are going to be neighbors, you must alter your notions in some things. I don't blame you at the first going off. It is natural for one who is used to living in the city where they have to pay for water, and sunshine almost, but here if you expect to be neighborly you must drop the idea of paying and being paid for every thing. I put up your fence because the cattle would have destroyed all your clover before you would have been up, as I thought. I believe you do turn out earlier than I expected. I did it for sake of a neighbor. I would not have been hired to work out as long as I did in that rain, for five dollars."

I felt that I had done neighbor Soles great injustice in my thoughts at least. I made a full confession and an apology, and expressed the satisfaction it would give me to meet him on his own ground.

"Don't you think" said he, "that most of the difficulties among men are owing to their not understanding one another? Now we might suppose something like this. You supposed that I put up your fence in order to get something out of you. I might have supposed that you said nothing about it, in hopes to get clear of paying me, and so we set one another down as rather close fellows. Then my cow goes in at your gate, which I see you leave open half the time (just put a pulley on it,) and eats up your garden stuff. You send me a rather short word to keep my cow at home, and I send you word back to keep your gate shut. Things go on so, till there is a regular quarrel, and for want of a right understanding in the beginning. Is'nt it so?"

I signified my assent by an inclination of the head, and looked at him as much as to say, "go on." He understood me and con tinued.

"I find it best to understand a man, and then if I find him altogether unsound to let him altogether alone. We can't get along without having some dealings with men who have some bad spots in them. But if a man is altogether unsound, I let him alone But there are some that are crooked in some things, but in the main, are upright men. You must bear with such and try to bring them round. If a man has only some good things about him, you may cure him of a great many bad things. Perseverance in being neighborly will generally bring such a man to. There is Salmon who lives at the fork of the roads. When he first came into the place he was as surly as a bull, and as unneighborly as a wild Indian. He would wallow right through your grass and grain, throw down fences and leave the bars down after him. I thought he was about as much damage to me as a dozen hogs would have been, if allowed to range all over the farm. But I saw he never ran about on the Sabbath. He either went to meeting or kept close at home. Thinks I, there is something left in him yet, so I kept on treating him neighborly and making no complaints. At last he comes to me and says, "I've made up my mind not to leave your bars down any more, for I can't stand it."

"Stand what?" says I.

"Why your everlasting kindness. If you don't stop I shall have to move away."

"I can tell you" says I, "what will be better than that."

"What 's that?" says he.

"Turn honest man and be neighborly," says I.

Salmon studied upon it for a spell, and made up his mind. He has been as neighborly a man as ever need to be ever since. Now it does one as much good to tame such a man, as it does to pay for a new farm."

WESTERN COMPETITION — WHEAT AND WOOL, DAIRY AND PORK.

It is yet to be determined whether the East can compete with the West or not. If the East had to run a parallel course with the West, or if the general husbandry of the former ran in the same channels as the latter, the question might be regarded as settled. There is a fertility and space in the West, a depth of soil extending itself far and wide, which secures years of productiveness on the one hand, and unbounded territory on the other, and so cheap is territory that a man of wealth may own a little kingdom, and count his miles instead of his acres, and the poor man become the proprietor of a farm. But the East has her markets, the supply of which must come from the Eastern farmer in every kind except in a few great staples. The aggregate littles derived from the sale of many articles make a very respectable amount in the purses of the small farmers. If the East, then, cannot compete with the West, it is only in the great articles of commerce, wheat and wool, and perhaps corn and pork; and yet, the last articles must and will form in all cases a large item in the products of the Eastern farmer. The expense of fattening hogs for heavy pork is well known to our farmers. To make a business of it would be attended with loss; but the dairyman has his whey, sour milk, the refuse of the farm in a variety of kinds; which if not fed to some animal would be lost. Then again by cultivating peas and feeding them green to his hogs, the expense of making pork may be reduced below that given by Bousingault and quoted by our friend of the Genesee Farmer. The raising of sheep in small flocks by the wheat grower of our Western counties is a productive plan of husbandry, which can not be rendered profitless by Western wheat or Western wool.

The wheat crop of New York in 1843 amounted to 12,479,499 bushels; in Pennsylvania, 12,219,239. New York raised 15,974,990 bushels of corn; Pennsylvania, 15,837,431; Ohio raised 18,780,705 of wheat, and of corn 38,651,128. Can it be supposed that at this time New York or Pennsylvania can give up their wheat crops? If it were necessary we could prove that a large part of New York has a soil as well adapted to wheat and corn as any part of the West; though it is undoubtedly true that a bushel of wheat costs the New York and Pennsylvania farmer more labor than the Western. The wheat of these two great Eastern states, however, cannot be dispensed with, and will and must go into a market to supply in part the wants of the world. But then many farmers who raise wheat might do something else with greater profit. Hay and oats for our own markets, barley, peas and potatoes, with mutton and small pork, young cattle and beef for home consumption, and the endless field for fruits, is all open, and a harvest both productive and profitable, lies before the Eastern farmer, and no Western competition can take his standing from him.

The great difficulty with the body of our farmers is, that they cannot and will not think of a new channel for their industry; neither will they let a neighbor think in peace. If it is proposed to go into the culture of silk or grapes, or any thing new, the horrors of shipwreck are held up to him, and if language of this kind is not used, that which is more effective is, a low species of ridicule. A man sometimes hardly feels that he is a free agent, and rather than encounter the laugh of a neighbor, or forfeit his good standing with him for prudence and judgment, he pursues the old way. But many have not considered the value and profits of some branches of business, or they feel that it is doubtful whether they can succeed. Let such look at the world before them as it is; go to New York and see the mouths which are to be fed, and let him consider that to-morrow they will be increased; let him study his location, his advantages and disadvantages, and make a satisfactory estimate of circumstances, and if he will carry out the results of his judgment, his fortune is made. Study the history of the last twenty years, study the times and seasons, and adapt himself to them, and whether he changes his husbandry or not, he will better his condition, and make his life a contented one.

TIME FOR CUTTING HAY.

The question, when grass should be cut for hay, has been frequently discussed in farmers' clubs, and it is not unusual to hear a variety of opinions expressed. It is plain, however, that while some diversity of opinion may prevail, it is easier to determine when it is mature and ought to be secured, than to do it; for inasmuch as the hay harvest lasts from two to four weeks, and sometimes five, it is plain that some fields must stand longer than they ought; so it is equally true that some may have to be secured before the grass has reached its maturity. The seasons, too, must modify the farmers' rules; if it has been dry and cold, a spindling thin crop of timothy or red top grows up, comes nearly to maturity, the whole of which may be less than half a crop. If cut, a loss is sustained; for generally rain and suitable weather for the growth of grass may sooner or later be expected; and hence, if possible, it is better to suffer the first growth to stand until it can grow a thick bottom. The removal of the early growth will leave a naked surface, which is less favorable to the latter; and besides, the labor and expense of cutting over the same ground twice, may be saved. Hence circumstances will necessarily control the farmer in his work in the hay harvest. The season must be regarded, and in consequence of the amount of hay to be secured, some must be cut too green, and some must stand till it is too ripe.

The time for cutting grass is when it has acquired the greatest amount of nourishment in its stalk. This may be known by the state of its flower. When in full blossom it is in the proper stage for cutting, as it is at this period that its stalk has stored up the greatest amount of nutritious matter. Now the flowering of timothy goes on for nearly two weeks. At the first appearance of its flowers it is still too green; only a part of the head has its flowers ripe. The number continually increases for a week, and at this time if the farmer examines his grass in the morning the field presents a rich purple hue from the long purple anthers which hang from the heads of the grass. Under ordinary circumstances very little change takes place for a week to come — the straw grows firmer and stronger, but at the end of the week its leaf begins to wither and dry, and now a loss will be sustained in the crop if not immediately cut. Now it is evident, if the farmer does not commence his hay harvest until all his fields are in this state, a heavy loss will be the result. Some seed will generally ripen in the heads of timothy during the fortnight the flowering is progressing, but the crop for hay ought to be secured ere much of it has ripened, as the ripening of the seed exhausts the nutriment of the stalk.

Other circumstances, too, control this work to a certain extent. Grass which has grown rapidly often lodges, and hence ought to be cut early. Grass, if we could have a choice, ought not to be cut immediately after a heavy rain. We are right, we believe, then, in saying, that circumstances must necessarily control the best farmer in securing his harvest, while at the same time he knows that his hay will contain the most nutriment if cut when it is in full blossom. The first effort of nature in ripening seed is to create a storehouse of food upon which it can draw during this highly important process. In grasses this storehouse is the stalk; in beets, carrots, and many other crops, it is the root, or what is called the root, perhaps an underground stem. Now in the case of the beet, the root becomes entirely worthless during the ripening of the seed, and so the stems of grasses lose their value when the seeds begin to ripen. The wisdom of a farmer is seen as strongly in the time and mode of gathering his harvests as in growing large crops — for what is the use of growing much, if the best order is not observed in saving them.

BONES OR PHOSPHATE OF LIME FOR A MANURE.

The difficulty, as certainly it is one difficulty, of using bones for a manure, is the want of a mill for grinding or crushing them. A large quantity of bone may be obtained in the vicinity of our villages, from the small slaughter yards; but as the farmer has no means by which they can be crushed; they are suffered to lie about those places as a kind of nuisance. A partial remedy, however, may be resorted to in these cases. Procure a quantity of oil of vitriol and subject them to its action in a tight half hogshead of oak, which, if the acid is diluted, will not be materially acted upon it. Of the dissolved bones make a compost with peat. Using peat if possible, or if not, the best of loam; that which contains an abundance of vegetable matter. To the sulphuric acid add bones as long as the acid is dissolved in them. The product is a super-phosphate of lime, and sulphate of lime. The object attained by the the addition of sulphuric acid to the bones, which consist of phosphate of lime and animal matter, is the greater solubility of the materials. The animal matter is in the condition of gelatine, and may be seen retaining the form of the bone. This will also now undergo decomposition, during which ammonia will be exhaled, which may be secured by the absorbative powers of peat and sulphate of lime. When mixed with the above materials, and in a dry state, it may be used like guano for corn or wheat. It is after all questionable whether in a series of years there is more economy in the use of the super-phosphate. Bone, if ground, will decompose and give its elements to the growing crops. Its operations will last longer, but will not of course be so effective for the first or second year. We think that there is economy in dealing out just the proper quantity of food to plants. We know there is in feeding animals. We seek the perfection of the one, as well as the other, and probably there is a point when manure may be so abundantly supplied that loss and waste actually occurs.

The *mineral phosphate of lime* of our rocks can be applied and used only by a solution in oil of vitriol; or at least, the powder dissolves so slowly that it is a matter of great importance to bring it to the state of super-phosphate. We have one crystal which contains nearly a sufficient quantity of phosphate of lime to supply an acre of corn. All the phosphate of soils, however, is the mineral phosphate; but it has been acted upon for a long time by air, water, and organic acids; besides, it is treasured up in a more soluble state in vegetables, which decay, and in which it probably exists in the state of a super-phosphate; but the amount is small, and where seed is removed from the soil it is soon exhausted, and then plants must depend upon the small amount of the unchanged mineral phosphate in the soil, unless it is supplied by the farmer.

EXTRACTS FROM THE JOURNALS.

PRINCIPLES OF BREEDING.

BY SANFORD HOWARD.

We have been several times requested to say something in regard to what is called "*in-and-in*" breeding. We are by no means confident, however, that any remarks of ours can throw light on the subject; though often discussed, it is still involved in intricacy. In endeavoring to understand it, the first point to be settled, is the precise meaning of the term "in-and-in" breeding. It seems to be understood variously—as some suppose it to apply to animals of any degree of relationship—others apply it to breeding from the same *family*, without particularly defining the affinity of blood which animals bred together should possess to justify the use of the term. Thus they regard the produce of father and daughter, or mother and son, as animals bred in-and-in; using the same term in this case as they would do in reference to the produce of brother and sister. But a strict definition is evidently necessary, otherwise the use of the term is wholly random, and its signification so uncertain, that it conveys only a vague idea.

What, then, is in-and-in breeding? Sir JOHN S. SEBRIGHT, in a letter on the "Art of Improving the Breeds of Domestic Animals," published some years since by the British Board of Agriculture, considers the term to signify breeding from animals of *precisely the same blood.* This is an intelligible, and we believe correct definition. It has also been assented to, and its adoption advocated with force, by JOHN HARE POWELL, Esq., a citizen of our own country, who has in times past been eminently distinguished as a breeder of stock.

Upon the basis of this definition it follows that no course of breeding can be strictly in-and-in, except that which results from coupling animals of exactly the same blood, and this, probably, can rarely happen but by an union of brother and sister, or of animals which were originally derived from such an union. Where the original male and female were of different families, it is obvious that the offspring does not possess the same blood of either of the parents, but has just half the blood of each. The produce of this offspring and either of the parents, would be three-fourths of one of the first pair, and one-fourth of the other. The next generation, bred in the same way, would be seven-eighths of the parent, the next fifteen-sixteenths, and so on; the blood of one of the original ancestors increasing and the other diminishing in this ratio with each generation. This and similar courses of breeding have been aptly denominated "*breeding in;*" and the term "*close breeding*" is also more or less applicable, according to the nearness of relationship existing between animals coupled together, or according to the extent to which breeding in is carried.

Having settled what is to be understood by the term "in-and-in," we will proceed to consider the expediency of that course of breeding. And it may be observed in the first place, that although many distinguished breeders have advocated and followed, more or less, breeding in, or close breeding, very few, if any, have recommended in-and-in breeding, *as here defined.** The effects of the course when carried on for several generations, can not perhaps be better described than in the language of SEBRIGHT, in the essay above referred to. "I have," says he, "tried many experiments by breeding in-and-in, upon dogs, fowls, and pigeons; the dogs became from strong spaniels, weak and diminutive lapdogs; the fowls became long in the legs, small in the body, and bad feeders. * * * Indeed I have no doubt but that by this practice being continued, animals would, in course of time, degenerate to such a degree as to become incapable of breeding at all."

It is a maxim in physics that an effect is not produced without a cause. Hence it is natural to ask a reason for the ill effects alleged to be produced by in-and-in breeding. We will endeavor to give one, which, though not entirely original, is in some respects different from any we have seen offered.

It is admitted that different families of animals have certain hereditary tendencies. The proneness to particular diseases in families of the human race, is evidence of this. Now it is plain that where two animals of the same blood and the same hereditary tendencies, are coupled together, there would be a greater liability in the progeny to exhibit any defect or disease which belonged to the family, than there would be if only one of the parents had this constitutional tendency. Hence we see the defects of parents augmented in the progeny.

This we believe to be the true cause of the degeneracy which ensues from in-and-in breeding. But let us not be misunderstood. It is not merely the *nearness of relationship* which produces these

* It is proper to remark that breeding *in* when carried to a certain extent, may be expected to produce results similar to those of breeding *in-and in*; that is, the consequences of the former will resemble those of the latter system, in proportion as the blood of the animals bred together becomes similar.

consequences; for we can readily believe that they might follow where the parents were not at all connected by consanguinity. The animals might belong to families wholly distinct, and yet their hereditary tendencies be similar. For example: let there be chosen a bull and cow wholly unrelated, or even of different breeds, each of which has disease of the liver to the same degree, and each also an equal hereditary tendency to that disease; the progeny generated by two such animals would no doubt have the same predisposition to the defect or disease of the parent as if both the latter had been of the same family. Thus the degeneracy of offspring is not owing to the relationship, simply, but to the natural defects of the parents or ancestors. The skillful breeder will therefore select his animals for propagation with a view of avoiding defects and increasing excellencies in the progeny.

But it may be said that excellencies as well as defects are transmissable hereditarily; and as animals of near relationship are sometimes found which possess certain valuable qualities in a greater degree than they are to be found elsewhere, the question is suggested—Why not permit these animals to breed together? This we should be in favor of to a certain extent; but the animals should be selected with judgment, and with particular care that they have not a predisposition to important defects. It will not do to rely on the idea that their good points will overpower their bad ones; for as their superior points or qualities are probably the result of art or accident, (not being natural or common to the race,) their defects will be more likely to be increased in the progeny than their excellencies.*

The remark in relation to animals which exhibit peculiarities not common to the race, we will endeavor to illustrate. For instance, in a species of squirrels, the general color of which is grey, we now and then find those which are perfectly white. Similar deviations from the general color of the species are met with also in mice, and other animals. The same thing is found in birds. We have heard of crows which were nearly white,† and we have

* Sebright observes that—"If one male and one female only of a valuable breed could be obtained, the offspring should be separated, and placed in situations as dissimilar as possible; for animals kept together are all subjected to the effects of the same climate, of the same food, and the same mode of treatment, and consequently to the same diseases, particularly to such as are infectious, which must accelerate the effects of breeding in-and-in. By establishing the breed in different places, and by selecting with a view to obtain different properties in these several colonies, we may perhaps be enabled to continue the breed for some time, without the intermixture of other blood.

† White Crows.—In an article on the "Principles of Breeeding," in another part of this number, it is mentioned that white crows have been sometimes seen Since that article was written, we have learned, through the Zanesville, (O.) Gazette, that Dr. W. E. Ide, of that place, has lately received for his ornithological cabinet, one of these rare birds, which was shot in that vi-

seen (to use a paradox) a white black-bird. Changes of form and habits are likewise met with which are equally striking. Animals which exhibit such deviations from the general characteristics of the race to which they belong, may be deemed *monstrosities;* but if it is wished to perpetuate their singular qualities, it is obviously necessary to adhere as closely as practicable in breeding, to the strain of blood in which these qualities are manifested. If, instead of this, the animals are allowed to breed with those which do not possess the desired peculiarity, the new traits, having no fixed hold on the blood are soon mingled and lost in the general current of the race which runs in a different direction.

Thus, where an extraordinary disposition to secrete fat is exhibited by a particular cow and her progeny, it may become necessary in order to secure that quality and increase the number of animals possessing it, to breed from near affinities. But much will depend on the skill used in selecting the animals to breed together, and only experience and the closest observation, aided by good judgment, can guide to successful results.

We would not, however, advise breeding from near affinities, except so far as may be necessary to fix some valuable quality not belonging to the race in general. Where no superiority is exhibited in a particular family, or where the individuals composing a race are nearly similar, we can see no advantage in resorting to the system.

In regard to the supposed necessity of *crossing breeds*, there are certain vague theories which we would by no means countenance. Some appear to imagine that breeds of animals can not be continued pure without deterioriation. This notion leads those who entertain it, to make various mixtures in breeding, in the hope either of avoiding degeneracy or creating improvement. We believe that the idea is not only unsound, but that, if it were carried out in practice, it would be productive of incalculable injury, by destroying the important distinctions which naturally exist among animals, and by which different species and breeds are admirably adapted to different locations and purposes.

No degeneracy is observable in animals in a state of nature. Among the various wild races (though as has been stated, some *occasional* changes occur,) the principal characteristics are continued from generation to generation. There is no evidence that wild geese or wild ducks degenerate; and no person can reasonably believe that the buffaloes of our western prairies need crossing, or that they could be improved for the situation they occupy by any foreign mixture. The same remark will probably apply to

cinity. It is said to have belonged to a brood of four, two of which were black, and two entirely white, except a dark tinge towards the tips of the wings. They were nearly or quite full grown. Their parents were black.

the West-Highland cattle of Scotland, and to some of the mountain and other breeds of sheep. SEBRIGHT has well remarked, however, that the circumstances in which wild animals are placed, "produce all the good effects of the most skilful selection;"* and though it is not unlikely that they frequently breed from close affinities, their freedom from disease or defect probably prevents the bad consequences which might attend such breeding with animals in an artificial state. The conclusion therefore is, that aboriginal races and breeds are readily continued without crossing. With varieties which have been produced by crosses, it is admitted the case is different. The original fixed habit being broken up by the cross, their course becomes erratic, and their qualities various. Hence the exercise of much skill is required to continue them. "What has been produced by art," says SEBRIGHT, "must be contined by art."—*Cultivator.*

LAYERING OF FRUIT TREES.

BY J. SLATER.

I am engaged in the nursery business, and it may be interesting to some of your readers to learn my manner of propagating fruit trees. I commenced with grafting and budding seeding stocks at the ground. When my grafts were two years old, I commenced with what I shall term *limb* layering; and as this mode of layering may not be understood by all of your readers, I will describe it. I take the lower limbs of my grafts and bend them down to the ground, and at that place in the limb which will be buried deepest, I cut the limb on the under side about half way off, and split it about an inch toward the end. I then cover it with fine earth about six inches deep where it is cut, leaving the end of the limb turned up out of the ground. As these limbs grow, the returning sap forces out roots from the under side of the cut; and when the roots have sufficiently grown, the limb is cut from the tree and transplanted in the nursery.

The time required for these layers to get well rooted, will be from one to three years—as some varieties take root much more readily than others. The time which writers on this business

* Speaking of animals in a wild state, Sebright says—"The greatest number of females will of course fall to the share of the most vigorous males; and the strongest individuals of both sexes, by driving away the weakest, will enjoy the best food and most favorable situations for themselves and their offspring. A severe winter, or a scarcity of food, by destroying the weak and the unhealthy, has all the good effects of the most skilful selection. In cold and barren lands no animals can live to the age of maturity, but those who have strong constitutions; the weak and the unhealthy do not live to propagate their infirmities, as is too often the case with our domestic animals."

have given for doing it is "late in the fall or early in the spring." These I admit are the best times for doing the work, but I have followed it successfully through the season. It will of course be understood that a tree grown in this way, from the limb of a graft, will be a graft, root and branch; and will be filled with limbs, like other young trees, from the ground up. With these I commence what I term *tree* layering. I dig trenches for my nursery rows, about ten inches deep by twelve wide, and four feet apart. I then place my layer tree in the trench, and cover it all except the tip of each limb with fine earth. The limbs of a tree buried in this way do not need cutting to make them take root, as in the case of *limb* layering. From each of these limbs I get a tree. They will commence growing about as soon as the tree that is transplanted to the orchard, and are not near as likely to die; because they do not have the severe exposure to the wind and sun that the orchard tree has, and by which it is often prevented from taking root.

Soon after the little trees commence growing from the limbs thus buried in the trench, the returning sap, not liking its underground journey back to the old root, throws out a set of roots from the tender wood of the end of the limb, near the top of the ground, by which the young tree is afterwards nourished.

When I first commenced this kind of layering, I took some of the straight limbs that were from one to two feet long, and turned them directly up from the stock of the tree, considering them as trees so far grown; but the wood near the butt of the limb was probably too hard to let the roots shoot out from it; and the sap (not being checked as in the case of the limb that was buried) kept up its circulation with the old roots. Consequently, when I took up my trees for selling, this kind, although large and handsome, was worthless for want of roots. A tree that is buried in the trench as it should be, to the ends of the limbs, does not seem to grow at all after the young trees above it have taken root for themselves.

Trees propagated in this way make about the same growth in a year that those do which are grafted. My largest cherry and apple trees of last year's growth, measure over five feet; and the season before, I had a still larger growth. Trees grown in this way are many of them of a medium size for transplanting at two years old; yet as they stand thick in the row, and are all connected in the ground, they should not be disturbed until the third year. Then the whole row can be taken up, and the nurseryman can accommodate his customers with large, medium, or small sized trees; and should there be any that are crooked or too small to sell, they can be kept to re-stock the row that has just been cleared. The space just cleared should be filled with the same variety, as there will many shoots come up from the fragments of roots that are left in the ground, and will be of value to the nurseryman if he keeps his row filled with the same variety; but if he does not, he must look to it that he does not in this way get his varieties mixed.

Trees that are propagated in this way, I think, are of more value than many that are grafted, or budded; for where a graft is set into a seedling stock above the ground, there must be more or less of a defect in the tree, according to the size of the stock into which the graft is set—it being well known that although a graft will overgrow and heal around the stump, yet the top of the stump never unites to the wood above it. But the layer tree is sound from one end to the other. And I believe it is often the case that a seedling root is not sufficiently vigorous to support as it ought some of the large fast-growing varieties. But the layer tree will have a root of the same kind and in proportion to its stock and top.

Again, it is believed by many (who for aught I know are good judges in the matter), that grafted fruit will *run out*, or become so adulterated as not to be known by its original name, after repeated graftings from one tree to another. This, as I understand it, is because the flavor of the fruit is (although mostly yet) not wholly given to it by the foliage, but is to some degree affected by the ascending sap sent up from the root. But in trees that are propagated by layering, I see no possibility for the variety of fruit to *run out*, or become adulterated by propagation.

I have heard but two objections to trees that are grown from layers. One is that "they are all suckers, and suckers are of no account." But the difference between a layer tree and what is generally termed a sucker, is considerable. Another objection is that some writer has said that layers will make dwarf trees. But the trees will show for themselves that they are not very dwarfish.

Some nurserymen who have examined my trees and mode of propagating them, are going to commence *tree* layering with trees that have seedling roots. Such will have trouble from the shoots that will come up from the roots of the trees they bury. When the young trees that have started from the limbs of the tree that is buried, have sent out roots for themselves, there will be so little a return of nourishment from the leaves to the old root, that it will make an effort to sustain itself by sending shoots directly up to the air. If the old root were a graff, these shoots would be welcomed by the nurseryman; for they too would soon send out a set of roots near the top of the ground, and make thrifty trees. But if the old root is a seedling, these shoots must be pulled up; and a thrifty seedling shoot so nearly resembles some of the grafted varieties that it is difficult to distinguish between them.

That nurserymen may calculate what progress can be made in putting down these layers, I will say to them that last fall, when the weather was favorable, with the help of two boys (one eight, the other twelve years old), I dug the trenches and buried layers enough for 1600 trees, daily.

As I am fully satisfied that trees produced by layers are as good, and can be afforded for half the price that those can which are grafted, I have thought the above mode of propagation was worth giving to the public.—*Prairie Farmer.*

[We believe that apple trees propagated by layers are not so likely to live when transplanted into the orchard: it is an old practice, and by it trees may be multiplied rapidly; yet, let the purchaser see that they are taken up carefully and planted carefully, and it may succeed.]

ANALYSIS OF THE ASHES OF THE SUGAR CANE.

BY CHARLES UPHAM SHEPARD.

Knowing that some of your readers would take an interest in the following results upon the *ashes of the sugar cane,* obtained by Mr. Stenhouse, I have been at the pains to condense them from a very valuable memoir published by this gentleman in a supplementary number of the London, Edinburg and Dublin Phil. Magazine, and Journal of Science (No. 183, Dec. 1845, p. 533), and herewith offer them to you, with a remark or two of my own, provided they meet your views.

	1	2	3	4	5	6	7	8	9	10	11	12
Silica.	45.97	42.90	46.46	41.37	46.48	50.00	45.13	17.64	26.38	52.20	48.73	54.59
Phosphoric acid,	3.76	7.99	8.23	4.59	8.16	6.56	4.88	7.37	6 20	13.04	2.90	8.01
Sulphuric acid,	6.66	10.94	4.65	10.93	7.52	6.40	7.74	7.97	6.08	3.31	5.35	1.93
Lime,	9.16	13 20	8.91	9.11	5.78	5.09	4.49	2.34	5.87	10.64	11.62	14.36
Magnesia,	3.66	9.88	4.50	6.92	15.61	13.01	11.90	3.93	5.48	5.63	5.61	5.30
Potassa,	25.50	12.01	19.63	15.99	11.93	13.69	16.97	32.93	31.21	10.09	7.46	11.14
Soda,	——	1.39	——	——	0.57	1.33	1.64	——	——	0.80	——	——
Chloride potassium,	3.27	——	7.41	8.96	——	——	——	10.70	11.14	——	16.06	0.84
Chloride sodium,	2.02	1.69	9.21	2.13	3 95	3.92	7.25	17.12	7.64	4.29	2.27	3.83

Nos. 1, 2, 3 and 4, were very fine full grown canes from Trinidad, consisting of stalks and leaves, but without the roots: Nos. 5, 6 and 7, were similar canes from Berbice; No. 8 from Demerara; No. 9, of full grown canes, but with few leaves, from the Island of Grenada; No. 10 from Trelawny, Jamaica, consisting of transparent canes in full blossom, grown about six miles from the sea and manured with cattle dung; No. 11, of transparent canes, from St. James', Jamaica, growing about two hundred yards from the sea, being old rattoons, and also manured with cattle dung; No. 12, young, transparent canes three and a half miles from the sea, and manured with cattle dung, guano and marl.

From these analyses, it appears that the cane for successful cultivation requires a very large quantity of silicate of potassa and also a considerable amount of the phosphates. Few cultivated plants, except the cerealia, require so much. Wheat, or any of the cereals, necessarily causes the removal of a portion of the valuable inorganic constituents of the soil, such as the alkalies, phosphates, &c., which can only be returned to it indirectly: but with sugar the case is quite otherwise. Sugar is a purely organic substance, consisting of carbon and the elements of water, all of which can be derived from the atmosphere, and contains neither alkalies, nor phosphates; so that if the ashes of the canes were carefully collected and returned to the soil in an available state, there is no reason why cane might not be grown upon the same lands almost indefinitely.

In the West Indies, where wood is scarce, the crushed canes are employed as fuel, under the coppers of the boiling house to concentrate the sirup, and as the heat required is great, a large amount of the silica and the alkalies present is converted into a hard, insoluble glass, which in this form being useless, is thrown away. We can therefore, readily understand the reason of the rapid exhaustion of their sugar-lands, and the comparatively slow wearing out of those in Louisiana, where from the abundance of wood, the cane-trash is never thus employed, and where in addition to the inorganic ingredients of the cane, the soil receives (at least where the planter-ship is what it ought to be,) the almost equally valuable mineral constituents of the wood itself.—*Southern Agriculturist.*

WOOL.

The annexed article by Hamilton Gay Esq., on the growth, preparation, packing, &c., of American Wool for the English market, contains information which will be valuable both to the farmer and merchant. It was elicited by the following note, dated—

New York, May 16th, 1846.

Dear Sir—You have been engaged for the year past in exporting American wools to various markets in Great Britain, and must have acquired much valuable information respecting the manner in which our wools should be prepared for those markets. Such information is much wanted by our farmers and wool dealers; for it is evident that wool is to be henceforth an important article of exportation from the United States. Allow us, then, to inquire, whether you will not do us the favor to write out your impressions for the Journal of Commerce.

We are, sir, your ob't servants,

HALE & HALLOCK.

HAMILTON GAY, ESQ., 53 South street.

NEW YORK, May 16th, 1846.

Messrs. HALE & HALLOCK:

Dear Sirs—I have your favor of this day's date. Such information as I can give on the subject of your inquiry, is at your service, for the benefit of those interested.

More than one-half of all the American fleece wool exported from the United States, of the last year's clip, was owned and shipped by myself and by others having a joint interest with me. The purchases were all made at the lowest point of the season, beginning on the 1st day of September, and closing on the 25th day of October last. The result has been a net loss of $5,993, and 188 bales of wool yet unsold; equal only to the fraction of a penny sterling on each pound. Not a fleece of the wool was sold to meet the payment of drafts drawn against it, nor was any portion of it unduly pressed upon the market—and this loss arose from causes unnecessary, easily avoided, and entirely within the control of parties in this country.

The prices of United States fleece wool are affected very injuriously in foreign markets by its unclean condition. It contains too much oil, and yolk, and dirt. The sheep are generally washed with too little care, and run too long after washing before shearing. A large portion of the wool, from this cause, must pass through the hands of those who sort it and scour it in soap and water, before it is sold to the manufacturers.

The wool itself is of superior staple, and while upon the sheep is inferior to no other in the world, of equal grade; and it may be safely stated, that every pound of oil, or other worthless substance, will, in the English markets, deduct from the value of the wool cantaining it, the price at least of two pounds of wool. English manufacturers and samplers, before purchasing, open a portion of the fleeces, and examine carefully, not only the fineness, but also the *strength* of the staple, and its condition throughout.

The first important operation in preparing our fleece wool for export, is to properly cleanse it before shearing. The sheep should be washed in clear running water—the water must run freely through every part of the fleece, and the wool and every part of it should be pressed and worked with the hand while under water, until the dirt and oil are removed, and *the water runs off* *clear.* The shearing should then take place as soon as the sheep become dry after washing.

Then comes the tying up of the fleeces.

All the loose locks, clippings and tags, and every thing unclean, or of an inferior quality, and the coarse wool from the thighs, if there be any, should be *wholly rejected*, and the fleeces tied up firmly, so as to keep their shape, and show, as is customary, the best part of the fleece on the outside.

This terminates the wool-grower's part; but I will here remark, that sheep should be kept as nearly as possible in uniformly good health and flesh, because every portion of the staple or fibre of the wool which grows while the sheep are very poor from disease or want of food, has so little strength as to break in working; and if this weak growth takes place in the fall of the year, it destroys the fleece for many purposes.

The next step is to properly sort and sack the fleeces, and direct them to the best market. This is the merchant's part, and more than a shipper's profit depends upon its being performed understandingly.

In England each manufacturer devotes his attention to one particular description of goods, for which his machinery has been constructed, and he makes no other. The makers of each kind of goods have established themselves mostly together in some one part of the kingdom, where they have a wool market of their own, in which they seek for the qualities and descriptions suitable for their purpose, and will buy no other. The broadcloth makers in the West of England; the Worsted Combers of Yorkshire; the flannel manufacturers of Rochedale, and those who make hosiery in Nottingham; purchase in their several markets a supply suitable only for their own machinery. So nice does this discrimination run, that the fleeces of fine wool, taken from sheep one year old, which were never before shorn, are mostly sent to one part of the country, and there sold to be used for one purpose, and the fleeces taken from the same sheep the next year, are sent to another part of the country, and there wrought into a very different kind of goods. Thus it is of great importance that *fleece* wool for shipment, before it goes on board, should be sorted and sacked according to the grades of foreign manufacturers, and suitable for their purposes, in order that it may be sold *directly* to them—otherwise, even if clean and in good order, it must pass first through other hands, that re-sort it, rĕ-sack it, and distribute it to various parts of the kingdom at considerable expense.

The size of the bales is the next thing to be kept in view. I have paid on large shipments as high as one dollar *per bale* for "Dock Dues," without reference to the size of the bales; while at some ports the charge is less than one-tenth part of this sum.

Custom in England gives the purchaser an allowance on *each bale* called "The Draft;" but the amount thus given varies at the different markets. I have many accounts of sales in which only one pound weight *per bale* is deducted for "the draft." I have other accounts of sales made in different places, in which 2 pounds, and 3 pounds, and 4 pounds, and even 8 pounds *per bale* is deducted for "the draft," without reference to the size of the bale. This may seem unreasonable, but it is established by the ancient usage of the different markets, and must be complied with. The bales should therefore be of a size suited to their destination; but not too large, else they will not be lifted, but rolled over the docks and streets. Each sack should be firmly packed by a man inside, but never pressed by machinery, and every fleece of weak staple carefully rejected, and those fleeces packed by themselves.

The shipment then requires some attention.

The wool should be placed on board dry, with the sacking whole and clean, and should always be sent as light freight in the upper part of the vessel. Our wool contains too much oil and gummy matter to be placed low in the ship, with heavy weights pressing upon it, without being in some degree injured by matting together.

This closes the part of the American merchant.

In illustration, I will remark that I have had two invoices of wool sold in England at the same price, in the same place, and within three days of each other, whose value in this country differed ten cents per pound on the day of their purchase, or any other day since. The one kind answered the market, the other did not, but was greatly superior in fineness of fibre.

My own clip of wool, grown upon my own lands, and cut last June, and which I know all about, I shipped to England in one vessel, and consigned it, in two equal quantities, of equal quality, to two different markets, about 200 miles distant from each other, and they were sold near the same time, by direction of the same house, and after full and fair exposure in both markets, at a difference of more than seven cents per pound in price. Its quality and condition were very superior, and just suited to the one market, and not to the other.

Within the past year, I have sent more or less wool to every part of England, and to Wales, and to Scotland, comprising the various qualities grown in Illinois, Michigan, Ohio, Pennsylvania, New York and Vermont. Nearly every invoice was accompanied with an intimation that "It was not sent so much with a view to profit as to try their market, and hoping to receive in return suitable directions or suggestions for a better method for preparing and shipping such wools to England." The result has been a voluminous correspondence, giving ample details, and all the particulars required. It is from this correspondence and the results of those actual sales, as well as from personal observation and information, that I venture the opinions already expressed. I trust that the past errors may be avoided in the future: and I now have done with the preparations and shipment.

The production of wool in the United States, until recently, has not equalled the consumption, but the low price of grains and provisions since 1840, has caused a rapid increase in the number of sheep; which, under very favorable circumstances, may double each three years; and they now surpass, and are likely still further to surpass, all previous estimates. The quantity of wool became so unwieldy last year, that the value fell full twenty per cent, notwithstanding the foreign shipments, the abundance of money, the high tariff, and the prosperous condition of the manufacturing interest. We now have the promise of considerably increased quantities in this year's clip, especially from some of the new States, with money more in demand, the protective policy in more danger, and lower prices of cloths. If the home markets were solely relied upon, wool, like all other articles, when produced in excess, would long rule low in price. An abundant supply will hereafter enable manufacturers to purchase at their leisure, and to choose their qualities; and henceforth prices must be regulated, like those of cotton, in the open markets of the world. The growing of wool in this conntry is receiving from year to year more and more attention. Men's minds have been turned in that direction. Hundreds of thousands of sheep, instead of being slaughtered as formerly, are now annually driven from older and cultivated lands, as fast as their increase exceeds their pasturage to newer grounds, where they are distributed to emigrants from the older States accustomed to take care of them, and there they form the germs of other flocks growing up in millions. An impetus has thus been given which must long continue, because consistent with the interests of those concerned. The room and the inducements are sufficient. In the North West, between the Alleghany and the Rocky Mountains, we have a vast region stretching over the extent of empires, where the soil is composed mostly of vegetable mould. the accumulating deposit of various herbage from year to year since the creation. The earth contains nothing approaching it in vastness and fertility. This deposit is a mine of material which may be turned into wheat, only by planting wheat upon it, or into wool only by pasturing sheep upon it. It lies open to every hand that will partake of it. Its position is secure from the desolation of wars. Its extent and quantity are such that it must pass to other generations of men before exhausted. But like all great tracts of interior territory, the transportation of its products to the ocean, and the markets of other climates, is laborious, costly, slow, hazardous and uncertain. Wool forms the only exception. Wool, which is worth ten times as much as iron of equal weight, may be sent forward from the place of its growth thirty times cheaper than wheat of equal value. The necessaries of densely peopled countries insures its steady consumption. Of all the articles of commerce, wool is the most stable in its nature, and has always been the most generally used by civilized man, from times the most remote of every nation, tongue and race. Of all the staple articles of the world, wool requires the least labor to produce it, the least care and cost in its preservation and transportation, and is the most suitable, profitable and reliable production for the great interior of this conntry, where labor is scarce and dear, and fertile lands cheap and plenty. Hence its growth will long continue to be a cherished interest, and the export demand, at the prices of other countries, will last forever.

I remain, yours truly,

HAMILTON GAY.

THE CURCULIO.

BY JAMES ALLEN.

If a man does not possess a comprehensive mind, or loses one between youth and old age, he may be good and clever, but never can be useful beyond the circle of common business. And if I am lacking from dotage or any other cause, my unbounded conceit can be put to the test when I make the assertion, that I can subdue the peach worm, and destroy the plum bug, *Curculio.*

As much has been written on both subjects, by men of learning and observation, they have only given me cause to believe that they have passed round the enemy and only driven in the picquet guards, instead of storming their fortress.

If a man having young peach trees will remove the ground early in the spring, and with a wooden paddle scrape about the roots and search for worms, and then with soft soap, made and kept with strong ley, soap the roots well and up the trunk about six inches, leaving the cavity made to remain open several weeks, and then filled up with ashes either leached or unleached, using enough to make a mound about each tree, there to remain until late in the fall, and then leveled down. The second year no soaping will be needed, if it was done well the year before. But the ashes put in mound form around the trees must be continued.

I will now leave the peach worm and pass on to that sly "Turk," the *Curculio,* that destroys all plums when they are let alone.

Lots where swine and poultry can have access is the proper place to plant plum trees, and in ground moderately hard, plum trees flourish best. To talk of hogs eating the fallen fruit and destroying the bug in that way, is but theory without evidence to support it. The most of plums are punctured when they are about the size of garden peas, and hogs destroy more of them by treading than in any other way. But there is a remedy to save the fruit before the injury is done.

Soon after the trees bloom, the bugs can be found on the trees ready to commence their work of destruction when the plum bursts the blossom cup; and at that time the fruit being young and tender, they soon make great havoc. In proper time I make a driver about one foot long, three inches wide, and more than one inch thick, and circle the end to suit the round of a tree, over which I put thick spongy leather, to save the bark of the tree and limbs from injury; and after preparing two large white cloths, one for each side of the tree, and spreading them on the ground, with my driver and small mallet I jar the tree and all the limbs well, and kill the bugs immediately. If this is continued thoroughly, but few bugs can escape; yet during the season afterwards all punctured fruit should be gathered and burned. It lightens the business for the second year. If not done, the worm escapes into the ground, there to remain until the next spring, when it rises a bug to commence its depredations. The victory thus gained must be continued from year to year, and every season the business will become lighter.

A drawing of a young plum with the enemy on it, and a semicircular cut made on the fruit by the bug, can be seen in A. J. Downing's Book on Fruits, but the drawing of the plum is too large, as the most of plums are punctured before they are one-half inch in diameter, and many of them before they are half that size.

Where bugs have gained a habitancy, and are very numerous, jarring trees twice a day is a very good plan, and in a few days their number will decrease; and the earlier in the season the business is done, the more effectual it will be.

Persons seeing this communication, if they lose their plums hereafter, it will be their own fault.—*Western Reserve Magazine.*

Road Making.—Roads may be improved by draining. Such a result may be attained by cutting a deep ditch through the middle of the road, running it parallel with it, for the distance required; the ditch may be filled with stone at bottom and gravel at top. This is the effectual remedy for muddy roads.—Ed.

WINDOW GARDENS.

[We recommend the following measure to the consideration of those who may be confined to narrow apartments, or who may require profitable as well as pleasant recreation: it is extracted from the *Gardeners' Chronicle*, a paper whose high standing is acknowledged by the first agriculturists and gardeners of this country.]

Believing that these gardens will prove a valuable acquisition to lovers of flowers in England, I send the following observations and lists of plants, in the hope of facilitating and promoting their general adoption.

The first published account of window gardens appears to be contained in a little work entitled "*Le Jardinier des Fenêtres des Appartemens et des Petits Jardins*," printed in Paris in 1823. The author states that one which he describes existed four or five years previously at the house of M. Gilet, Rue du Faubourg de Temple, and he states the interesting fact, as connected with the usefulness of those miniature greenhouses that the Cereus speciosissimus there flowered for the first time in France.

But it would appear, although many amateurs visited M. Gilet's house to see the splendid novelty, they were not induced by his success to follow his example, and the window garden seems to have been forgotten; for ten years afterwards an engineer, of Mézières, passing through Boulogne, saw one at the house of an English admiral, and was so much struck with it that he made a communication on the subject to the Horticultural Society of Paris, and it was so new to the members that they referred the paper to one of their standing committees, who made the following report upon it:—

"The committee think this sort of greenhouse must be pleasing; easily constructed, although rather expensive,* and particularly adapted for a window presenting a disagreeable view."—*Annals de la Soc. d'Hort. de Paris*, for 1833, p. 260.

Notwithstanding this public notice, it is only very lately that Parisian amateurs have adopted the plan, which is the more remarkable in a city where the taste or rather the passion for flowers is almost universal; but the fact is proved by M. Paquet having thought it worth while to give a figure of a "Fenêtre Serre" in his "Almanack" for the present year. He tells us, however, that they are common in Belgium, probably at Brussels, for at Ghent, the head quarters of horticulture in that country, they have only

* A singular objection to have made to so simple a structure in a country where glass is so cheap as it is in France.

been introduced within the last two years.—*Annals de la Soc. d'Agric. et de Bot. de Gand,* for March, 1846.

One is naturally led to compare the advantages of a window-garden with those of a Ward's case, and probably few amateurs would hesitate for a moment in deciding that the former is beyond all comparison the more useful of the two. It has always appeared to me, that the utility of Ward's cases, when employed for growing plants in rooms, has been greatly overrated, while it is not possible to appreciate too highly the benefit they have conferred on botany and horticulture, by affording the means of transporting plants by sea, with the certainty of success, from distant parts of the world. A problem has thus been solved that had baffled the ingenuity of collectors, and appeared to defy the resources of science for several centuries.

But what does the amateur gain by filling his windows with these cases? After all that has been said and written on the subject, it is a fact that very few flowering plants will thrive in them, especially in town houses; but the great objection is that they give no occupation; there is no gardening to be done in a Ward's case. After the novelty is over it excites no more interest than any other article of furniture in the room, and whenever a few cut flowers and a basket of green moss can be obtained, gratifying the sense of smell as well as pleasing the eye, it is almost useless.

Now one of the great advantages of a window-garden is the agreeable occupation it affords to those amateur gardeners who are imprisoned in towns, to invalids, and to lady amateurs, and young people who are cofined to the house by bad weather, in town or in the country. Watering the plants, tying up climbers, making cuttings, and raising seedlings, shifting the plants, watching the daily progress and gradual opening of the flower-buds, may serve to beguile many a tedious hour, and persons unaccustomed to plant culture would hardly believe how much occupation, amusement, and instruction these little gardens will supply.

It will be found a great improvement, and tend to secure a healthy vegetation, to plunge the pots in moss and to cover them with the same material. The green moss is in itself a beautiful object, while it serves to conceal what is the very reverse, a collection of red garden-pots; then by keeping it wet in summer, and dry or nearly so in winter, an atmosphere may be readily provided exactly suited to the wants of the plants, and the soil in the pots is kept at all times in an equable state with regard to moisture and temperature, protected alike from a burning sun in summer, and from the cold occasioned by evaporation, or by radiation under a clear frosty sky in winter.

The moss likewise allows the plants to be frequently watered overhead, or syringed, without it; in performing these operations, a part of the earth is liable to be washed out of the pots, which it then becomes necessary to remove, in order that the shelf may be cleaned.

In a French window, the glass case occupies the whole height when the casement opens from top to bottom, or three-fourths of the height when there is a division, as shown in the figure at p. 203 of the Chronicle. In an English window, and where economy is studied, the case need only reach to the top of the lower sash; but where expense is not an object, and if the room be otherwise sufficiently lighted, it is advisable to let it occupy the entire space of the window, covering both sashes. The additional height would give room for several shelves, which might be readily got at by drawing down the top sash; but the principal advantage would consist in the ample space gained for climbing plants, which might then be made to occupy not only the sides but the front.

When there are other windows in the room to secure ventilation, it is not necessary that the sloping light should open, especially if the window has not a southern aspect.

In most cases, where any opening is required, sufficient air might be admitted by a casement occupying a single square, either on one side or in the top-light.

In winter it is essential that the joints of all openings should be made air-tight by pasting slips of paper over them; in our ill-ventilated apartments the supply of air required for respiration, and the combustion of fuel, is obtained by allowing a cold atmosphere to rush through every chink and crevice about the doors and windows, and such currents in frosty weather would destroy the flowers and foliage of any plant exposed to them.

Before I proceed to the subject of plants adapted for window gardens I would suggest that those who intend to adopt them would do well to study carefully the papers of Mr. Errington on "Winter Flowers," and those of an "Amateur Gardener," which have appeared from time to time in the Chronicle.

In furnishing the garden it is evident that in order to produce the best effect, the habit of the plants should harmonize with the limited dimensions of the structure intended to contain them; moderate sized flowers of clear and brilliant colors, delicate foliage, and a compact habit, are the points to be chiefly attended to in selecting the plants.

In summer and autumn there can be no difficulty in providing an abundance of plants among the endless varieties of Pelargonium, Fuchsia, Calceolaria, Verbena, and Roses.

ON THE SUCCESSIVE DEVELOPMENT OF VEGETABLE MATTER IN THE CULTIVATION OF WHEAT.

M. Mathieu de Dombasle, who is so well known in France from his scientific researches into the means of preventing bunt in corn, has, in a memoir on the nutrition of vegetables, endeavored to overthrow an opinion generally entertained by cultivators that plants do not exhaust land except during the period of fructification; that is from the time of fecundation to that of the ripening of the seed. This opinion is founded on the generally admitted fact that a crop mowed just after coming into flower exhausts the land much less than if it is suffered to become ripe. Thus Clover and Tares are considered not merely as innocuous, but in some cases even as decidedly beneficial to the land. Besides, we know that of all parts of vegetables the seeds are those which, in the same bulk, contain the greatest quantity of nutritive matter, and therefore, *à priori*, it is natural to conclude that they require for their formation a greater quantity of nutritive principles.

To these facts M. de Dombasle has opposed others quite as well established, which tend to prove that plants draw as much nourishment from the soil at the beginning of their development as at a more advanced period. For instance, amongst vegetables considered as the most exhausting there are some which in ordinary cultivation are not allowed to produce seed, as Cabbages, Woad, and Tobacco; and it is agreed that in nurseries where young plants of Coleseed and Beet are raised for transplanting, the ground soon loses its fertility.*

M. Mathieu de Dombasle has not hesitated to attribute the slight degree of exhaustion caused by certain green crops to the circumstance of their leaving in the ground a quantity of roots, which is very considerable compared with the whole mass of vegetation. To complete this organization, it may perhaps be useful to remember that those green crops which exhaust but little, or are beneficial to the soil, are gifted with the power of deriving from the atmosphere the greater portion if not the whole of their elements. In a former work M. Boussingault has made it appear that all the vegetable matter produced in the course of a crop is not found in it when mowed; in Clover, for example, the quantity of organic matter remaining as an acquisition to the soil may amount to more than 0.8 of the weight of the hay. We must then set it down as a principle that every crop depauperates the

* It is evident that these instances are not conclusive. The point is not to prove that young crops do exhaust the ground, but to inquire whether they exhaust it as much as when they are allowed to ripen their seed.

ground on which it grows, but that the exhaustion, which is always clear when the crop is entirely taken away, becomes so much the less sensible, as there remains in it a greater or less quantity of residual parts.

The slightly exhausting effect then of vegetables before flowering, is far from establishing the point that during their early stage of growth they subtract but little from the soil; the above-mentioned facts prove the contrary, at the same time that they seem to indicate that at this epoch the plant already holds in reserve, accumulated in its organs, a large portion of the matter which at a later period will concur in the formation of the seed. We know, for example, that vegetables taken up after fecundation yield seed notwithstanding, when they are kept in a proper state of moisture.

When a vegetable is fecundated the reproduction of the species is insured, for, strictly speaking, it is effected under mere meteorological influences. Proceeding from this phase of vegetable life, the matter accumulated is carried towards the point where the fruit is to be developed; the green color of the leaves gradually fades, the saccharine and amylaceous principles, and the azotized substances, leave gradually the stems and roots. Clover and Beet after having produced seeds can no longer be considered as fodder, their stems and leaves presenting merely a ligneous and insipid tissue.

In consequence of this appropriation of the succulent principles of the roots, we understand that a full grown plant will leave only a small residual part in proportion to what it would have left before maturity. It is to this diminution in the organic matter of the residuum, that M. de Dombasle has attributed the exhaustion occasioned by crops; but does it follow necessarily from this concentration of the juices towards a single organ, that from the moment it commences, the air and atmosphere cease to have any part in the phenomena of vegetation, and that the whole work of organization which is accomplished after flowering is formed merely at the expense of the materials stored up in the tissues of the plant. This is the opinion of M. de Dombasle. Nevertheless, after flowering, the leaves preserve for a long time their aërial functions, and the moisture which escapes from their leaves shows that the roots have not ceased their functions. We see that for an ill-founded opinion, an opinion entirely contrary, but not sufficiently justified in every point of view, has been substituted; it was contended that assimilation takes place principally during fructification; M. de Dombasle affirms that a fecundated plant incloses already all the elements necessary for maturation, and as he did not find for his defence arguments as strong as those which he had employed for the attack he had recourse to experiment.

On the 26th of June, when the Wheat was in flower, he marked out 40 plants as equal as possible. Twenty of these were taken, the remainder reserved for future observation. After having cleaned and dried the 20 first plants, he found that they were composed of—

	oz. (avdp.)
Roots,	1.5
Stems, spikes, and leaves,	4.4
	5.9 ounces.

The remaining 20 plants were gathered after the ripening of their seeds on the 28th of August, and gave—

	oz. (advp.)
Roots,	.95
Straw, spike, chaff, and leaves,	3.01
Seeds,	2.34
	6.30 ounces.

In becoming ripe the plants had increased by 4-10ths of an ounce only, that is, by about 1-16th of their weight. The Wheat, therefore, had gained from the time of sowing to flowering 15-15ths of its whole weight. If, then, it had been mown when in flower, it would have returned to the earth by means of its roots, a fourth of the weight of the crop, whereas, when ripe, it left in the soil one-seventh only.

The practical inferences to be deduced from this experiment, if correct, are important; for if it is true that a plant cut when it is in flower contains already nearly the whole of the organic matter which it will contain a month or two later, as regards hay crops, it would be more advantageous to mow before, rather than after flowering. The method recommended by certain cultivators of multiplying the cropping and cutting of hay, on the same field, would thus be justified—a method whose merits are very doubtful in the estimation of many practical men, but which, were it well-founded, would have the advantage, which is always of such consequence in cultivation, of producing the greatest quantity of fodder in a given space of time. Thus, setting on one side the question of the exhaustion of the soil, which is quite a secondary point; M. Boussingault has devoted his attention especially to verifying the exactness of the experiment whose consequences are so important.

He proceeded in the same way as M. de Dombasle; but to avoid the risk of any important error which might arise from the dessication not being perfect, he thought it best to analyse the matters taken from the soil. In fact, analysis offers a great security, because, indicating, as it does, the absolute quantity of carbon and azote which is found developed in crops, it is of no consequence whether the substances containing these elements were weighed in a state of greater or less dryness.

On the 19th of May, 1844, he looked out for a spot where the Wheat was as uniform as possible. 450 plants were taken, which, freed by washing from the adherent earth, and dried by long exposure to air,

	oz. (adrp.)
Produced stems and leaves,	9.7
Roots,	1.6
	11.3

On the 9th June, when it was in flower, 450 other plants were taken in the same spot, and dried in the same way, which gave,

Spikes in flower,	3.5
Stems and leaves,	29.9
Roots,	3.5
	37.2

On the 15th of August, at harvest time, 450 plants were again taken as before, which gave—

Seed,	23.8
Spike and chaff,	5.4
Straw,	32.6
Roots,	4.2
	66.0

Mean for each plant—

			Difference.
May 19.	Plant without flowers,	0198	0632
June 9.	Plant in flower,	0830	
Aug. 15.	Plant in seed,	1471	0641

Thus, from flowering to harvest, the increase of dry matter was in a ratio of 100: 177, that is to say, that in this interval the weight of the plant was almost doubled—a result very different from that arrived at by M. de Dombasle.

The analysis of these successive crops was made by taking as a representative of each, proportional quantities of different organs. The details of this analysis are here omitted, and we confine ourselves to giving the Table in which M. Boussingault has established the successive increase of organic matter in the crop from a hectare of land. (2.471 acres.) In fact the crop from the land whence the plants for experiment had been taken was weighed with the greatest care. First, the weight of the sheaves was ascertained; the wheat was threshed by a machine, and then, after the grain had been measured, the difference between the weight of the straw and chaff was estimated. There was per hectare, not deducting the seed,

Wheat,- -	3717 lbs.
Straw and chaff,- -	5914
Roots, (estimated)- -	661
Weight of whole crop per hectare,- - - - - -	10,292 lbs.

The relation of the grain to the straw and chaff is nearly the same as that given by the 450 plants. We have a right then to presume that the weight of the plants taken befoie harvest, on the 19th of May and the 9th of June, represents, within the same limits of error, the state of cultivation of the fields at these two periods.

Applying, then, to the whole crop the results of the preliminary analysis, we have as the successive increase of organic matter, on a hectare of land, the facts registered in the subjoined table.

Times of Gathering.	Weight of plant when dried per hectare.	Carbon.	Hydrogen.	Oxygen.	Azote.	Mineral substances.
	lbs. av					
May 19, ...	1519	566.9	88.2	781.1	27.3	56.2
June 9,.........................	5803	2222.9	359.7	3023.7	52.2	145.1
Increase from May 19 to June 9,..	4284	1656.0	271.5	2242.6	24.9	88.9
August 15. (harvest,)...........	10293	3829.1	699.9	5121.8	92.6	411.6
Increase from June 9 to August 15,	4490	1606.2	340.2	898.1	40.4	266.5

We see from this table, that if, before flowering, from the 19th of May to the 9th of June, there were assimilated per hectare 1656 lbs. of carbon, and 25 lbs. of azote; the same principles fixed in the plants, from the appearance of the flowers to harvest, were 1606 lbs. of carbon, and 40 lbs. azote. Doubtless, and as might have been supposed, *a priori*, the development of organic matter, at first very rapid, became less so as the crop approached maturity; but it was still sufficiently active to double nearly the weight of the crop between flowering and harvest.

The analysis shows besides what was the progress of the assimilation of the constituent elements of the corn during the time of cultivation. Thus, supposing vegetation to have been uninterrupted from the 1st of March to the 15th of August, we have the following numbers:

Times of Vegetation.	Per day and per hectare.				
	No. of days elapsed.	Dry Vegetable Matter.	Carbon.	Azote.	Mineral Substances.
March 1 to May 19,....................	79	15.0	6.06	.264	.617
May 19 to June 9,......................	21	205.0	78.86	1.191	4.235
June 9 to August 15,..................	56	82.0	28.67	.727	4.764
Mean assimilation per day,.............		6.38	24.00	.551	2.603

M. Boussingault had collected the necessary materials for executing a work of the same kind on leguminous plants; but the increase of weight in dry vegetable matter was so considerable between flowering and maturity, that the analysis became useless for estimating the consequence deduced from the experiment undertaken on the culture of Wheat, viz., that after fecundation plants continue to fix in their tissues elements derived from the soil and atmosphere.

GROWTH OF ORCHARDS—PEACHES—PLUMS.

We published not long since the growth of a young orchard; we now give another instance. We think it is well to give these examples occasionally, that none may be deterred from setting fruit trees, with the notion that it requires the long life-time of a person for them to come into bearing. One thing the reader will please bear in mind, and that is the cases we name are favorable ones, the result of skill and good management, but it is no more than others can do under favorable circumstances.

A short time ago we had the pleasure of visiting the farm and fruit orchard of Mr. Moses Jones, Brookline. Mr. Jones is one of the best cultivators in the country, in farming, gardening, and fruit growing; but few can obtain so much profit from the same extent of land. He is not only a skilful manager, but a very constant and industrious worker, giving his personal and practical attention to every department. He commenced with nothing when he was twenty-one years of age, and he has made his property by farming, and he now has enough—a fortune, if one can call that a fortune which makes him independent, and affords all that one needs or can enjoy. This gain of property is in some measure from the rise of lands, but without regard to the sales of land, considering it for cultivation only, he has a very handsome income.

About nine or ten years ago, Mr. Jones cut away the growth on a side hill, and set out an orchard of 112 apple trees, two rods apart. The eighth year after he set the trees, his crop of apples was 103 barrels. Any one acquainted with the growth of young trees under good cultivation, knows very well that the crop will soon be doubled, and before long it will be quadrupled. Mr. Jones has manured and cultivated among these trees, raising various crops which have more than paid the expense of manure and cultivation.

Thus far this appears very well, and those who neglect their trees so that they never grow well nor become productive may call this a great story. We recommend to such a visit to this orchard, that they may contrast the management and success of others with their own. But there is another important item which we will introduce into this account, that will make the story *better* still, if not *greater*. A few years after the apple trees were set, peach trees were set between the apple trees in the rows, and whole rows of peach trees were set between the rows of apple trees, in the inner part of the orchard, but not on the outside. The trees do not yet interfere, and the peach trees will doubtless decay after bearing plentifully a few years; and in this case it should be considered that the peach trees were set several years after the apple trees. Had they been set at the same time, they would doubtless have declined long before they interfered with the apple trees.

But now as to the cost and profit of these trees, which some cultivators would think should not be set there, if their practice accords with their opinions. Mr. Jones gave $100 for 400 trees, and some of his neighbors laughed at him for his injudicious expenditure, and one remarked that he would never see his $100 again. Most of these trees, as the reader may calculate, were required for this piece. The crop of peaches last season sold for $400.

Mr. Jones had a number of plum trees that were large enough to bear, but he got no fruit, whether from its not setting or from the destruction of the curculio, we do not remember, as we write from memory; they were among his asparagus, and having heard that dock mud was good for asparagus, he applied it to that purpose, and since then he has had good crops of plums, doubtless from the good effects of the salt in the mud.

We measured some apple trees in Mr. Jones' orchard that were only 11 years old that were one foot in diameter, and have doubtless produced 4 or 5 barrels of fruit in a year. Mr. J. has a handsome elm tree in front of his house which he set nine years ago; it was then so small that he brought it some distance on his shoulder. It is now one foot in diameter, and of a proportionate height. Verily the hand of so skillful a cultivator is like the philosopher's stone, it turns every thing it touches into gold, or into something of more intrinsic value.—*Boston Cultivator.*

CHESS.

BY PROF. C. DEWEY.

It hardly need be remarked that the articles on this subject in the Prarie Farmer for last August and September, do not touch the question whether *wheat is changed into chess*, as commonly apprehended. Those cases, admitting their real existence, are in the language of botanists, *monsters.* They are not the ordinary form in which chess appears and are the only cases of the kind on record. Wheat and chess have entirely distinct modes of growth as their fruit is respected. Wheat bears a single spike or a culm, long and regular; but chess grows in *panicles* or variously divided flown stalks, having a large number of *spikelets* on one culm. If chess is altered wheat, the whole form of bearing fruit is changed, as well as the general shape and aspect of the plant. This form is taken by the chess and wheat *before the time of flowering*. It cannot be the result of the action of any pollen, as it exists before the pollen is formed. If chess and wheat grow on the same root, which I should like to see before the thing requires my belief, and which I have always found to be separate, however near they grow to each other, the change cannot be of the hybrid kind. It is a change which affects the form, manner of growth and of flowering, the nature of the leaves and especially of the seeds. Hence, wheat and chess are placed in different genera by all botanists, differing far more from each other than wheat, rye and barley, do. Though wheat and chess belong to the grasses, in the large application of that term by naturalists, so do Indian corn, broom corn, sugar corn, &c., but they are separated far from each other by various characters and properties, and placed in distinct genera for these constant differences.

A hybrid is the product of two species of the same genera, and of two closely related species; and the form of the hybrid is between the two and like the two. The pollen of the one species is deposited on the stigmas of the other. So little is the tendency in nature to this effect, that florists are obliged to take much effort to obtain it. It is the law of the vegetable world, that " the earth bring forth grass, the herb (plant) yielding seed, and the fruit tree yielding fruit after his kind, whose seed is in itself." On this law men expect to raise rye from its seed, and wheat from its seed, and chess from its seed, and barley, and Indian corn, and millet, and oats, &c., from their seed. Without such a law the culture of the earth would be abandoned. If the different genera and species could be mingled in the manner of the hybrid, and this mingling of the pollen of various and different plants in the flowers of others were common, vegetation would be one scene of confusion; the science of botany would have no existence, and agriculture would be preserved only by keeping each cultivated plant entirely removed and separated from all others. Even when a hybrid is procured, the constant tendency of the hybrid is to revert to one of the two related species of its origin.

If wheat turns to chess in ordinary cases, the change must be in the germ or embryo in the seed, so that the whole plant shall be changed. The change cannot be in or near the time of flowering.

The naturalist believes no such change ever takes place. To convince him of the contrary, bring forward a plant of chess growing on the same root with a stalk of wheat, both having their characteristic fruit. Let the connection of the roots be palpable —no sowing or stitching together, like those two legs of a lamb on his back, or the calf's head on a hog's body with six legs, which have excited the wonder of the gaping and separated the fool and his money. Preserve the real plants, roots and all, growing together on the same root; put them into the hands of some naturalist or honest and shrewd printer who can see through a millstone when a hole is made through it; and let the whole be substantiated by credible witnesses. The subject, if it is to be settled satisfactorily to those who suspect such a change to be possible, demands all this effort and security, and will place a crown of fame on the head of the fortunate discoverer.—*Prairie Farmer.*

EDUCATION.

[The subject of popular education is of vital importance to the farmers of America, and, as many of the states are now agitating it with the hope of adopting an efficient and well-organized system of common schools, we shall appropriate a brief space in our Journal to these improvements—to the new and sounder methods of teaching which are or may be in use by the best teachers, with occasional extracts bearing directly on the general subject. The following forcible appeal, from an address by the Hon. Wm. L. Dayton, inculcates a most important lesson for the young men of our country—that of *self-reliance.* We ask every farmer's son to read it. It at least hints at the reason why the great mass of men know so little of common truth, even of those operations in nature we may add, by which the fruits of the earth are produced.]

In the outset of your career I wish to impress upon you *the necessity of self-reliance as essential to success in life.* I do not mean by this to inculcate that which is synonymous with mere industry. A life-time may be spent in gathering up the thoughts of other men. The granary may be full, and yet not a sheaf of your own be there. The ancient mariner who crept along the coast, guided by some mark on the land, or at best some star in the sky, was just as laborious as *he*, who, before the shape of the earth was settled, or the philosophy of Newton was known, reasoning from visible objects only, steered his ship boldly into the great deep, to reach Cathay, the further India, by a western passage. It is the self-reliance of intellect, of thought, which I would inculcate as necessary to distinction in life. And without meaning to touch upon the province of others, whose better right it is, to enforce our humble dependence upon a Higher Power; I would add that such dependence from the creature to the Creator, is daily and hourly due; that its constant acknowledgement gives strength to our weakness, upholds us in every effort for the better development of our powers. Let it not then be forgotten that the self-reliance I inculcate in the course of these remarks, is in exclusion only of that reliance which feeble man places upon his fellow.

And here permit me, in the first place, to refer to a principle of our nature antagonistical to the exercise and development of this faculty. I mean the *vis inertiæ* of the animal, as opposed to the intellect of the man. It is more pervading and controlling in its effects than the vanity of our nature will readily admit. The truth is, mankind in the mass, are indolent. How else is it that they know so little, as a whole, of common philosophic truth? so little of the material universe around them? They live by the fruits of the earth, yet scarcely ask how nature works in their production. The lightnings play, the winds come, and the rains descend; they see the effect, but trouble themselves not to understand the cause. The sky is literally bespangled with shining bodies; some fixed, some wandering, and some shooting madly from their sphere; they look in momentary surprise at a falling star, then trouble themselves no further about the economy of God's glorious universe! While these things add nothing to sound sleep or easy digestion, the *inertia* of the animal is too much for the intellect of the man. However much we may talk of the incitements of honorable ambition, I very much fear they only control the few: that it is want—the wants of physical nature alone, which stimulate the many to exertion. These wants are widely enlarged by a kind Providence, through the forms of conventional life—of organized society: and each additional want, whether actual or imaginary, gives rise to an increased mental exertion. Thus it happens that our wants, rather than our ambition, are the fulcra upon which the intellect of the mass of society is lifted up, and the points about which it revolves. But let it be remembered that I speak of the many, not of the few who pursue truth and knowledge for their own sakes. It is of the latter class only that the great in literature and science ever come. No man has distinguished himself highly, without an object above merely bettering his condition in life. But those of you who are farthest removed from the necessity of actual exertions to procure your personal comforts, are in the greatest danger of falling victims to this general *inertia* of our nature. And to such, more particularly, would I give the voice of warning. As a means of success or happiness in life, the most unstable of all, is a reliance upon the favors of fortune.

It sometimes happens that we are slow to appreciate the value of elementary study. That we distrust the practical utility of the learning of the schools; and where this is so, although the voice of instruction, like "the rains of Heaven may descend upon the just and the unjust," its fertilizing principle sinks deep only in the one, while it runs off unfelt from the other. From those more especially whose collegiate life ends with the morrow, the last apology for neglect (if any such there hath been) is about to pass away. They can no more ask themselves, of what avail is all this? What boots it that we become learned in languages; wise in cones, spheres, squares, and cubes? "Will it set a bone? No. Or an arm? No. Or take away the grief of a wound? No—therefore I'll none of it." A different scene now opens. Your next step is preparation—immediate preparation, for active life. You will soon be transplanted from beneath the parent stem; you will have an individuality, and must stand or fall as you shall bear yourselves in the coming struggle. Are there any who even yet hesitate? who cast about for farther delay—further indulgence? Then indeed their case is almost hopeless. They enter upon the serious duties of life with a species of "malice aforethought." I will not suppose it. I am willing to believe that all are ready. Now it is, that you would make a gainful barter by exchanging a goodly portion of all the genius and talent you possess, for a part only of the unshaken confidence—the strong self-reliance of men immeasurably your inferiors in acquirements. Look abroad; animate creation has its lesson. The beasts of the field seek safety and protection in their own instincts and strength. The fowls of the air poise themselves aloft, each by the steadiness of its own wing. The worm of the dust in its slimy track, knows no guide save its own feeble instincts. The earth, the air, the sea, " and all that in them is," have stamped upon their physical condition a law for their development, that each take care of itself. And man, the noblest of them all; the only created thing which to the instincts of nature, hath added the lights of reason; who " perisheth not as the beasts perish," he, too, for the development of his intellectual nature, is subject to the same general law, that each rely upon himself.

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But while I would thus encourage you by the example of others to test your capacities to the utmost, do not let me be misunderstood. I do not urge you into a headlong impetuosity — a rush upon the duties of life without preparation—a blind reliance upon your own powers, in despite of the counsels of your elders. All experience confirms the truth of the sentiment, " temeritatis est videlicet ætatis, prudentia senescentis." Nor do I suppose that all who hear me are to shine as stars of the first magnitude. We cannot all be destined to an immortality of fame. But each of you may become respectable in the several departments of human industry. This is a target within " point blank" distance; all may reach it. Literature, and science; the healing art; the pulpit; the bar, and the council chamber are all open. But in each and all, at every step you must remember that self reliance is essential to success.

In science or literature, to make a name which will live beyond the hour, a man must do something or say something, worth being done or said, and not better said or done before. He must add something to the knowledge or happiness of his species. And without the habit of self reliance, even literary men attempt nothing serious. They are elegant triflers only. They skim the surface of human knowledge as certain birds skim the face of the deep, just touching a pinion to the water in sport, then sparkling go away into other. But there is another of a higher order, which self-sustained, poises itself aloft, with eye fixed, then pitches from its height down, down to the very depths beneath; then upward soars, higher, higher still, with its treasure in its beak."

Before you embark in public life, you will, if just to yourselves, prepare yourselves by deep and careful study of the history, constitution and laws of your country. This will avail you more a thousand fold, than all that petty knowledge of political detail picked up in magazines and newspapers; and which is current, as a kind of circulating medium among street politicians. A species of knowledge, which, like small change, answers only the small purposes of life. Let your views and objects be more liberal and enlightened. You do not live in a day of revolution —

you may not be called upon to stake "life fortune and sacred honor;" but you will be called upon to sustain measures calculated to develope the resources of your country, and advance the happiness of your species. These are the objects of the statesmen of every age. In effecting such objects let me hope you will move in a region above the influence of mere popular passion; that you will never pander for present purposes to a vicious sentiment, but seek the ultimate good of all in sincerity of heart. If public sentiment be right, follow it; if wrong, rectify it; but never become its slave. "Vox populi, vox Dei," in its common acceptation, aside from its profanity, is the sentiment of a demagogue. A class of men who bear the same relation to the public, that the false friend of private life bears to the companion of his social hours. They sat for their picture in the days of Cicero; and after eighteen hundred years the coloring is as true to nature, as though it were the work of yesterday.

Such men have no intrinsic value; no reliance on themselves. They stand among their fellows like senseless mirrors in a crowd. The world that looks upon them, sees nothing there save the reflections of its own shifting feelings. Beware of this. Have principles of your own; a sense of right and wrong for your guidance. Whatever may be the present current of public opinion, it will eventually hold you answerable for your own acts. History never extenuates political profligacy by pleading the oscillations of popular feeling. Your reputation in after times will stand alone, fragrant with the healthful perfume, or the corrupting stench of its own odor."

ECONOMICAL MODE OF PRESERVING CHERRIES.

Procure the cherries ripe and fresh from the tree, and without any preparation, put them into a bottle or wide-mouthed jar, filling it about three-fourths full. Then pour in common molasses, fresh and cool from the cask, until the vessel is nearly filled; cork or seal it up air tight, and set it aside in some cool dry place, occasionally shaking the vessel, in order that its contents may be well mixed. A portion of the molasses will be absorbed by the cherries, which will render them sufficiently agreeable, when made into puddings or pies, without the addition of any sugar or syrup. The liquid which remains in the jar after the cherries are taken out, has an agreeable flavor, and, when mixed with water, forms a wholesome and refreshing drink.—*Amer. Agriculturist.*

MUTUAL DEPENDENCE BETWEEN AGRICULTURE AND OTHER PURSUITS.

[Extracts from an Address delivered before the Agricultural Societies of Hampshire and Hampden counties, in Massachusetts, at their Anniversary Fairs, in Northampton and Springfield, in October, 1845, by Rev. EDWARD HITCHCOCK, LL. D., President of Amherst College.]

The mutual dependence between the arts, manufactures, commerce and agriculture, will need but a few words of illustration, because familiar to all. In order to success in any important pursuit, it is necessary that a man should give to it an undivided, constant, and nearly exclusive attention. Neither the farmer, mechanic, or merchant, can be thriving and successful, if he do not rise up early and sit up late, and make his business a leading object of pursuit. He cannot successfully combine two or more of these branches of labor, unless it be as mere oversight. What, then, could the merchant, mechanic or manufacturer do, without the products of the soil? and how could he obtain them, were there not a class of men exclusively devoted to their growth? Take a single example. The exports of the United States, in 1835, amounted to more than 101 millions of dollars; of which about 75 millions, or more than three quarters, were agricultural products. Let the farmer then, cease his labors, and it would almost sweep commerce from the ocean, shut up almost every merchant's shop, and starve out most of our mechanics and manufacturers.

On the other hand, let not the farmer imagine, because he is the principal producer, that he is independent of commerce, arts, and manufactures. His existence might, indeed, be continued without them; but it would be only existence as a savage; and of course only a small fraction of the present population of a country could in this way even exist. Besides, they would owe their sustenance, not to agriculture, but rather to the bounty of Providence, which has caused the earth, in almost every land, to bring forth spontaneously the fruits essential for the food of a scattered population. But agriculture, properly so called, can not exist without commerce and manufactures. The very first step in farming, I mean the breaking up of the soil for seed, requires the artizan's skill in the construction of tools. Without that skill, indeed, the farmer's present comfortable, and it may be elegant, habitation, must be exchanged for the skin lodge of the Pawnee, the bark hut of the Hollander, or, at the most, the wigwam of the aborigines of New England. His dress, too, if dress he could obtain, must be the undressed hide of some animal; and his wife and daughter must exchange their silks, muslins, and calicoes, for the filthy skin of the horse, the raccoon, the bear, or the buffalo; festooned it may be, as the *ne plus ultra* of savage skill, with the quills of the porcupine, the feathers of the eagle, or bark painted with elderberries. In his habitation, too, the nicely sanded or carpeted floor must give place to the lap of mother earth, where vermin, lizards and serpents, would dispute with him the right of possession. An unglazed hole in the wall must let in the storm and the wind, as well as the light; the stagnant pool must be the mirror before which he must make his toilet; and his glass, pottery and porcelain, must give place to a wooden trencher or bowl, wrought out by a flint. Let the farmer be thus stripped for a few months, of all the necessaries, comforts and luxuries which come to him through the arts, manufactures and commerce—let him, like Nebuchadnezzer, be compelled "to eat grass as oxen, and his body be wet with the dew of heaven, and his hairs are grown like eagle's feathers, and his nails like bird's claws"—and he would cease to say of his present state of comfort and happiness, "is not this great Babylon, which I have built, by the might of my power, and for the honor of my majesty." He would be ready to acknowledge his dependence, if not on God, yet on commerce and the arts.

If it were necessary to illustrate this dependence still further, I might mention the character and amount of the imports into this country, in the same year for which I have mentioned the exports, viz., 1845. All the imports for that year amounted to about a hundred and fifty millions of dollars, of which only seventeen millions, or one-eighth, were agricultural products. All the rest were manufactured articles; and a large proportion of these were doubtless consumed by the agricultural part of the community, not as mere luxuries, but as comforts, and even seemingly necessaries. At least, so they would appear, were the community to be deprived of them. For our necessities usually multiply in about the same ratio as our luxuries. The artificial wants created by the latter soon become as clamorous as those which are natural.

But why should I dwell on this subject? for every agricultural fair presents us with a practical illustration of the intimate connection and dependence between agriculture and the arts. The choicest and richest displays of mechanical skill meet and gratify us there; and many of them, too, have been prepared in the farmers' families, in the intervals of leisure; so that, in fact, to attempt to depreciate manufacturers would be to depreciate farmers themselves.

The important connection between agriculture and national prosperity is a subject almost too trite for an occasion like the present. And yet few think of all the relations between these subjects. The products of the soil, which result from its cultivation, are generally thought of as the only contribution which agriculture makes to a nation's prosperity. This is, indeed, a main pillar of that prosperity. But, after all, the most important element of national character, is the character of the citizens. Now, without disparagement to other classes, and other pursuits, the cultivation of the soil is eminently calculated to make genuine men; men of vigorous minds and unflinching nerve; men of stern independence and sterling integrity, who yet bow quietly to the authority which they have themselves delegated to others; men who are not tossed to and fro by every gust of feeling, but can always be found at the post of duty, whether it be a place of danger or safety; men, in short, who form the stable pillars of society, and are genuine patriots, because they have a filial attachment to the soil which their own hands have cultivated, and where their fathers are buried. Men of similar character are, indeed, found among all classes, and in every pursuit of social life. But none of these pursuits are so well adapted as agriculture to give them the needful discipline.

Now just such men as agriculture produces are needed to fill up the ranks of other pursuits in society. For though these other pursuits are of the utmost importance, nay, indispensable to the prosperity of society, and therefore those who engage in them are in a most honorable and respectable path, they are not adapted, like agriculture, to give that physical energy and happy development of character to the rising generation, which they need to take the place of their fathers. Indeed, all the sedentary pursuits in which men engage, tend rather to the deterioration of the human constitution, so that the sons of mechanics, merchants, and professional men, can only in part fill up the vacancies occasioned by death. Nay, an enfeebled constitution often compels them to resort to agriculture to restore its lost stamina. Hence there is needed a foreign supply, to keep the ranks full and strong in these professions. And, where agriculture is in a proper state, it furnishes such a supply. The discipline which the young are undergoing on every well-conducted farm in the land, is fitting them to become future artizans, merchants, and professional men. Especially are they preparing there to supply the enormous demand which the cities and larger towns are making upon the country The fact is, that the strong mental excitement, the heavy pressure upon time, the unseasonable hours, the luxurious habits, and the want of fresh air and exercise, in city life, ere long break down the strongest constitution; and in a large proportion of cases the children of robust parents are feeble, and, though precocious, are destitute of the bodily hardihood and mental energy essential to eminent success in any pursuit. Hence such children must usually give place to youth from the country, whose descendants in time must yield to others from the same prolific source. Scandinavia was called by the historian, "the workshop of the human race," because it poured forth such swarms into southern Europe. Equally proper is it to call the farm-houses of the land the workshop of the nation. For, if this supply should be cut off, our cities would soon be depopulated, or at least sink into weak effeminacy; and in fact, the locks of the nation's strength would be shorn, and we should shake ourselves in vain. Hence, as I have wandered over the hills and valleys of our land, and have met by the wayside, and on the farm, or in the meanest hovel, with children uncultivated, and even repulsive in their appearance, yet healthy and hardy, I have often felt for them no small degree of respect, when I recollected that probably, under that rough exterior, there lay concealed the future wealthy merchant, or eminent artizan, or distinguished scholar. The refined city beau, or belle, may indeed smile contemptuously at the uncouth manners of the plow boy, who, on his first trip to the city, is staring about the streets with half opened mouth; but not unlikely that despised rustic will one day rise far above them in wealth, learning, and respectability. At any rate, such transmutations are of every day occurrence in the city.

But let not the farmer vainly imagine, that because he furnishes so important a part of the raw material of national prosperity, he is independent of that prosperity. Let incompetent, or ambitious, or unprincipled men get the reins of government into their hands; let them adopt measures that paralyze commerce, shut up manufactories, discourage internal improvements, and above all, plunge the nation into war; and the farmer will find a worm at the root of his own prosperity and happiness. His produce will rot on his hands, his income be consumed by taxes, and his sons, instead of rising to respectability and influence in private life, will be made "food for powder." In short, he will soon learn how intimate is the connection between his private fortunes and the state of the nation.

The cause of education is regarded by all intelligent men, especially in a country like our own, as one of the most important of national interests; and hence we should inquire what influence is exerted upon it by agricultural pursuits. An eminently salutary influence, is the decided reply. Especially is this the case in respect to popular education, as appears from several considerations. These pursuits, in the first place, afford more of leisure for study than most others, since the hours of active toil must be so much fewer than those of the waking period of the day. The farmer, also, is ever in intimate communion with nature; and thus an inquisitive and discriminating spirit is excited. The farmer of experience likewise soon learns how much he may be aided by a good education in his calling; and thus is he prompted to secure such an education for his children. But above all, his active habits give him so much physical vigor, that the old adage may be applied to him: *mens sana in corpore sano;* a sound mind in a sound body. He can sit down calmly to his books with little of that nervous irritability and restlessness, and little of that cloudiness and debility of intellect, that torment and retard so many of sedentary habits. Those only can appreciate the value of such a state of body and mind, who have had to struggle with its opposite. If I may be allowed to give my own experience on this subject, I would say, that decidedly the best time for study which I have ever known—when the mind was the clearest and the nerves most quiet—was the evening that succeeded a hard day's work in hoeing or mowing. After having mowed an acre of grass, I found my mind prepared to mow an acre of Geometry or Astronomy; and often in subsequent days, when study was a task, and there seemed to be a muffle over the mind, I have sighed for the return of that period, when the intellect had as keen an edge by night, as the scythe had by day.

In correspondence with these views, we find that primary schools, as a general fact, are better sustained and better improved by an agricultural population than almost any other. So, too, in New England at least (with the exception of professional and literary men), reading is more common and more thorough in such a community. And what is read, is better digested than among classes of society who have less of calm leisure, and learn the art of talking rather than of thinking. For fluency in conversation is often in the inverse ratio of the amount of ideas in the mind; and men often talk much, not because they are so full of thoughts, but because they are destitute of them, just as a stream bubbles most which has the least water in it. The farmer, it may be, talks less and with less grace of manner; but he thinks more, and with more logic. For these reasons, the sons of farmers are peculiarly welcome at our higher literary institutions; although the inquiry there is, not whether a youth originated from this or that profession, but whether he has the determination and ability to be a good scholar. Young men in crowded communities, under the influence of the strong social excitements which exist there, sometimes acquire a precociousness of manners and of intellect, that gives promise of more fruit than is ever realized; but when the son of the farmer presents himself, we feel much more sure, that, though the stone be just from the quarry, unhewn and unpolished, it is undoubtedly genuine marble, and will repay the labor devoted to it. Indeed, let the early history of distinguished men in our country, I mean our lawyers, our physicians, our clergymen, and our politicians, and the leaders of our benevolent enterprizes, be traced out, and I am greatly mistaken if you do not find that a large majority have once followed the plow.

Of the reflex influence of education upon agriculture I might say much. It is this indeed, almost exclusively, that distinguishes the farmer of New England from the serf of Russia; the one, about as low in the scale of humanity as is possible; a servile animal, with scarcely more of intellect than the ox or the horse; the other, an intelligent freeman, with sagacity to know what his rights are, and with the determination to maintain them; far more independent than the European lord, who, with all his wealth and his castles, is a slave to his menials. The American farmer has enough property to supply all his reasonable wants, but not so much as to make him miserable. He knows how to take care of himself, and is not compelled, therefore, as most of the wealthy are, to commit his happiness into the hands of mercenary hirelings, or unpaid slaves. And it is his education merely, that gives him such a proud preëminence over so vast a majority of his fellow men. This alone teaches him what are his peculiar advantages, and how best to improve them.

SHIRKING OF LESSONS A SELF ROBBERY.

[Extract from the report of Horace Mann, the secretary of the Massachusetts Board of Education. It contains matter well worthy the consideration of the younger part of our readers.]

I fear that this *slurring* or *shirking* of the lesson, is sometimes regarded in no other light than as a clog upon the progress of the pupil; or as an abatement from the success of the coming examination. The substance of the argument often used, as a warning against this species of misconduct, is, that whoever leaves a lesson of his course, unmastered, leaves an enemy in ambush behind him;—an enemy who will, at some day, rise up to molest his peace, and perhaps to defeat his most cherished hopes. But, though this is a legitimate consideration, yet the subject has relations far more important. It is not so much the lesson which is omitted, as the wrongful act which is committed. The knowledge that is lost is an insignificant matter, compared with the trickish habit that is gained. The avoidance of the lesson has deprived the intellect of so much exercise, and therefore has prevented whatever of strength that exercise would have given; but the means by which the lesson was avoided, has given exercise and strength to motives of deception and fraud. Herein lies the lamentable character of the deed. It is only a misfortune to be ignorant, but it is an unspeakable calamity to be dishonest. However vigilantly the teacher may look after the intelligence of his charge, he should use a thousand times more vigilance in preserving their integrity. Limited attainments are not incompatible with a high degree of happiness; but every immoral act diminishes the capacity for happiness forever and ever.

Another means of avoiding study,—and I am sorry to say I have found no little evidence of its existence,—is, after procuring some fellow-pupil, or other person, to perform the work which the teacher has assigned, to present the work thus performed by another, as the product of one's own labor. The intellectual loss and injury of such a course are great. It leaves the mind unexercised, when it was one of the principal objects of the lesson to exercise it. It also disqualifies the pupil more and more for mastering subsequent lessons. A scholar who did not get his lessons last week, through indolence, may be unable to get them this week, through incapacity, and next week, he may give them up in despair. But the most deplorable quality of such conduct is, that it is an *acted* falsehood; and, as subsequent lessons are mastered with so much more difficulty, after the omission of preceding ones, the power of the temptation increases, in a geometrical ratio, at each succeeding step.

The cases above referred to are generally those where assistance is obtained out of school; but the prompting of a fellow-pupil in school, and during the recitation, comes under the same general head, and incurs the like mischievous consequences. To guard against the latter species of misconduct, the teacher should be all eye and all ear. He should be so familiar with the lesson, that he can devote his whole attention to the class, instead of occupying the time in preparing himself, by looking at his book, to hear the successive answers. His eye should be on them, on their account; and not on his book, on his own account. To guard the pupil against taking fraudulent measures out of school, he should instruct as faithfully in regard to the object of the lesson, as in regard to the lesson itself. The attention of the pupil should be forever turned towards the state of his own mind. Have the lesson, the fact, the principle, the scientific relation, been reproduced within himself? Are they recorded on the tables of his intellect? Are they so clearly and enduringly written there, that if the slate and black-board were broken to fragments; if the book were to be consumed; he would still posses them as his own,—ineffaceably inscribed on the mind? Is the lesson so luminously recorded in his memory, that he can see it there in the darkness of midnight, and revive it in the solitude of a desert? Every pupil should be made to see that to transfer or to copy an answer or a process from a text book to his own slate or paper, or to take it from another's dictation, is valueless in the way of acquisition, of improvement; that it is in its nature the veriest task-work or tread-mill service ever performed. He should be made to see that he might as well learn the art of swimming, by getting another boy to swim for him; that he might as well increase his stature and strength, by employing another to eat his meals; or that he might as well expect to gain wealth by forfeiting all his daily earnings to the more industrious. Perhaps the most appropriate punishment for stealing the solution of a sum from a book, or for transferring it from another's slate, or for borrowing another's composition instead of writing one, would be to make the offender copy off figures in logarithms, or the letters of some algebraic process, about which he knows nothing; or to transcribe passages in the French or Latin language. This would be a parallel to his own " vain knowledge," and would show him how pleasant it is to feed upon the east wind.

But the forfeiture of privileges and of knowledge which the pupil incurs by such a course as is above described, is not the principal evil. It is not a loss of utility merely, but it is a departure from honor and honesty. Why should not the scholar who now cheats his teacher in the recitation-room, cheat his master in his work when he becomes an apprentice or a clerk; and his customers in their utensils or their goods when he becomes a mechanic or a merchant? All great robbers began by stealing small things; and the foulest assassins and murderers commenced their career by inflicting petty injuries.

I fear the little departures from rectitude and truth which sometimes pervade a school, or are practised by particular members of it, are not regarded in their true light,—as seminal principles or germs, which, if not eradicated, will grow up to maturity, and bear the fatal fruit of falsehoods, perjuries and frauds. How narrow the range of a school child's thoughts, compared with the vast compass and combinations of an adult mind; how slow the mental operations of the former, compared with the celerity with which the latter passes from premises to conclusions, and from means to ends! The child is obliged to commence his calculations with visible and tangible units, and for a long time he moves feebly and totteringly forward, constantly seeking the support of another's hand; yet what vast and complicated schemes the same mind, in its maturity, will project! When we thus witness the capacity of growth and expansion, with which the intellect is endowed, why should we doubt that the appetites and propensities have at least an equal power of expansion and activity?

Nay, it is not conceded in every system of mental philosophy ever promulgated, that the appetites and desires are endowed with an ardor and a vehemence, to which the intellect is a stranger; and that the passions, if unregulated and unchastened, rush to extremes infinitely more wide and more ruinous than the understanding can ever reach? Why then, when we find the mind which was once so feeble, now capable of concerting vast plans for wealth, for ambition, or other forms of personal aggrandizement,—why should we doubt that the little tricks and prevarications of the schoolroom may grow up into fradulent bankruptcies, or stupendous peculations and embezzlements? States and empires are no more to the man than the toys of the nursery to the infant; why then, should not corruption in politics, and hypocrisy in religion, grow out of the artifices and pretexts of the playground? If we would enjoy an immunity from the latter, we must suppress the former. How much easier and safer to crush the brittle egg than to kill the coiling serpent!

PRIZE FARM REPORT.

BY GEO. GEDDES, ESQ.

[The specific details which are furnished in this report and the confidence which may be placed in its statements make it a document of uncommon value. Mr. Geddes, we know, has correct views of the nature and capacities of his farm, not only as a whole, but of the different parts, and in consequence of this knowledge is able to adopt and carry on a husbandry suited to its capacities. He has special reasons for what he does, and hence in the results which follow, Mr. Geddes has not farmed it without a remunerating profit. The formation on which his estate is bottomed is the Onondaga salt group, and in which all the gypsum of New York is contained; and it is a curious and interesting fact that the owner finds it highly advantageous to use so much plaster when it abounds in the rocks within a few feet of the surface. In the former numbers of this Journal we have given some account of the soils of this county and of this farm, which may be referred to in common with this report, with advantage.]

The following answers to the interrogatories of the New-York State Agricultural Society are respectfully submitted:

1. My home farm consists of three hundred acres. Thirty are in wood. About ten acres of the side hills are unsuitable for plowing, and are only used for pasture; the remainder is under cultivation, except what is required for roads, yards, &c.

2. The soil is principally a disintegrated gypseous shale, it being the first stratum below the Onondaga lime, running up to and taking in some sixteen acres of the lime, which is covered with about one foot of soil. This is in the wood lot, and furnishes quarries of good stone. There were formerly a few cobble stones on the surface, and one very large granite boulder. A small brook running through the farm is bordered by about forty acres of soil that has been deposited by the brook, and is not suited to the production of wheat. In the valley of the brook is found marl and peat, and at the springs that come from the hill sides calcareous tufa.

3. I consider the best modes of improving the soil of my farm to be deep plowing, application of barnyard manure, free use of sulphate of lime, and frequent plowing in crops of clover.

4. Unless I am plowing in manure, I plow from six to eight inches deep. Deep plowing upon the gypseous shales, never fails to increase fertility. Full trials justify my speaking with confidence on this point.

5. I have not used the subsoil plow, as I have no retentive subsoil on my farm.

6. I apply my barn-yard manure in large quantities at a time, preferring to at once do all for a field that I can in this way. About 50 loads of thirty bushels each, of half rotted manure to the acre at a dressing.

My stables are situated on two sides of a square; the manure, as it is taken from the stables, is at once piled in the centre of the yard, as high as a man can pitch it. Sulphate of lime is put on the manure in the stables, and the heap, as soon as fermentation commences, is whitened over with it. My sheep are all fed under cover, and most of their manure is piled under cover in the spring, and rotted. As to keeping manure under cover, my experience has led me to believe, that the best way is to pile it under cover, when it is most convenient to do so, and only then as I am compelled to apply water to the heap to rot it, unless it has received the snows and rains out doors. The coating of sulphate of lime will, I believe, prevent loss of gases, and in process of fermentation the heap will settle so close together, that water will not after that enter into it, to any considerable depth, particularly if it was piled high and came up to a sharp point.

7. My means of collecting and making manure, are the straw, corn stalks, and hay raised on the farm, fed to farm stock, and what is not eaten, trampled under foot, and converted as before described, so much of it as goes through the stables. But large quantities of straw never pass through the stables at all; stacks are built in the yards, and the straw is from time to time strewed over the ground, where it receives the snows and rains, and is

trampled by the cattle. Embankments around the lower sides of the yard, prevent the water from running off and confine it in water tight pools, which are filled with straw to absorb the water, except so much of it as is wanted to put on the garden.

8. I make from four to five hundred loads of manure annually, and it is all applied.

9. Most of the manure is put on corn ground. It is drawn on about one-half rotted, and spread over the surface, and plowed under about four inches deep. The reason I do not plow it under deeper is, that I suppose I must plow deeper the next time to bring up the earth into which the manure has been carried by the rains.

10. I have never used lime in any quantity, excepting in the form of a sulphate as a manure, believing that there is enough in the soil. Sulphate of lime, I use in large quantities; fourteen tons this year. It is sown on all the wheat, corn, barley and oats, and on the pastures and meadows in quantities varying from one to three bushels to the acre. All the ashes made by my fires are used as a manure, and I think that it is worth as much as the same bulk of sulphate of lime to use on the corn. Sulphate of lime has been used on the farm for many years, and in large quantities, and I think it essential in my system of farming. I have not used salt or guano as manure.

I raised this year about

77	acres	wheat	yielding	1,616	bushels, averaging per acre,	20.99
15½	"	corn,	"	821	"	52.96
18	"	barley,	"	665	"	36.94
38	"	oats,	"	2,249	"	56.55
2½	"	potatoes,	"	292	"	116.80
				5,643		

50 acres of pasture and 30 of meadow.

12. I sow at the rate of two bushels to the acre, about the fifteenth day of September. I summer fallow but little, and only to kill foul stuff, and to bring the land into a good state of cultivation. A part of my wheat is sown on land that has been pastured, or mowed, plowing it but once, but that done with great care, and as deep as I can. The oat and barley stubble, as a general rule is sown to wheat, plowing only once, having previously fed off the stubble with sheep so close as to have most of the scattered grain picked up. The plowing is done as near the time of sowing the wheat as is practicable, and the wheat is sown upon the fresh furrows, and harrowed in. I have tried various modes of treating stubble, but none of them has answered as well as this. What little grain of the spring crop is left on the ground is turned deep under, and the wheat being on top, gets the start of it. The

harvesting is done with a cradle. Corn is generally planted by the tenth day of May, on sod land; most of the manure is put upon this crop. The corn is planted in hills three feet apart each way; from four to six kernels in a hill, and no thinning out is practised. Sulphate of lime, or ashes is put on the corn as soon as it comes up. Two effectual hoeings are given to it, and a cultivator with *steel* teeth, is run twice each way of the field between the rows, to prepare it for the hoe. Corn plows and cast iron cultivator teeth are entirely discarded.

At the proper time, the stalks are cut up at the surface of the ground, and put into small stooks, and when the corn is husked, the stalks are drawn up at once into the barn, without being again set up. In this way they are kept in good condition, and labor saved.

Oats or barley are sown the next spring, on this corn stubble. Of each of these grains, three bushels of seed is put upon an acre. As soon as the grain is up, sulphate of lime is sown. These grains are also sown on sod land. The reason of this is, I cannot command the manual labor necessary to cultivate *one-fifth* of my land in corn, and secure it at the proper season. The rotation of crops I attempt to pursue, is—first, corn, second, oats or barley, third, wheat on the oat or barley stubble, fourth, clover and herdsgrass pasture—the seed sown on the wheat—fifth, meadow. But inasmuch as certain portions of my farm are not suited to raising wheat, and as I cannot command the force necessary to cultivate the proportion of corn, I am compelled to modify; but I come as near to this rotation as I can.

The usual time of sowing barley is as soon as the ground is settled—commonly by the 26th of April. The oats are sowed later, generally early in May.

The yield of the crops for this year has already been given, and I think I am safe in saying, that the average of one year with another, upon the system of rotation before given, comes up to that of this year. The pasture will sustain two cows upon an acre, and the hay will generally yield two tons to the acre.

13. This interrogatory has been so far anticipated, that it is only necessary to add, that sometimes manure that is not convenient to draw in the spring, is put upon the corn stubble and upon wheat.

14. This interrogatory has been anticipated, in part. My reasons for applying my manure to corn, are, that I have better means of destroying the seeds of weeds, and from the belief that corn is the best crop to take up that part of the manure that the first crop can use, and that the manure is thus prepared for the crops that follow. Experiments that I have made, go to show that, coarse manure benefits the second crop as much as it does

the first—and the third crop cannot but receive great benefit from it. The fourth and fifth crops probably do not impoverish the soil. By this rotation, three crops are had for three plowings; and my experience proves that the soil increases in fertility under this management.

15. Potatoes. In consequence of the disease that has injured this crop, there were but two and a half acres planted this year; the disease was very destructive to my crop last year, but thus far nothing has been discovered of it this year. I have not been able to discover either the cause or remedy for this disease.

16. Herds grass, at the rate of eight quarts to the acre, is sown on bottom land. Clover and herds grass, mixed in equal quantities, is sown on uplands, at the rate of eight quarts to the acre, commonly. Generally sow herds grass in September, when it is sown alone on wheat: but if mixed with clover, sow it in March, on a light snow, if possible; the sowing is done by hand. The last spring, I sowed herds grass seed at the rate of eight quarts to the acre, on a field of wheat that I wanted to mow. Sixteen quarts of clover seed were mixed with the other seed and sown on fifteen and a half acres. In the fall this field was not fed off until the clover headed out, when it appeared finely covered with clover.

17. I usually mow about thirty acres, and expect two tons to the acre. This year the herds grass was killed by a frost late in May, and the estimate made was one ton to the acre. I use the variety of clover known as the "medium," and cut it when one-half of the heads are turned. At this stage, a very considerable proportion of the herds grass will be sufficiently advanced for the seeds to mature. The mode of making the hay, is to move it as little as possible. Generally it is put into cock. When the bottom lands are stocked down, clear herds grass used.

18. There is no part of my farm that cannot be plowed, except the side hill before mentioned. These side hills are in grass, and are pastured.

19. I have irrigated a part of my bottom lands. For a few years, the grass was very much increased in quantity; but the herds grass disappeared, and a kind of grass took its place of but little value. I now suppose that the water was suffered to remain too long on the meadow, and thus destroyed the valuable grasses. This meadow has been plowed up, with a view to subdue it, and again seeded with herds grass; when it is to be hoped a second experiment in irrigation may be made with more skill and better success.

The mode of watering the meadow, was by a small ditch taken out of the brook, at a point high enough to enable me to convey the water through the middle of the meadow. Lateral cuts from this main ditch, with gates, distributed the water.

20. Of the bottom lands mentioned, about twenty acres were very wet, and may have come under the denomination of "low peat lands." This land has been thoroughly drained, with ditches from three to five feet deep. Very heavy oats were this year raised upon some of this land, and about one-half of my corn was upon this description of land. The next year, the whole forty acres are to be planted or sown to oats.

21. There have been four oxen, seventeen cows, and sixteen head of store cattle, eighty sheep, eleven horses, and thirty-three swine kept on the farm the past season, with the exception of a short time. The cattle are either thorough bred, or high grade short horns.

22. I have made no accurate and careful experiments to test the comparative value of different breeds of cattle.

23. No account is kept of the butter and cheese made on the farm, as it is mostly consumed on the premises.

24. There have been but eighty sheep kept on the farm the past season. My flock has recently been very much reduced, with a view to substitute pure Merinos. My sheep yielded a little over four pounds of wool each, for the whole flock. The pure Merino ewes, each raised a lamb, and they averaged a little over five pounds to the fleece. I think that about ninety lambs may be expected to be raised from one hundred ewes. I have heretofore raised mutton sheep, but have disposed of all my sheep whose chief value was for mutton, and intend to turn my attention to the raising of wool, as the first consideration. Two dollars has been about the average price I have received for mutton sheep fattened on grass.

25. There have been thirty-three swine, of grade Berkshire, kept on the farm this year. About one-half of them have been slaughtered. Our hogs weigh from two hundred and fifty to five hundred, averaging over three hundred and fifty, when dressed.

25. No accurate experiments have been made by me, to test the value of roots as compared with Indian corn. I fatten my hogs and cattle on corn ground with the cob; cooked for hogs, and sometimes cooked and sometimes raw for cattle, being governed in this particular by the amount of grain I am feeding. I think corn the most economical grain I can raise to feed, in view of the prices coarse grains usually bring in market.

27. There are about two hundred apple trees on the farm, most of them grafted—spitzenbergs, russets, pippins, &c.—most of the approved varieties.

28. Pears, peaches, plums, cherries, quinces, &c., are raised in abundance for our own consumption; and we have many of the

best varieties of these fruits; five or six of pears, twenty of peaches, seven or eight of cherries, and four or five of plums.

29. Various insects common to this country have depredated upon the fruit trees; the most troublesome of all, is the common apple tree worm. Strong soap suds applied by means of a piece of sheep skin with the wool on, attached to a pole, is the most effectual means of destroying them.

30. My general management of fruit trees is, to prune them annually, keep them free from insects, and see personally to the selection of scions for grafting.

31. I have applied leached ashes to wheat, grass, and corn land, without being able to see any benefit.

32. Besides the mansion house, I have four houses occupied by men that work on the farm. Two of these houses have barns connected with them. In a central position is a grain barn, fifty-four feet long and forty wide, twenty feet high with a stone wall under it—making a granary and sheds. Near the mansion house are the hay barn, sheep barn, and a grain barn fifty-four feet long by thirty-four wide. Basement stories to all these buildings, furnish sheds and stables for the stock; so that every animal I winter, is fed all the valuable food in a rack or manger, and under cover.

Besides these buildings, is the wagon-house, forty-two feet long, with a basement under it; and the tool-house, carriage-house, corn-house, milk-house, smoke-house, ice-house, hen-house, &c. My yards around the buildings near the mansion are all supplied with water in tubs, sent there by a powerful force pump under the mill, driven by the same wheel that grinds the feed and saws the wood.

33. The common fence on the farm is posts and boards, the posts set three feet or more in the ground. Of red cedar posts I have about three miles—and of other timber for posts, about two miles. I have something more than a mile of stone wall, made from stone quarried from the quarries mentioned. These walls are built four feet ten inches high, two and a half feet thick on the ground, and eight inches thick on top, having the same slant on both sides, and laid straight and strong. This fence costs me $1.50 a rod, and I build fifty rods or more every year, upon a system of fencing that in time will put an end to further expense. The board fence costs 88 to 100 cents a rod. There is a considerable portion of my fences of rails, mostly cedar, but no new rails are made. As to the condition of my fences, I would respectfully refer to the report of the committee on farms for this year, for the county of Onondaga, a copy of which report is attached.

34. Most of my fields have been measured, but sometimes more

than one kind of grain is raised in a field—and thus the amount of ground covered by each kind of grain is not always accurately known. All the grain raised on the farm is measured, and the measurements entered in books kept for that purpose by proper men. The work hired by the day is entered in these books, and any other thing that appears of sufficient importance.

These memorandum books furnish most of the materials for a farm-book which is kept by myself.

From the farm-book, it appears that there have been nine hundred and twenty-seven days' work done on the farm, from the 1st day of April to the 1st day of November. This account covers all the work done in drawing plaster, sowing it, drawing out manure, threshing and delivering so much of the grain in market as has been sold, and all other men's labor on the farm. There have been produced on the farm five thousand six hundred and forty-three bushels of grain, aside from garden vegetables. Besides this, sixty-six loads of hay.

As the grain is sold, entries are made in the farm-book, of the price it brings; and that part of the products of the farm that is kept for home consumption, is estimated at the price it is worth in market. Thus arrived at, the grain and hay raised this year was worth three thousand five hundred and twenty-three dollars and seventy-nine cents.

I have no means of determing the value of the pasture, fruit, and many other things produced on the farm, nor the cost of team work. GEO. GEDDES.

Fair Mount, Onondaga Co., N. Y., Dec. 31, 1845.

METEOROLOGY OF WESTERN ASIA.

[The following remarks on the most important features of the climate in several places in Western Asia, are extracted from an article communicated to the *American Journal of Science and Arts*, by Rev. Azariah Smith, M. D.]

At Erzeroom, we find, as might be expected from a place in the latitude of 40 deg., and more than a mile above the level of the sea, a cold winter and relatively cool nights throughout the year. The heat of summer, more particularly of the middle of the day, is however less modified by the circumstances of latitude and elevation than one would suppose from the mention of these particulars alone. The extensive and nearly barren plain, which stretches for several miles north and west of the city, has undoubtedly much to do in counteracting the causes of cold which exist there, as in places similarly elevated. A remarkable freedom from wind, which occurs during the winter season, serves greatly to diminish the amount of sensible cold, and a person may sometimes be in the open air when the mercury is very low, without being at all sensible of the extreme cold indicated by the thermometer. As it is natural to associate clouds and storms with mountainous regions, the dry season of Erzeroom, though not so long as that of Syria and the region of Mosul, is a feature of its climate well worthy of mention, None of the gardens and fields around the city, nor indeed anywhere upon the plain, are expected to bring their productions to maturity without being watered by artificial means. This remark is supposed to be true very generally of all Turkey in Asia not lying on the declivity which looks toward the Black sea. It is true emphatically of the mountainous region south of Erzeroom, as the writer had occasion to observe when in the country of the Mountain Nestorians in 1844. There none of the lands are considered tillable, except those lying on the borders of streams, or where the waters of a spring may be made to flow over them. The dryness of the soil arises not only from the infrequency of rains, but also from the great want of moisture in the atmosphere, there being no large evaporating surfaces like those of our large rivers and inland lakes. In consequence of this, the air needs only to be slightly elevated in temperature, and it becomes greatly undercharged with water. The nearness of the Black sea does little to supply this want, since it is skirted along the whole southern shore with mountains so high as to prevent, to a great degree, the passage over them of the moisture raised from its surface. In traveling over, and along the sides of these mountains, I have been struck day after day, and week after week, with the difference observable in the meteorology of their two sides. Towards the north, fogs and clouds, and towards the south a clear blue sky, were the almost universal order of the day. Early in the morning indeed, the view from the mountains towards the northern horizon is sometimes singularly clear; but low beneath the feet of the observer, a vast sea of clouds stretches before him, and he rarely gets a glimpse of, what he so much wishes, the distant Euxine as first seen by the Ten Thousand in their signal retreat. In a short time after the sun rises, the clouds begin to creep up the declivity facing the north, and soon afterwards, attaining the summit, they pour over it towards the south, presenting a white sheet along the mountain ridge, not unlike that of the brow of our own Niagara. The destination of the vapory cataract of these high regions is, however, very different from the one of water which it so naturally suggests. Hardly do the clouds pass these mountain summits before they begin to melt away and disappear in the arid atmosphere, which waits to receive them. Rarely, very rarely, during the summer months, does a north wind prevail so strong as to carry the clouds unbroken over an extended space so far in the interior as Erzeroom. It is only when the season advances, as in October or November, and when the temperature is such as to give the atmosphere a greatly decreased capacity for moisture, that the cloudy, damp and stormy weather of other mountain regions begins to prevail, and the rainy season sets in.

Trebizond is remarkable for the equable nature of its climate as to temperature, and for the predominance of moisture in the atmosphere, compared with some other places. The average daily variation for the year as thus obtained being 5°, while that of Beirut, the one which approximates the most, is about 65°. The great moisture of the atmosphere is observed in the tendency of every thing to rust, mould, or acquire dampness, even in the most favorable situation, where not exposed to the direct rays of the sun. The amount of rain which falls at Trebizond, and the great proportion of cloudy weather are also striking features compared with other parts of Turkey, and the remarks made in the preceding paragraph will furnish obvious reasons for these peculiarities. Its situation on the shore of the Black sea, hemmed in behind by mountains, and having a prevalent wind from the water, either in the form of a sea breeze or otherwise, are the causes referred to. Only eighty-three out of two hundred and sixty-eight records made in June, July, August and September, 1843, and only one hundred and seventy-two out of three hundred and thirty insertions in the register for the same months in 1844, were *clear*, and these months, it is to be remembered, include that part of the year when a clear sky and dry atmosphere most prevail at all the other of our posts of observation. It has been remarked by one of the observers at Trebizond, that the ordinary rules for predicting changes of weather from the state of the barometer, do not seem to hold true at Trebizond, but unfortunately we have no such records as will enable us to present the facts now alluded to. Doubtless the vicinity of mountains, and the peculiarity of the winds must be the ground of the exceptions referred to; as they are found likewise to effect equally strange and sudden changes in temperature: for example, March 10, 1844, we have the thermometer 71° at sunrise and 58° at 2 P.M.; and Feb. 16th of the same year, 48° at sunrise, 37° at 2 P.M., and 45° at 9 P.M. It may be well also to remark that Trebizond is less affected by the sirocco than any other of the places where meteorological tables have been kept.

Constantinople.—The climate of the capital of Turkey furnishes little that is sufficiently striking to merit notice in this brief account. Its situation on the Bosphorus, and between the Black sea and sea of Marmora renders it peculiarly exposed to northerly and southerly winds. On looking over the daily observations of a year, I find the northeasterly winds most prevalent, and that during the whole time there were but two instances of the winds blowing directly across the straits for the entire day, in one of which it was from the east, and in the other from the west. The mildness of its temperature during the winter, is greater than that of the same latitude in the United States, and it is very rare to have any considerable fall of snow; but at the same time there are enough cold rainy days to make the weather on the whole seem more chilly than the bracing air of New England. During the summer there is less of rain and a greater proportion of warm pleasant weather than is enjoyed by the middle and New England states, but ordinarily there is enough rain to bring grain to maturity without artificial irrigation. There is a common saying here, that one must keep his best fuel until March, and it is observed by foreign residents, that although spring seems pretty uniformly to open in February or the first of March, with fine weather, there are after this, several days if not weeks of the most uncomfortable chilly weather of the whole year.

Broosa.—The inland situation of Broosa, and its location at the foot of Mount Olympus,—which is 7,000 feet high and preserves snow on its top throughout the entire year,—causes a greater annual range than exists at any of the sea-ports from which we have records, though not so great as that of Erzeroom, Mosul and Oormia. The effect of the sirocco is more trying and opressive than at either of the places already mentioned, and I should think from my limited observations, that this wind there, is for some reason, peculiarly frequent. Still Broosa is considered a very favorable climate for invalids, and crowds of people flock there during the summer to recruit their health at the *natural* hot baths with which the vicinity of the place abounds.

Smyrna.—The annual range of temperature at Smyrna is not very great, but the average daily range, 14°, is wider than that of any of the other places from which we have observations. Its winter consists in a damp, rainy season, and is rarely marked with slight falls of snow; but Americans who arrive here from Boston during this portion of the year, uniformly feel more inconvenience from cold than during previous winters at home, but whether this may not be mainly owing to the change experienced on leaving the sea, is a reasonable question, to settle which, facts are needed that we do not yet possess. The summer of Smyrna is warm compared with that of any of the aforementioned places, and on this account, it is the more to be regretted that our records from this place are deficient for the months of July and August.

Beirût.—The warm climate of this place is what might be expected from its latitude; and the slight annual range of temperature, from its fine exposure to the open sea, from which the wind prevails at all seasons of the year. The force and constancy of the southwest wind is such as to be constantly making its impress upon the land; the sand rolled up by the sea, is raised into the air and driven in such vast quantities into the interior, southeast of the city, as to form there, high ridges, which by gradual advances of a few feet each year, are covering up trees, gardens, vineyards, and even houses themselves when they are not removed in anticipation of the calamity.

Mosul.—No one can cast an eye at the records of this place, without being struck with the extreme heat of the weather during the summer months. So excessive indeed is the temperature that it will not be strange if some of the readers of this article are incredulous with regard to the accuracy of the observations, from which the above abstract was made. But the writer may state, that before the place of observation was fixed upon for the summer of 1844, three thermometers were suspended for several days in succession, in the most eligible situations in the house in which he then resided, (a house favorably situated too, it being on the highest ground in the city,) and that among these a place was chosen, which, while it was not affected by the confined air of the court, was also in no way exposed to the direct rays of the sun, and as little as possible to the reflected rays. Moreover, the opportunity was afforded of occasionally comparing the temperature thus given, with that of a thermometer suspended in a good position, at the country residence of the French consul, among the ruins of ancient Nineveh (?), and there is therefore every reason to believe, that local causes had very little effect on the mercury of the thermometer with which the record was made. The temperature at 9 o'clock P. M., strongly corroborates this, as does also the fact that the removal of the thermometer into the sun at noon, would always cause the mercury to rise at once to 144 or 146 deg. On account of this excessive heat, all who are able, have rooms fitted up in their cellars, where they retreat to spend the middle of the day. The nights are uniformly spent on the flat roofs, dew and rain being wholly unknown during the summer season. One peculiarity growing out of this extreme heat of the climate, was often the subject of our remarks. Contact with every thing dry communicated the sensation of heat, our beds seemed to have been just scorched with a warming-pan, and stone floors appeared as if endowed with the power of generating caloric. Instead of being refreshed by the cooling sensation which a change of clothes ordinarily gives in the summer, the linen taken out of our coolest wardrobes seemed always, on putting it on, to have come roasting hot from the mouth of some glowing furnace.

Respecting Jerusalem and Oormia, not having visited those places, we are unable to give, according to the plan pursued with regard to the other points from which we have records, any prominent meteorological peculiarities. A great tendency to intermittent fever is known to exist on the plains of Oormia, and may be mentioned as one peculiarity of the climate of that place as a mission station. The cause of this is no doubt to be found, either in the miasmata of the city or the exhalations from the great lake which bounds those plains on the east.

From observations made for several years by the missionaries resident in Beirût, Trebizond and Oormia, it has been found that by leaving those cities for the mountains near at hand, during the summer months, they obtain a healthier and far more pleasant place of residence. This has led to a careful comparison between the temperature of the plain and the places of resort on the mountains, and in neither of these cases does the average variation exceed 7° or 8° Fahrenheit. Still, the variation in one's feelings is very manifest, even in ascending four or five hundred feet. While on the plain the parched and sultry air of a summer's day seems almost insupportable, the breeze of the upper strata of air seems to refresh and revive the spirits, and to infuse new life into the whole system. "What is the cause of this effect on the physical frame?" is yet a question open for investigation. Would the residents at Oormia be refreshed by a sudden removal to the sides of Mt. Lebanon, or to the hills back of Trebizond? If so, as such a removal would bring them two or three thousand feet nearer the level of the sea, it is plain that the effect is not produced, as is commonly supposed, by the diminished pressure of the atmosphere in elevated regions. Without doubt, differences in the electrical state of the air, will yet be found a fertile cause of various modifications in the working of the nervous system, but as we have thus far been unable to obtain any facts of this kind in respect to the cases now referred to, we must leave the question they suggest where we found it.

Receipts.—*Pies.*—Take four eggs, one and a half pints of dried apples after they are saturated. Beat the eggs in a coffee cup full of sugar, add one pint of cream and a little salt. Make a mixture of the whole by stirring well: it is sufficient for three pies.

Johnny Cake.—Take three pints of Indian meal, half pint of cream, half spoonful of ginger and spice each, coffee cup full of sugar, two eggs beat together, and add half tea spoonful saleratus, some salt and a few dried currents or berries. The cake to be made soft, or of the consistence of a stiff pan cake. Those who prefer it, may omit the sugar.

CORRESPONDENCE.

We have received an interesting letter from our friend, M. de Verneuil, in which he gives a brief account of an interesting discovery which he has made in the Ohio coal field. It shows the remarkable similarity of all the great formations of this country to those of Europe. We make only a brief extract:

"I have made in the carboniferous formations of Ohio a very interesting discovery for me, as a Russian traveler. The burrh stone, or mill stone of this country, is a siliceous band which occupies about the central part of the carboniferous series. This stone is full of small cavities, similar to the impression due to a grain of corn or wheat. These cavities, as I assured myself, have been filled by a small animal of the class of the foraminiferæ which the Professor Fisher has called in Russia, *fusulina cylindrica.* You will easily understand the pleasure I felt to find my old traveling guide. In Russia, the *fusulina* occupies principally the highest division of the carboniferous limestone, and here it is confined also to the coal series; but what is the most astonishing is, that in the old continent, the fusulina is exclusively found in Russia, where it constitutes hills of two hundred feet, entirely composed of them. When you come to Germany or the British islands, the fusulina is wanting; so it seemed to us that it was a being organized for eastern countries. Is it not interesting to find on this side of the Atlantic our good Russian friend?"

TESHEEVAH PLANTATION, *Yazoo Co., June 6th,* 1846.

DR. E. EMMONS,—I received a few days since your esteemed favor of 28th April, containing the analysis of Yazoo marl; I also received the first No. of the Quarterly Journal for the present year.

The analysis is very satisfactory as far as it goes, but as my principal object was to know the per centage of lime in the marl, I am sorry "*the shelly part*" was taken out—and must therefore beg of you the favor of another analysis of the marl, with *the shelly part in;* as I said before, the result of the analysis is satisfactory, and has considerably raised my opinion of the value of the marl as a fertilizer; for if the earthy part contains 10.34 per cent of carbonate of lime, without the shelly part, I think with it, it must contain enough to make the marl valuable, as well as probably some phosphate of lime.

We take this opportunity for saying that we deem it unimportant to analyze the shells of a marl bed—they are rich and valuable on all kinds of soil. The shells of oysters and clams are almost entirely a carbonate of lime, with but little animal matter, and a trace of phosphate of lime. The shells of crabs and lobsters contain from 50 to 60 per cent of carb. lime, and from 3 to 6 of phosphate, the rest being carbonate of lime.

MISCELLANIES.

Theory of Agriculture.—One object of the article in this Journal, entitled the Theory of Agriculture, was to show that the soil contains the food of vegetables, and that, contrary to what has been taught by Liebig and others, it is in a soluble state, or in an available condition. We wished to bring back the attention of agriculturists to the soil—the great storehouse of supply for the vegetable kingdom, or the medium through which the carbon must pass in order to gain access to the secretory organs of plants.

Dr. Lee has taken exceptions to these views, as we supposed he would. We thank him for his favorable notice of our article and journal, and we certainly have no objections to criticism from him, or any other person. We care not where the light comes from, if we can have it: the bed and the bushel were condemned long ago as receptacles for light; therefore, we say, shine forth.

Dr. L. objects to Dr. Jackson's experiments with crenates of potash and lime, because the benefit *may* be due to the potash and lime alone. There is no light here, for it *may* be equally as well that the crenic acid was the element of growth. But the experiment itself shows that it was not exclusively the alkali; the removal of the color showed that. Again, suppose that vinegar or acetate of potash should not benefit a crop, it would be no proof against crenic, apocrenic acid, or their salts.

Dr. Lee objects to the Theory of Agriculture on the ground that the combination of the crenates is such that the supply of carbon for wheat or any other crop is impossible. He says, to supply 100 pounds of wheat or corn with carbon at least 250 pounds of the crenates must pass through the plant. Well, if we believe in Liebig's theory, how much *air* must pass through the plant in order to supply it with carbon? Air contains one part of carbonic acid in 2,000. Carbonic acid contains six parts of carbon in 22 of acid. There is no greater probability of excess of alkali in one case than of oxygen in the other. Besides, we did not design to inculcate the doctrine that there is no other source for carbon than the crenates. We know that carbonic acid exists in solution in water in an uncombined state. What we wish to be understood as the true doctrine is, that the food of plants, whatever it may be, is absorbed by the roots mostly, and that the soil is its storehouse; that this is eminently the case with our cereals we believe—else why say so much about exhaustion by crops?—and it is now known that it is not enough to supply alkalies, or the inorganic matters; there must be present also, those bodies which contain carbon in some form. Liebig himself, we believe, has abandoned the notion that it is sufficient to supply the inorganic matter. Practice and experience of all ages go to confirm the doctrine we have taught in regard to the function of the root. Why is it that lime is worthless on soil destitute of organic matter?—and why is it so useful when organic matter is supplied? We are ready to ask some other questions when these are answered.

Expense of Fattening Pork.—We have often seen the article in the Genesee Farmer entitled, "Expense of making Pork," quoted with evident approval by our cotemporaries. Let the American farmer, however, look at the experiments of Boussingault, and see if they are worth anything to us. He put up seven swine, weighing 1691.8 pounds, and fatted them 104 days—at the end of which time they had gained only 409.2 pounds—about 58½ pounds each: was this increase of weight what a farmer who understands his business would have a right to expect? This pork cost, according to Dr. Lee's estimate, 10¾ cents per pound.

Again, Boussingault puts up nine thrifty hogs to fatten, and they gain only 344 pounds. This is still worse—a little over 38 pounds for each hog. But admitting that Boussingault made the most of his feed, does it cost us as much to make a pound of pork as is here represented? We say not. We have supposed, however, that in Massachusetts and New York it costs 5½ cents per pound—but then, in making pork, the farmer has converted matters into wholesome food, which would otherwise have been lost. The western farmer, however, can make money by selling pork at three cents per pound. So we think Boussingault's experiments prove nothing for us.

Glass Milk Pans are used in England. They are preferred to earthen for these reasons: They may be washed clean without boiling water; they stand a heavy blow without breaking. It is not improbable but they preserve milk better than tin, zinc, or earthen, especially as the latter is more or less absorbent of foreign matters. They weigh eight pounds, and cost from 3s. 9d. to 6s. 8d., according to the quality of the glass.

Impregnation of Violets.—Thos. S. Rulf, Esq., pointed out to the members of the Linnean Society, that the particular form of the stigma was connected with the development of hairs in the spurred petals upon which the pollen falls. The stigma is globose and the style bent, which brings the former in contact with many moniliform hairs in the claw of the petal. It is through these that the pollen gains access to the interior of the style.

AMERICAN QUARTERLY JOURNAL

OF

AGRICULTURE AND SCIENCE.

No. VIII. OCTOBER, 1846.

MINERAL AND AGRICULTURAL RESOURCES OF NEW YORK.

In the last number of this Journal we gave a brief and condensed account of the mineral resources of New York. In the first part of the essay here referred to, we attempted to show the importance of an early investigation of the natural resources of a state, inasmuch as its prosperity is greatly promoted by investigations of this kind. We took occasion also to say, that the mineral formations have much to do in directing the business and enterprizes of life: that they frequently move the springs of action when least suspected; or, in other words, that it is the formation and structure of the country which controls the pursuits of men; and that their occupations are results determined by the geological conditions of particular districts. This view of the subject is verified by daily observation. The coal fields of Britain and of the United States call for the labor of certain classes of men, and furnish profitable employment for an immense amount of capital. Capitalists, engineers, miners, draymen, common laborers, transportation companies, etc., operating in all their various spheres, merchants and dealers, all make up classes of interests directly called into being by the peculiar formations of a district.

The earth in many ways opens a field for industry and employment, and as it were compels both capital and labor to be expended in certain channels. It is true individuals embark from choice, yet there is a sense in which there is a controlling power in the structure and formation of the country which effectually moves great classes of men in a given direction. New channels of industry are opened by almost every discovery, the extent of which can never be perceived at the moment it is made. A material when first known may be useless, though abundant, and its value comes to light only in the progress of discovery. This, however, when once disclosed, becomes a new element of wealth, a new road opened for the industry of classes of men, who are ever afterwards subordinated to a sphere in life which was created in the original constitution of the earth's surface.

The great depressions in the earth's crust are basins for the reception and accumulation of bodies of water; the valleys lead from them, and diverging in all directions toward the elevated regions, become the channels of supply to the waste occasioned by evaporation; and upon these too we may travel and transport all the materials which constitute its productions. In all this commerce is created and made one of the great pursuits of men. The valleys and gentle slopes create husbandry, and rural occupations. To compel the same to change and push their labors in a new channel, we have only to place them in different formations.

The linear depression forming the Mohawk valley, and making a channel of communication east and west for more than three hundred miles, and connecting itself with the great lakes, and at the same time with another north and south depression, in which the Hudson river and lake Champlain are not only situated, but form as it were continuous links of a single chain, and whose extremities join two distant points of the great Atlantic basin, not only makes the state of New York what she is, but has created a commercial metropolis of the Union, and has contributed greatly to the prosperity of the New England and Middle States. Even the great west feels the advantages of the physical structure of New York. A barrier at Little Falls, or the Highlands, and the city of New York would never have become greater than a city of the third or fourth class of dimensions.

The Mohawk and the Champlain and Hudson valleys, then, are without doubt the great channels for commerce and agricultural products of the west and north. Even in the former direction it may well extend beyond the rim of the great basin of the Mississippi, for great as the river of this valley is, foreign export had rather, or had better pass through the Mohawk valley, as it is brought to a port nearer the shores of Europe than if it travels by the great river and valley of the west.

In consideration of these great channels of communication with the Atlantic, the great highway of the nations, it seems that it is wise and politic to extend it as far as is practicable, to make the inland highway as broad and deep as possible, to send off from it branches wherever the circumstances of the country require it. The future will approve of this policy, for the increase of men and the increase of the productions, will be found to justify this view. It is true many talk as though the state was full, and that the height of its productions were already reached; still, it goes on and still increases, and every census return overruns the estimates of the previous calculations.

It is doubtful however, whether it is wise and politic to seek for revenues in the artificial communications of which we have been speaking. They should be paid for and kept in repair by their own earnings; but after that let them be open to the use of the world. Like other great channels of intercourse, the seas, the rivers, the lakes, the foundation of those great works were laid when the depths of the sea were made. They belong to the country as much as the Mississippi and the great lakes; and the commonwealth is merely an agent to open and complete a work which was made feasible in the original structure of her territory. It is for the interest of agriculture that it should be so. It is for the interest of the many that it should be so, as it will cheapen food and clothing, and make the necessaries of life more abundant. Bread should go to market with the least possible expense, and that liberality which benefits the many aids civilization in its progress, and harmonizes and subdues those feelings which may under ordinary circumstances become discordant between the rich and poor.

We have spoken of the natural channels of communication because they constitute a part, and no small part, of the resources of the state, without which a fertile soil and mineral resources would lose their great value.

The mineral resources are remarkable for their distribution. Iron ores belong to four great divisions of the state, the south, west, north, and east, in each of which they are not far distant from the great lines of communication already spoken of. Brine springs and plaster belong to the central counties immediately upon the Erie canal, or upon navigable waters. Flagging stone of the best kind is within striking distance of the Hudson. Limestone exists in all parts of the state, except in the southern tier of counties, good stone for construction in most of the sedimentary rocks.

We must not, however, dwell too long upon these important products. We now propose to take up in detail the agricultural resources of the state. Our object mainly will be to show the aggregate amount of the products of the farm, and how these products are distributed over the state.

Wheat, corn, oats, and barley, may be regarded as staple products, an excess of which is always raised over and above the wants required for home consumption.

The quantity of wheat raised in New York in 1844-5, was 13,391,770 bushels. This amount was harvested from 958,233 acres, thus averaging for the whole state, nearly 14 bushels per acre. The average product per acre may appear very small, but it must be remembered that some parts of the state where wheat is attempted to be raised, is not well adapted to its culture, or else much was destroyed by the insects. Indeed large tracts of land which formerly produced good crops of wheat, cannot now be employed in its culture on account of the wheat fly. Hence the average for the whole state is reducĕd to a low standard; for notwithstanding repeated failures, many acres are sown under the hope that the result may be more fortunate; but still it is no doubt true that in the eastern counties on the Hudson, the crop is becoming more profitable than formerly, for some counties raise enough for home consumption.

It may however be interesting to know the average yield in different sections of the state. For this purpose we will select several counties which may be considered fair representatives of the section of the state in which they are situated. In Westchester the average of the wheat crop for 1845 was 9 bushels per acre; in Washington county, 12; Rensselaer, 8; Dutchess, 5; Columbia, 6. Proceeding to the western part of the state, the yield of Livingston county was 15; in Onondaga county, $14\frac{3}{4}$ nearly: and Monroe county nearly $19\frac{1}{2}$ bushels, which is the greatest average yield for any of the counties of the state. In the southern tier of counties the average yield is much less, but more than some of the older river counties already spoken of. Thus Allegany raised 260,190 bushels on 23,600 acres of land, the average per acre being about 11 bushels; Steuben raised 180,095 bushels on 15,365 acres, the average of which is over $11\frac{1}{2}$ bushels. In the extreme northern section of the state we find Clinton county giving a very handsome average yield of wheat. On 6,508 acres, 114,570 bushels of wheat were harvested, which is an average of about $17\frac{1}{2}$ bushels per acre.

If we now turn to the premium crops, and compare the several averages with them, we shall have the means of forming an estimate of what the produce should be per acre. The State Society's premium for the greatest crop of wheat was awarded to Edward Rivenberg, of Vernon, Oneida county, who raised a little over 55 bushels per acre. The second premium was awarded to a crop of 55 and a fraction. The Washington County Society awarded a premium for a yield of 44 bushels per acre, and Madison county for $53\frac{1}{4}$ bushels per acre. William Garbutt of Wheatland, Monroe county, raised an average of 26 bushels per acre for 16 years in succession. This is a good example of the produce of this grain for several successive years. The greatest yield was in 1833, amounting to $38\frac{1}{2}$ bushels per acre.

Now it would be interesting and certainly important if we could ascertain the cause of the diversity which appears in the above results; for though something must be attributed to the ravages of the wheat fly, still it is not at all probable that it is all due to this one cause. Something undoubtedly must be found in the soil which raises the average yield to nearly twenty bushels in one case, and depresses it to five or six in others. This difference in the ability to raise wheat has been attributed by some to the limestones, but the fallacy of this assigned cause is evident when we compare Dutchess and Westchester counties with Onondaga; there being about as much limestone in the former as in the latter county, and beside the analysis of the limestone soil, or the soil upon the Onondaga limestone, gives no greater amount of lime than in many localities where limestone is absent. When we compare however the soils of Clinton and Onondaga and Monroe, we shall find that in each of these counties there is an excellent clay soil, which seems to be the debris of shales containing in addition to lime, magnesia also, as well as the phosphates of the earths, and of the peroxide of iron. This clay soil in Clinton county is newer than in the river counties, where the yield is quite small at present, but formerly and for many years, probably half a century, the same soil of the river counties has been cultivated for wheat, and has yielded its famous crops, and now it is not at all strange that characteristics of exhaustion have appeared.*

The quantity of corn raised in New York in 1845 amounted to 14,722,114 bushels, on 595,134 acres. This gives an average of nearly 25 bushels to the acre. In this average as in the wheat crop, we must regard as before the capabilities of the soil and the soil and climate. One hundred and fourteen bushels of corn have been raised on an acre in a section of the state not remarkably well adapted to the crop, and fifty and sixty bushels are very fre-

* It is probable that in St. Lawrence, and perhaps in Clinton county, the favorable yield may have been owing to the cultivation of new lands, New lands over the whole state yield good crops of wheat; while it is only in the western and central counties that the crop is kept up without a diminution in the product; even some of those counties often better after twenty-five years' cultivation—which shows most clearly their adaptation to the crop.

quently obtained, and that without much extra labor and expense in favorable locations, or in soil adapted to the crop. It will be interesting to see in what parts of the state there is a failure in the corn crop so far as to diminish the product below the average of the state. Westchester gives an average of 31 bushels per acre, Dutchess 25, Columbia 20, Rensselaer 28, and Washington 21. The average of these five counties is 25 bushels.

The western and central counties, which constitute the best wheat lands, give the following results: Livingston raised 257,346 bushels of corn on 9,922 acres, or an average of 25 bushels per acre; Onondaga 516,496 on 19,688, an average of 26 bushels; Monroe 453,463 on 15,270, an average of 29 ; and Erie 238,295 on 10,530, an average of only 22½ bushels to the acre. In these four standard counties we obtain only 25½ bushels of corn per acre. Comparing the two districts together, it is plain that although the western is superior for wheat, it is not for Indian corn; that the river counties are quite as well adapted to this crop as the central counties. It is, however, questionable whether the soil is really as good, and it is probable that the chilly winds of the lakes may affect unfavorably some portions of the western district. This conjecture may not prove true to any great extent, as we find that the average yield of Wayne county is 26 and Orleans 27 bushels. Still it would appear that soils like Orleans, Wayne and Monroe ought to yield an average considerably exceeding that of the river counties, particularly Washington, Rensselaer and Columbia county. The two best northern counties will be found also to compare very well with the preceding; thus Clinton county produced 104,830 bushels on 3,093 acres, or an average of 26 bushels. St. Lawrence 304,403 on 12,341, which is an average of 24 to the acre.

In the southern tier of counties, Broome raised 172,703 bushels on 6,611 acres, which is an average of 25 bushels. Allegany raised 101,140 on 4,845 acres, which averages only 20 bushels to the acre.

The State Society's premium for corn for 1845 was awarded to George Vail, of Rensselaer county, who raised 182 bushels on an acre, when shelled and accurately measured. The premium crop for Washington county amounted to 131 bushels per acre, and another crop in the same county yielded 128 bushels per acre. Mr. George Geddes of Onondaga county raised corn at the rate of 71 and 80 bushels per acre on different pieces of land, but differently cultivated. These instances may be contrasted with the average of the state, or of the different districts of the state. We learn from the above also, that the eastern counties are as well adapted to the corn crop as the central and western. This appears both from the average yield and from the premium crops given above, as well as in preceding years.

It will be observed from the foregoing results, that corn may be raised with almost equal facility in all the sections of the state, if we except those districts whose height exceeds a thousand feet above tide. At this height in this latitude, frost often injures the crop. There is probably but one kind of grain which will give so much nutriment as corn. Wheat gives muscle and strength, and still for sustaining young animals while growing, whether fed in small quantities, or given to the mother, it is quite doubtful whether it is not superior to wheat. It is richer in phosphates, and hence supplies the material for bone. It is true it may be regarded as an expensive crop compared with some others, and yet will it not be found that the quantity of nutricious food in the grain, husks, stalks, &c., pays the farmer a better profit, all things considered, than any other grain. So far as the market is concerned it fluctuates less, bears a steadier price, and certainly so far as home consumption is concerned, it must rank among the best products for fattening swine and cattle. We have even regarded roots an inferior kind of feed for cattle and hogs, and not by any means to be brought into competition with corn. It is true that in feeding some care is required if fed raw in the ground or unground state. If however it could be cooked and given in the form of a coarse bread, it would be much safer and give a greater return in profit. Roots in small quantities for the purpose of giving bulk and sufficient moisture to feed are important.

The quantity of oats raised in the state of New York in 1845, was 26,323,051 bushels on 1,026,915 acres, averaging 25 bushels to the acre. The variations from the average of the state are not very great, still some sections seem to be better fitted to this crop than others. Thus in Rensselaer county, the average yield per acre is 28 bushels, and in Dutchess 31; Westchester 26, Columbia 25, and Washington only 23. The average of these five counties amounts to a little over 26 bushels. It will be seen on comparison, that the western and central counties scarcely exceed the river counties in productiveness in this crop. Thus Monroe raised 517,789 bushels on 18,510 acres, the average of which is 27¾ bushels nearly; Livingston raised 351,233 on 11,616 acres, which is only 21½ bushels; Onondaga 825,002 on 26,506 acres, equalling 31 bushels; Erie 637,513 on 27,312, the average of which is 23. The average of these four counties is a little over 25 bushels, about the mean of the whole state.

The southern counties fall a little short of the others. Thus Broome raised 331,425 bushels on 13,945 acres, or an average of 23¾ bushels; Allegany 503,134 on 22,274 acres, which is about 28 bushels per acre; Delaware 648,982 on 28,950 acres, an average of 22½ per acre; Steuben 635,304 on 24,356 acres, or an average of 26 per acre. The average of the four counties is a little over 23 bushels per acre.

The northern counties are superior to the southern; thus Clinton gives a return of 26 bushels to the acre, having raised 268,256 bushels on 9,969 acres; Jefferson 709,232 on 26,462 acres, or an average of nearly 27 bushels; St. Lawrence averages 27 bushels, having raised 646,556 on 24,175 acres; Lewis averages 25 bushels to the acre, having raised 202,551 bushels on 7,923 acres. The average of these four counties equals 26 bushels. The surface of the country, its soil and its rocks, or geological formations of those four counties, is almost identical. Clinton has a larger proportion of surface perhaps of tertiary clay. The same similarity also exists in the section in which the other counties are situated. The southern tier of counties geologically consists of slates, shales, and sandstones, which agree in their lithological characters. The same may be said of the river counties. The western and central counties arranged on a belt with Onondaga, Monroe and Erie, are also upon formations differing but little from each other, and hence it would appear that the average product of the sections taken by themselves may be due to the character of the formations upon which the crop is grown.

The State Society's premium crop on oats was awarded to Tompkins county. The produce per acre was 91 bushels and 28 quarts. The second premium was awarded to Lewis county; the yield was 90 bushels to the acre. Eighty-six and a half bushels were raised upon one acre in Washington county. The lithological character of the rocks of these counties is not very dissimilar; in each shales and slates abound.

The adaptation of the state for barley seems to be nearly equal throughout its whole territory. The amount of barley raised in the year 1844, was 3,108,704 bushels. The number of acres on which it grew 192,503. The average product was 16 bushels per acre.

In the eastern and river counties, the average yield for Dutchess, 11 bushels; Columbia, 13; Rensselaer, 17; Westchester, 18; Washington, 14. Average for the 5 counties, 14½ bushels nearly.

The central and western counties stand about the same: thus, Erie raised 40,485 bushels on 3,280 acres, giving an average yield, 11 bushels; Livingston raised 93,959 on 6,698 acres, or an average yield of 14 nearly; Onondaga 360,421 on 18,770, giving an average of 19 bushels; Madison 229,606 on 12,972, the average crop of which is 17 bushels.

The northern counties are less; thus, Jefferson raised 159,872 on 11,007 acres, the average of which is 14 bushels; St. Lawrence 48,100 on 3,118 acres, giving 15 bushels on the average product; and Clinton of 12 bushels to the acre, though only 192 acres were cultivated for this crop. The average of the 3 counties falls short of the average of the state 3 bushels per acre.

The southern tier of counties grows about the same average as the northern: thus, Broome raised only 10 bushels per acre, with only 96 acres under cultivation for the crop; Chemung averaged 11 bushels, and raised 25,265 bushels on 2,244 acres; Allegany, which seems to stand high for this crop, raised 38,132 bushels on 2,098 acres, which gives the average yield of 18 bushels per acre. Onondaga had the largest crop of barley, and there is a greater yield of this grain in this county than in the others. Allegany and Westchester come next.

We believe from all that appears in the cultivation of this crop, that it is quite as profitable as wheat, and may be grown in all parts of the state; that it is less select in the soil, and is very generally suited to the common coarse soils of our primary rocks. It is a good crop in New England, and is one of the most profitable grains raised in the more hilly and mountanous parts, as the old counties of Hampshire and Berkshire.

The premium crop of barley was awarded by the State Society to Lewis county, for a crop of 74½ bushels per acre. A crop in Washington county amounted to 45, in Rensselaer county 52, Madison 67, and Allegany 63, and two crops in Oneida of 63 each.

The census returns for rye are too obscure and imperfect to admit of use. No distinction is made as it regards the kind of rye which was raised. The whole amount however of rye harvested, was 2,966,322 bushels. As the returns stand, the average yield for Westchester was 9 bushels, 7 for Dutchess, 9 for Columbia, 10 for Rensselaer, 9 for Washington, 11 for Livingston. The premium crops of rye are certainly very great. The Society's premium was awarded to a gentleman in Oneida who raised 52½ bushels to the acre. A gentleman in Washington county raised 41 bushels, and received the County Society's premium.

The buck-wheat raised in the state was 3,634,679, and the number of acres cultivated for this crop was 255,495, giving an average yield for the whole state, of 14 bushels per acre.

Of peas, 1,761,503 bushels were hauled from 117,379 acres; the average yield of which is 15 bushels per acre. The crop amounted to 162,187 bushels, the average yield per acre was nearly 10 bushels.

Turnips which are esteemed very highly with some, is not a crop which furnishes a great yield for the entire state. The quantity raised was 1,350,332, and the average yield per acre was only 88 bushels, which must be considered as quite short of what may be grown upon an acre when properly cultivated.

Remarks of the same kind may be made in regard to the potatoe crop. For the average yield for the whole state is only 92 bushels per acre, while it is well-known that it is not at all difficult to raise 300 bushels. In comparing different parts of the state with each other, it will be found that the best wheat lands are not the best for potatoes.

The yield per acre for Livingston county was only 87 bushels per acre. Onondaga yielded 90, while Alleghany gave an average of 99, Jefferson 143, Clinton 137, Westchester 89, Dutchess 84, Columbia 76, Rensselaer 75, and Washington 122. Broome county stands as having yielded less than 30, which is probably owing to some error in the returns. Delaware, which we should expect would yield good crops of potatoes, has returned an average of only 76 bushels per acre. It is difficult to assign a cause for the small mean for this crop, it may be that as it is a crop which all cultivate, and requires but little skill to get something of a return for labor, that it is neglected, and it is rarely attempted to raise more than an ordinary crop. It is not an article sent to market, except when the market is near, and hence it is considered of little consequence to raise more than is required for home consumption, which is easily accomplished by ordinary tillage.

The premium crop of potatoes was raised in Lewis county, the yield was 396 bushels per acre. Delaware gave in a crop of 324, Rensselaer 355, and Madison 426. We believe that 1,000 bushels of potatoes might be raised from an acre, if the crop was cultivated with the same care that corn often is. It is still a question whether the management of the potato is as well understood as corn and some other crops, notwithstanding it is so generally cultivated.

The quantity of flax raised in the state, was 2,897,062 lbs., and 46,089 acres were under cultivation; the average number of pounds per acre, is a little over 62. The river counties when compared with the average of the state, are found to yield a much larger quantity than is given in the returns. Thus Westchester gives an average yield of 139 lbs., Washington 174, Rensselaer 157, Columbia 187, Dutchess 237, and Livingston only 67 lbs., which if this wheat county is a representative of the state, shows that the middle and western counties are poorly adapted to this crop, while the coarser soils of the river counties are well adapted to it.

The greatest crop of flax raised in the state, and which received the Society's premium, amounted to 567 lbs. per acre. The next best was one yielding 437 lbs. per acre. The above was rewarded to a gentleman residing in Chautauque county.

The dairy business is one of considerable interest in the state. It is however difficult to determine from returns which have yet been given, what part of the state is best adapted to this business, that is, the production of butter and cheese. In order, however, to make an approximate determination of this matter it was necessary to convert the butter and cheese into one item. Or in other words to estimate both products as cheese. For this purpose the butter which was returned was estimated as equal to two pounds of cheese, which product was added to the amount of cheese returned. It was then determined from the number of cows which were milked, how much cheese each cow produced. We have given below the results obtained by this method.

The average quantity of cheese in pounds made per cow, in Delaware county, was 207 lbs.; in Washington, 184; Herkimer, 307; Rensselaer, 187; Dutchess, 184; Onondaga, 203; Saratoga, 182. According to observation we believe these counties are considered the best grazing sections in the state, and it will be seen that Herkimer produces the greatest number of pounds per cow of any section. The average for the state, estimated as above, is only 95 lbs.

A large quantity of milk, however, must be consumed in New York, Albany, Troy, and the numerous cities and villages, which can not be estimated, and which must serve to reduce the average of the state to a low amount. The number of cows milked was 999,490, and the pounds of butter made, 79,501,733; of cheese 36,744,976.

The number of neat cattle was 2,072,330. Of these 334,456 were under one year, and 1,709,479 over one year. The number of horses in the state 505,155; no distinction of age. The sheep in the state amount to 6,443,855. Of these 1,870,728 were under one year, and 45,053,369 over one year old. The number of fleeces sheared was 4,607,012, yielding 13,864,828 pounds of wool. The number of hogs in the state was 1,584,344. The aggregate number of domestic animals in the state is 8,867,810. This includes merely cattle, horses, sheep and hogs.

The number of acres of improved land is 11,757,276. This embraces the aggregate for all the counties, or the whole state. The number of farmers or agriculturists in the state is 253,292. Those who are engaged in manufactures and trades amount to 138,089. These three classes embrace the great mass of active business men. The number of merchants is 20,758. The number of lawyers, clergymen and physicians is 12,558.

The agricultural resources of New York appear in the premium crops. It would not be right to rate them according to the average product of the state, or of any one section of the state, for these are by no means the measure of the state's ability. Indeed it is quite probable that we may consider the ability to produce even greater than appears in any of the premium crops. In comparing premium crops with the averages of any part of the state, we are forcibly reminded that most of the husbandry of the state is in inefficient hands. It would not be proper to consider the defect as due to inertness, or bodily laziness, but rather to a state of ease and contentedness in ignorance of what may be done.

The foregoing results show us another important fact, namely, that the profits of husbandry must be quite equally divided; that the advantages which are possessed in some parts of the state, are balanced or may be set off against others in distant sections of the state. The pasturage of Herkimer and Delaware seems to be better fitted for making cheese than Livingston, or the wheat counties in general. The soil of Rensselaer, Dutchess and Westchester appears as well adapted to corn as any of the central and western counties. Flax also grows well in the poorest parts of Rensselaer county. In Livingston, and perhaps some other wheat growing counties, potatoes require to be changed frequently in order to preserve a tolerable quality for the table. The hilly and mountainous counties produce those of an excellent kind for a series of years, and where corn is an uncertain crop, oats and peas become excellent substitutes, especially for fattening swine.

In view of the foregoing results, it may be interesting to some of our readers to see an additional statement of the yield of the cereals in South America and some of the European countries.

It is in the temperate zones that wheat and the other nutritive grasses find a region favorable to their cultivation. In the equinoctial parts of Mexico they are never cultivated below the height of thirty-nine hundred feet. At Xalapa wheat is raised solely for its straw; at elevations a little higher, the cereals begin to be cultivated, and upon the table-land between Queretaro and Leon, the wheat yields in the proportion of 35 or 40 to one. Humboldt states that at Cholula, the common return is from 30 to 40, frequently exceeds 70 or 80 to one. But the produce of the whole country is stated at 20 or 25 to one. The Mexican wheat is of the best quality, and enters into competition at Havana, with that from the states. The Mexican wheat however, cannot be preserved from decay, longer than two or three years.

The following is a general statement of the yield of the different countries according to the best authorities.

In France the yield of wheat is 6 to 1; in Hungary, Croatia, and Sclavonia, from 8 to 10 to 1; in La Plata 12, and in the northern parts of Mexico 17; in the province of Pasto in Santa Fe, 25 to 1; in the province of Casamarca in Peru, 18 to 20 grains to 1. The cultivation of corn or maize is very extensive in South America. It is cultivated from the coast to the valley of Tolucca, which is 9,186 feet above the sea. Maize may be regarded as the principal food of the Mexicans, as well as that of all domestic animals. The fecundity of the Mexican corn is very remarkable. It is not unusual for it to yield 300 or 400 fold; and a harvest is regarded as defective in some places which yields only 160 to 150. The general average for the equinoctial regions of Mexico, is considered however only as 150. The weight is less than the corn of the northern states, and has less nutritive matter.

Rye and barley resist cold much better than wheat, and are grown in all the higher regions to a limited extent, and generally barley takes the place of oats as food for animals, as in New Spain oats do not produce well. The plant cultivated in the highest and coldest regions of New Spain is the potatoe. Some species are there cultivated which are unknown in Europe or this country, for example, the Solanum cari. Potatoes are grown in Santa Fe and Quito which are a foot in diameter, and are said to be of a superior kind.

In conclusion we may probably say that in New York an increased spirit of enterprize may properly be encouraged and excited in consequence of the accessibility of excellent markets, and the certainty that increased attention to husbandry, especially if accompanied with an enlightened view of the department of labor. Besides all this, the farmer may be assured that New York furnishes as many comforts and luxuries as any part of the Union, and that industry certainly no where in this commonwealth goes unrewarded. Nor is there a territory, which favors so highly health and longevity, and freedom from severe and lingering diseases.

The peculiar nature of the wheat and other soils is of that character which may be depended upon; the wheat soil in particular does not become exhausted by cultivation in that rapid ratio, as those of Ohio and some of the western states. It has a bottom which bears good crops, with little deterivation year after year. Some portions of the county of Cayuga produces better crops of wheat than at the first settlement of the county.

In Ohio, according to a statement recently published in the Cleveland Herald, there has been a gradual falling off in the wheat crop for the last four years. It may be owing to be sure to an impoverishing system of culture which may not be followed in this state. This crop of 1842, was 25,387,439 bushels; 1843, 18,786,705; 1844, 15,969,000; 1845, 12,000,000. The corn crop in Illinois is also falling off. In four years, according to his statement, the crop has diminished more than one-half, a fact which must be owing in part to a diminished product of the soil.

In this state, on the contrary, the harvest of 1845 exceeded that of 1840 by 1,438,263 bushels. From these and other facts we infer that New York can raise wheat at a profit notwithstanding the cry that the east cannot compete with the west. It may cost more to raise a bushel of wheat in New York than in Iowa and Wisconsin: our difference however is not so great as to leave the farmer without profit, and as the husbandry of the state is improving, as the expense of the wheat crop is diminished by it, we hope to see the crop still increasing.

For the purpose of giving a wide circulation to the important and interesting facts contained in the census returns of this state, we are induced to publish them entire, and to append them to this article. That some may feel that they occupy too much space in a journal of this kind, is highly probable, but we intend that it shall be a repository of facts which shall be useful to the farmer and statesman, to which each and all may refer, as occasion may require. Very few persons who can read but have sometimes to refer to facts contained in statistical reports; for this reason we given them a place in the Journal.

TABLE OF PREMIUM CROPS.

Kind.	Counties.	Premium crops. Amt in bushels.	Average crops.	Av'rage crop for the eastern counties.	do western and central do.	do northern counties.	do southern counties.
Wheat, ...	Oneida......	55	14	8	17	14	11
Corn,.....	Rensselaer, ..	182	25	25	25½	25	22½
Oats, ...	Tompkins, ...	91	25	26½	25½	26	23
Barley....	....	74½	16	14½	15½	13	13
Rye	Oneida, ...	52½	9½	9			
Flax, ...	Chautauque, .	437 lbs	62	179	67		
Potatoes,..	Madison, ...	426	92	89	82	137	87

I. STATISTICS OF WHEAT, RYE, AND OATS.

Counties.	No. of acres of improved land in the county.	No. of acres of Wheat sown.	No. of acres of Wheat harvested.	Quantity of Wheat raised. Bushels.	Av. No. bushels per acre.	Number of acres of Oats sown.	Number of bush. of Oats harvested.	Av. No. bushels per acre.	No. acres of Rye sown.	No. of bush. of Rye harvested.	Av. No. bushels per acre.
Albany..........	233, 295	5,341	6.112	44 149	7⅓	28,921	624.038	22	15,705	163,894	10
Allegany	204, 147	26,152	23 600	260,190	11½	22,274	503,134	22½	402	31,144	7
Broome	144, 421	8,738	7.204	81,388	11½	13,945	331,425	24	4,6 6	37,049	8
Cattaraugus, ...	15˘, 442	16 660	15.331	177,927	12	19,095	459.770	21	114	934	8
Cayuga,.........	295, 651	48,452	41,783	652.896	16	21,382	652,281	30½	588	4,415	7½
Chautauque,.....	252, 784	23,499	22,336	268,261	12	16.979	448.834	27	· 322	3 158	9½
Chemung, ...	104, 762	17,807	15.365	180,095	12	11,604	287,146	26	1.537	10,780	7
Chenango,.......	309, 851	8,837	8,313	104,562	13	21,430	597.508	28	3.559	40,148	11½
Clinton,.........	125, 605	8.064	6,508	114,570	17½	9.969	268,258	27	3,753	37.998	12
Columbia,.......	311, 767	9.482	11,389	75,065	7	42.379	1, 093,850	27½	31,044	302,508	9½
Cortland,........	160, 584	8,675	8,111	96,852	12	15,134	400,342	26½	596	4,532	7½
Delaware,......	307, 316	4,305	4,260	50.685	12	28,950	648,982	22½	10.616	113.114	10
Dutchess,........	379, 459	12.186	17 505	86.863	5	40,531	1, 283,718	30	21,365	165,782	8
Erie,...........	224, 196	22,017	20,433	251,781	12	27,313	637,513	23½	1,096	11,007	11
Essex,...........	266, 644	8,117	5,900	84,217	14½	11,028	241,514	20	3,077	32,160	10½
Franklin,........	101, 995	7,662	6,632	97,999	16	6,239	148,378	24	2,081	21,746	10
Fulton,..........	119, 831	1.761	1,618	17,118	11½	14,249	287,221	20	4,415	42,623	10
Genesee,........	194,956	43,389	42,960	695,107	16½	12,308	406 594	23	219	2,033	10
Greene, ...	199, 096	2,165	2,512	19,713	9	15,777	347,891	22	11,090	84,380	7½
Hamilton, ...	11,866	59	41	253	6½	940	14,625	15½	196	956	5
Herkimer, ...	255, 725	4,982	4.846	60,700	12½	27,012	690,413	25	2,097	22,367	10
Jefferson	386, 789	35,986	32,949	421,819	13	26,462	709,232	27	3.989	55,456	13½
Kings,..	20, 720	1,420	1,411	26,992	19	1,799	64,786	36	500	9,724	19½
Lewis, ...	114, 187	7.026	6,375	87,406	14	7,923	202,515	25	913	9,278	10
Livingston, ...	214, 112	53,043	52,047	821,762	16	11,616	351,233	30	464	5,200	11
Madison, ...	267, 812	13,915	13,477	190,364	14	18,510	517.789	28	745	5,888	8

Monroe,	281,011	72,635	68,3-3	1,338,585	19½	16,832	538,063	32	326	3,198	10
Montgomery,	190,708	7,547	6,978	69,589	10	34,187	717,212	21	8,786	80,962	10
New York,	4,034	4	3	60	20	83	2,135	26	10		
Niagara,	148,108	43,506	39,521	713,318	18	10,098	292,099	29	59	498	8½
Oneida,	362,559	9.010	8.453	115,927	14	34.233	971,608	28½	2,096	19,676	9
Onondaga,	311,872	43,638	42,899	636,177	15	26.506	829,002	31	1,297	10.107	9
Ontario,	274,395	58,265	57,924	918,616	16	16,461	533,062	32	1,160	9,569	9
Orange,	302,244	9,010	9,488	82,881	8½	14,646	417,388	28½	19,896	191,864	10
Orleans,	151.711	43,040	38.731	692,127	18	8,186	236,743	29½	18	219	12
Oswego,	166,834	9,653	9,370	98,880	10½	15,574	359,767	24	2,039	1,594	8¾
Otsego,	389,515	10,645	8,733	109,551	13	46.145	1,004,541	22	9,131	87,925	9½
Putnam,	104,538	414	656	4.913	7½	3,645	81,416	26½	3,698	31,275	9
Queens,	125,574	6,449	8,702	99,374	12	12,160	324,218	27	5,802	61,680	10½
Rensselaer,	278,437	8,302	8,276	75,708	9½	26,942	763,841	29	18,517	201.314	11
Richmond,	17,067	764	740	10.337	15	1,009	27,704	27	514	7 501	14½
Rockland,	55,828	205	194	1,705	9	2.327	45,120	22	4,548	26,283	6
Saratoga,	295,051	9,853	9,745	104,660	11	27,373	620,395	23	16.981	145,777	9
Schenectady	92,459	1.818	1,918	19,754	10¼	14,640	254,455	18½	5,252	56,205	10½
Schoharie,	234,297	7,888	7,962	79,175	10	33,841	683,560	20	13,760	120.030	9
Seneca,	140,588	35,484	32,698	483,773	15	8.224	292,397	35½	596	4,094	7
St Lawrence,	305,555	22.456	20,536	264,832	13	24.175	646,556	27	4.491	51.716	12
Steuben,	277,936	44.737	42.028	457,304	11	24,356	635,304	26	2,068	16,378	8
Suffolk,	157,727	5,640	6,611	77,423	12	10,583	278,820	27	6,889	60,376	9
Sullivan,	68,525	315	319	3,252	10	6,457	150,300	25	7,260	64,869	9
Tioga,	103,292	11,044	10,309	113,165	11	10,535	265,922	26	1,585	9,433	6½
Tompkins,	223,478	35.371	31,352	375.640	12	20,385	528,763	26	1,202	8,493	7
Ulster,	216,707	5,065	4,315	39 323	9	17.607	429,713	25	27,371	218.281	8
Warren,	83,394	1,897	1,599	16,469	15	5,945	107,112	18	2,961	22.318	10
Washington,	310,279	7 758	6,296	75,496	9	25,525	593,423	23	12,194	116,834	9½
Wayne,	206,900	43,925	41.041	587,817	14½	17,522	476,422	28	493	4,178	8½
Westchester,	230,011	2,296	2,414	23,612	10	11.963	316,156	26	9,602	100,016	10
Wyoming,	1 0,920	23,545	22,564	331 111	15	16,852	456,160	26	72	811	11
Yates	140,639	31 73[illegible]	29.447	403,069	14	8,108	224,673	28	1,172	4.564	4
Total,	11,737,276	1,013,665	[illegible]8,233	13,391,770	14	1,026,915	26,323,051	26	317,099	2,966,322	9½

II. CORN, POTATOES, PEAS, AND BEANS.

Counties.	No. acres of Corn sown.	No. bushels of Corn harvested.	Av. per acre.	No. acres of Potatoes.	Quantity of Potatoes raised.	Av. per acre.	No. acres Peas und'r cultivation.	No. of bushels of Peas raised.	Av. per acre.	No. acres of Beans.	Quantity of Beans raised	Av. per acre.
Albany,..........	10,251	208,254	20	5,762	404,594	70	3,522	51,252	16	492	4,487	10½
Allegany,........	4,845	101,140	21	5,794	575,196	99	3,260	48,25[illegible]	16	272	2,378	10½
Broome,.........	6,611	172,713	26	2,979	182,461	63	237	2,929	15	160	1,458	10½
Cattaraugus,.....	4,558	96,540	24	4,823	506.919	105	1,294	18.369	15	161	1,830	11
Cayuga,.........	16,765	479,151	24	5,232	536,933	105	3,551	56,755	16	233	3,523	16
Chatauque,......	12,247	313,121	25	6,118	686,969	112	1,857	28,746	15	257	3,183	15
Chemung,........	6,461	177,965	27	2,152	146.901	75	414	5,069	12	118	1,148	10
Chenango,.......	8,807	241,205	27	5,113	396,096	78	409	5,845	14	162	1,896	11½
Clinton,.........	3,994	104,830	26½	4,520	620,028	137	2,035	25,823	12	696	6,601	10
Columbia,.......	28,350	526,629	18½	5,442	415,035	78	260	2,653	12	141	1,092	8
Cortland,.........	5,032	123,186	24	3,244	259.364	85	951	12,237	14	143	1,276	9
Delaware,.......	3,732	85,128	23	5,903	467,582	75	327	3,782	12	54	550	10
Dutchess,........	32,391	814.153	25	4,565	387,124	85	116	1 347	12	70	792	10
Erie,............	10,530	238,295	22½	8,040	552 091	70	3,640	51,401	16	543	4,636	8½
Essex,..........	3,893	96,429	25	4,712	515,650	125	2,624	31,885	15	425	3,144	8
Franklin,........	3,078	70,109	23	4,074	623,844	152	1,431	19,622	15	186	1,981	11
Fulton,..........	5,813	105,124	20	2,858	166,162	55	1,672	22.384	13	126	942	8
Genesee,........	8,298	225,615	25	3.221	380.710	125	4,821	75,966	17	461	3,865	8
Greene,.........	8,946	178,026	20	3,540	265,977	75	809	8,467	10½	497	3,503	7
Hamilton,.......	305	4,536	15	380	26,104	70	47	357	8	17	40	2½
Herkimer,.......	8,073	180,340	22	4,399	263,999	60	1,786	27,507	15	189	1.689	9
Jefferson,........	17.432	467,229	27	8,628	1,235,139	150	10,079	153,374	15	659	6,974	11
Kings,..........	3,241	124,688	38½	1,630	178,434	110	263	9,345	35	103	4,821	37
Lewis,..........	2,291	53.180	25	5,244	498,849	95	1,542	21,925	14	104	678	6½
Livingston,......	9,922	257,346	25	3,065	268,161	88	2,039	33.429	16	244	2,370	10
Madison,........	9,279	230,781	25	4,500	393,989	90	1,839	31,312	17	270	2,063	8

Monroe,.........	15,270	453,463	30	6,043	667,491	110	4,099	66,341	16	466	4,271	9
Montgomery,.....	9,455	187,700	20	2,802	187,905	92	4,850	70,205	17	488	2,665	5
New York,.......	153	6,325	40	138	6,085	45	....	30	17	....	25	
Niagara,.........	6,824	188,166	29	3,359	333,658	110	5,163	84,626	16	206	2,186	10
Oneida,.........	16,709	423,753	27	9,516	685,168	75	1,643	26,469	16	455	4,158	9½
Onondaga,........	19,688	516,496	27	6,335	573,896	90	5,709	106,875	19½	331	4,294	13
Ontario,..........	12,936	357,747	29	3,889	414,090	106	3,216	50,941	16	307	3,772	12
Orange,..........	18,442	603,167	32	3,202	173,018	56	2	29	15	32	331	10
Orleans,..........	7,783	213,702	30	2,458	276,433	137	2,643	45,589	19½	1,008	3,001	3
Oswego,.........	12,142	285,366	23	5,943	541,737	90	2,361	30,647	15	463	3,497	7½
Otsego,..........	9,981	201,031	20	7,808	620,921	60	1,916	21,990	12	355	2,789	8
Putnam,..........	4,440	120,858	27	1,326	74,430	75	3	62	20	19	318	12
Queens,..........	17,221	438,661	25	2,437	229,876	95	1,618	38,219	20	305	20,299	60
Rensselaer,......	17,942	403,548	22	7,992	604,025	75	747	9,985	13	549	4,552	8
Richmond,........	1,894	64,421	35	48	44,230	93	11	269	24	6	272	45
Rockland,........	3,649	95,698	31½	1,162	59,880	60	2	33	17	4	49	12
St. Lawrence,....	24,795	512,361	20	7,062	611,919	85	2,312	29,070	12	416	2,311	6
Saratoga,........	5,279	103,729	20	1,760	112,842	70	1,155	16,351	18	142	1,432	10
Schenectady,.....	4,786	85,173	18	4,532	319,914	70	5,474	77,946	15	352	2,406	7
Schoharie,.......	7,621	204,940	29	1,736	169,081	97	444	6,335	16	103	895	9
Seneca,..........	12,341	304,403	25	11,033	1,592,723	145	6,075	101,555	16	457	5,496	12
Steuben,.........	8,976	194,063	21	6,263	551,723	90	3,782	52,949	16	290	2,680	9
Suffolk,..........	15,878	501,939	34	1,567	190,830	120	7	130	19	254	3,302	13
Sullivan,........	4,587	62,362	15	1,961	79,786	42	5	41	8	26	276	10
Tioga,...........	6,307	168,160	27	2,607	167,333	65	942	9,391	10	108	890	9
Tompkins,.......	11,252	248,752	24	3,600	316,334	85	2,680	32,406	13	373	2,438	7
Ulster,...........	15,937	356,201	22	3,918	201,064	50	63	325	5	26	271	10
Warren,.........	5,326	92,746	18	2,704	236,344	86	804	8,171	10	176	1,038	7
Washington,.....	19,766	471,756	25½	7,892	969,501	122	3,535	37,675	12	763	7,400	10
Wayne,..........	16,614	441,545	2 ½	4,459	531,941	120	2,982	38,553	12	485	3,675	8
Westchester,.....	15,593	498,019	32	7,725	488,534	63	8	304	38	22	479	20
Wyoming,.......	4,263	102,139	2	4,235	388,640	90	2,791	41,771	20	322	2,699	8
Yates,..........	6,122	135,999	22	1,858	177,739	98	492	6,146	12	126	1,184	9
Total,..........	595,134	14,722,114	25	255,762	23,653,418	90	117,379	1,761,503	15	16,231	162,187	10

III. BARLEY, BUCK-WHEAT, TURNIPS, AND FLAX.

Counties.	No. acres of Barley cultivated.	Quantity Barley raised during preceding year.	Av. per acre.	No. acres of Buck-wheat.	Quantity of Buck-wheat raised.	Av. per acre.	No. acres Turnips cultivated.	Quantity of Turnips raised.	Av. per acre.	No. acres Flax cultivated.	No. pounds of Flax raised.	Av. per acre.
Albany,.........	7,603	120,978	16	10,973	183,274	16	173	12,219	70	421	34,984	80
Allegany,.........	2,098	38,132	17	4,740	61,995	15	237	32,197	98	1,119	95,268	80
Broome,........	96	1,032	10	5,318	75,019	15	204	13.349	65	242	32,144	132
Cattaraugus,.....	958	13,671	15	1,968	24,026	12	229	20,812	9	453	42,886	90
Cayuga,.........	8,915	143,516	17½	4,161	74,069	18	130	22,567	120	3,814	139,126	35
Chautauque,.....	1,855	32,833	17½	1,392	20,000	16	212	22 143	104	720	129,749	180
Chemung,........	2,244	25,265	12	6,613	104,567	17	46	4,957	107	526	27,163	51
Chenango,........	1,266	20,147	17	4,621	70,802	17	309	22,464	75	647	114,911	177
Clinton,.........	1,915	21,018	10½	3.393	51,564	17	239	29,246	122	27	4,266	150
Columbia,........	687	9.270	15	8,933	129,001	14	271	12,812	45	172	32,182	187
Cortland,........	2,273	32,214	18	3,354	50,157	16	197	25 075	135	667	101,344	150
Delaware,........	192	2,404	11	9,417	133,235	15	274	30,152	110	221	30 110	135
Dutchess,........	498	5,671	11	6,505	89,199	15	2,418	84,134	40	146	34,633	237
Erie,............	3,230	40,485	13	2,592	31,592	15	252	17,899	70	358	36,819	100
Essex,..........	110	1,869	17	2,014	20,989	10	211	25,706	121	44	7.385	164
Franklin,........	396	6.517	17	1,646	24,780	14	233	25,459	108	60	9,250	150
Fulton,..........	1,828	26.596	14½	4,060	48,694	12	199	6,287	30	502	50,812	99
Genesee,.........	4,310	60,716	15	1,110	19,713	19	68	7.314	105	749	19.440	27
Greene,.........	926	11,209	13	8,359	106.524	13	162	13,932	85	137	14,647	107
Hamilton,.......	199	810	4	616	5,058	8	70	2,423	35	7	863	100
Herkimer,.......	5,255	101,805	19	2,807	44,193	15	67	3,976	60	1,815	51,179	28
Jefferson,........	11,007	159,872	14½	2,882	42,128	14	159	18,538	108	1,105	208,545	190
Kings,..........	11	360	33	166	2,991	18	289	57,038	197			
Lewis,..........	1,587	23,119	15	1,816	25,803	14	259	22,340	90	480	85.281	175
Livingston.......	6,698	93,959	15½	2,301	34,148	17	68	6,742	99	440	32.510	74
Madison,........	12,972	229,606	19	1,557	24,445	14	107	7,399	74	718	42,232	60

Monroe,.........	3,668	57,102	19	1,752	31,149	15	213	38,580	180	84	10,796	128
Montgomery,....	10,917	161,396	15	7,055	119,843	17	16	1,841	107	4,382	72,191	18
New York,......	5	....	....	8	300	37½	8	600	75			
Niagara,........	3,597	58,340	19	1,231	20,101	17	170	26,464	155	349	9,411	24
Oneida,.........	9,115	162,235	18	5,105	76,614	15	403	31,452	78	294	38,000	150
Onondaga,.......	18,770	360,421	20	2,456	51,198	21	162	22,503	148	1,064	107,035	100
Ontario,.........	11,877	211,653	19	2,600	43,690	21	94	13,967	149	594	20,240	33
Orange,.........	141	1,907	13	7,112	111,671	15	286	24,623	85	92	15,350	165
Orleans,.........	1,207	16,872	14	679	8,528	14	88	11,118	126	805	13,681	17
Oswego,.........	1,513	16,130	11	4,172	57,926	14	231	25,529	110	407	57,034	140
Otsego, ...	7,333	112,261	16	8,039	117,265	14	241	32,517	135	884	89,589	100
Putnam,.........	....	....	....	2,683	37,516	18	633	24,506	38	18	2,832	150
Queens,.........	162	2,600	16	4,420	67,571	16	500	90,710	180	7	1,416	175
Rensselaer,......	694	12,382	17	4,456	64,362	16	370	21,631	60	1,793	282,690	150
Richmond,.......	130	3,231	25	170	3,016	18	53	7,559	142	1	100	100
Rockland,........	12	133	11	2,596	37,289	14	39	6,207	155	8	863	95
St. Lawrence,....	2,200	30,975	14	8,488	98,207	12	198	22,613	110	287	30,619	102
Saratoga,........	5,332	91,451	18	3,800	54,682	18	48	5,342	110	789	19,840	25
Schenectady,.....	8,994	208,231	22	10,004	147,708	15	86	6,177	90	833	70,672	80
Schoharie,.......	3,663	50,071	17	2,190	37,611	18	45	4,690	105	5,949	39,220	7
Seneca,.........	3,118	48,100	16	3,470	47,014	15	420	56,577	140	291	40,508	135
Steuben,........	4,087	59,817	15	12,359	195,165	16	266	29,880	115	547	59,413	108
Suffolk,.........	306	13,791	44	7,883	51,193	7	396	97,750	240	26	6,328	235
Sullivan,.	14	146	10	5,289	67,267	13	238	13,318	60	46	6,541	140
Tioga, ...	207	2,632	13	5,250	80,767	16	65	6,148	95	291	35,575	118
Tompkins,.......	2,137	23,873	11	8,935	158,460	17	106	7,838	75	6,077	55,091	9
Ulster,..........	30	257	8	10,404	151,130	15	489	19,912	40	339	56,025	165
Warren,.........	32	509	16	2,665	22,473	11	107	9,761	95	51	6,952	139
Washington,.....	666	9,470	15	4,209	27,279	7	115	10,436	92	858	149,550	175
Wayne,..........	4,350	48,236	11	3,412	57,187	18	150	21,974	146	1,403	98,498	70
Westchester,.....	405	7,883	20	4,952	64,944	16	1,693	92,837	55	25	3,491	140
Wyoming,.......	2,942	42,281	14	1,788	21,935	13	125	12,889	103	1,064	108,193	110
Yates,..........	5,691	71,144	13	2,531	35,933	17	80	5,189	65	729	11,579	15
Total,..........	192,504	3,108,705	16	255,495	3,634,679	14	15,322	1,350,332	88	46,089	2,897,062	100

IV. NEAT CATTLE, HORSES, AND HOGS — BUTTER AND CHEESE.

Counties.	No. of Neat Cattle.	No do under 1 year old.	No. do over 1 year old.	No. of Cows milked.	No. lbs. of Butter made during the year.	No. lbs. Cheese made during the year.	No. of Horses.	No. of Hogs.
Albany,	26,840	3,689	22,766	13,939	980,009	111,339	10,780	32,807
Allegany,	51,900	11,597	40,967	19,737	1,563,054	887,113	10.261	23,573
Broome,	30,307	6,124	24,130	12.168	1,153,484	148,752	4,540	15,267
Cattaraugus,	45,256	9.994	35,010	15,582	1,284,635	567,867	6,908	19,844
Cayuga,	41,584	7,548	34,640	19,715	1,696,764	394,001	13,932	43,546
Chautauque,	66,885	13,735	52,756	25,024	2,130,303	974,474	10,506	32,013
Chemung,	22,516	4,345	17,039	10,056	724,135	71,553	5,085	16,800
Chenango,	63,745	11,308	52,640	29,006	2,816,291	1,145,057	10,416	23,949
Clinton,	24,006	4,066	20,027	10,669	677,348	184,440	6,378	13,476
Columbia,	35,718	5,372	29,391	16,963	1,519,610	246,384	9,814	54,477
Cortland,	39,068	7,889	31,446	17,833	1,588,696	682,201	7,049	18,155
Delaware,	62,555	10,904	50,803	30,627	3,117,649	135,562	8,585	24,374
Dutchess,	47,258	4,296	42,597	20,152	1,772,770	164,525	11,342	66,828
Erie,	57,506	9,401	44,928	26,809	1,728,021	1,288,780	13,527	38,087
Essex,	23,895	5,236	19,291	9,697	673,366	212,475	5,118	12,083
Franklin,	20,069	4,035	15,964	7,962	554,441	240,415	3,878	10,343
Fulton,	20,311	3,454	16,857	10,055	733,958	432,051	4,548	11,141
Genesee,	25,689	4,222	21.048	11,771	888,396	313,491	10,096	27,364
Greene,	27,383	4,586	23,424	12,540	1,122,526	123,718	6,258	20,606
Hamilton,	2,133	405	1,728	795	63,391	10,032	288	788
Herkimer,	53,440	5.930	47,606	36,255	1,480,628	8,208,796	10,053	23,578
Jefferson,	85,934	16,497	69,185	41,360	3,080,767	2,802.314	16,397	53,068
Kings,	7,449	340	6,134	6,792	80.059	606	4,360	9,515
Lewis,	32,793	5,176	26,915	18,024	1,266,933	1,420,368	4,570	15,813
Livingston,	28,808	4,678	24,130	12,391	1,027,611	265,140	10,910	28,819
Madison,	45,216	7,322	37,671	21,513	1,531,205	2,022,855	11,774	28,540

Monroe,....................	39,305	4,861	33,217	19,590	1,504,397	366,782	16,811	48,493
Montgomery,....................	30,202	5,140	25,064	15,218	1,263,986	911,292	9,010	24,850
New York,....................	831	48	764	7,102	12,080	50	13,346	8,591
Niagara,....................	27,836	3,659	24,043	11,921	861,300	154,976	8,614	30,968
Oneida,....................	85,464	11,750	71,767	47,713	3,876,276	3,277,750	17,303	45,723
Onondaga,....................	49 498	7,419	39,956	24,595	2,123,787	749,838	16,968	52,907
Ontario,....................	32,544	4,787	27,848	15,508	1,286,119	424,742	2,625	36,986
Orange,....................	59,712	5,018	54,710	42,256	4,108,840	6,717	10,226	57,265
Orleans,....................	21,007	2,529	18,036	10,028	781,167	216,950	7,696	10,399
Oswego,....................	41,300	7,562	30,992	19,532	1,532,144	933,922	9,008	27,736
Otsego,....................	61,706	10,893	50,986	30,022	2,436,718	1,595,407	14,183	38,485
Putnam,....................	16,083	1,294	13,213	7,983	779,780	24,361	2,049	12,833
Queens,....................	16,271	1,421	14,831	9,821	533,110	10,209	7,395	21,148
Rensselaer,....................	34,734	5,020	30,634	19,295	1,409,312	738,841	10,594	39,262
Richmond,....................	3,669	305	3,001	2,048	81,982	....	1,223	3,085
Rockland,....................	6,458	683	5,744	3,897	267,178	31	2,495	6,242
St. Lawrence,....................	36,784	6,141	30,527	18,304	1,498,986	336,085	10,028	37,882
Saratoga,....................	12,043	2,068	9,764	6,142	545,404	155,979	3,884	10,971
Schenectady,....................	36,902	6,519	29,674	17,106	1,545 889	123,532	9,512	29,625
Schoharie,....................	17,521	2,986	14,253	9,142	816,061	71,781	7,267	22,023
Seneca,....................	77,979	16,122	62,200	33,676	2,529,741	1,281,972	13,470	38,150
Steuben,....................	55,482	1,696	44,261	22,559	1,838,420	311,314	12,310	35,987
Suffolk,....................	24,728	3,480	21,139	10,511	584,281	22 501	6,558	21,623
Sullivan,....................	20,507	3,913	16,641	8,381	795 607	17,307	2,958	9,808
Tioga,....................	23,999	5,279	18,904	10,119	822,220	170,755	4,746	15,764
Tompkins,....................	38,174	7,129	31,299	18,003	1,785,604	142,594	11,191	28,348
Ulster,....................	36,513	6,419	29,376	18,602	1,556,457	8,946	8,643	42,627
Warren,....................	13,631	2,597	11,091	5,482	415,496	95 638	2,734	7,549
Washington,....................	43,527	7,856	35,005	19,654	1,639,416	312,736	11,115	42,189
Wayne,....................	33,891	5,570	28,107	16,833	1,466,124	305,067	12,258	35,873
Westchester,....................	32,848	2 105	29,705	18,086	1,514,242	29,197	6,935	35,609
Wyoming,....................	31,039	6,883	27,049	13,906	1,191,615	763,208	8,104	21,607
Yates,....................	18,878	3,153	16,585	9,017	841,643	130,187	6,523	18,822
Total,....................	2,072,330	334,456	1,709,479	999,490	79,501,733	36,744,976	505,155	1,584,344

V. SHEEP, WOOL, FLEECES—AGRICULTURAL STATISTICS.

Counties.	No. of Sheep	Under 1 year old.	Over 1 year old.	No. leeces.	No. pounds of Wool.	Av. No pounds per Fleece.	No. Farmers and Agriculturists.	Legalvot'rs exclusiv of colored persons	Total Population.	Proportion of Farmers and Agriculturists.
Albany,...	66,536	21,573	44,169	43,574	142,747	3½	4,558	15,878	77,268	1 to 19
Allegany,...	184,901	56,267	133,803	135,154	349,759	2½	5,491	8,754	40,084	7
Broome,...	66.133	20.425	45,880	46,034	127,506	2½	3,340	5,814	25,808	8
Cattaraugus,...	103,780	32,463	68 609	63,844	196 903	3	4,615	6,588	30,169	6
Cayuga,...	175.148	50,155	130.397	120.559	412 667	3½	6,270	11,140	49,663	8
Chautauque,...	235.403	69.220	163,495	160,225	485,816	3	6,122	10,159	46,548	7
Chemung,...	55.498	16,940	39,134	39,785	107.559	3	2,635	5,191	23,689	11
Chenango,...	223.453	62,891	161,726	170.392	503,937	3	5,122	9,393	39,900	8
Clinton,...	63.533	17,866	48,739	46,088	135,612	3	3,100	5,306	31,278	10
Columbia,...	172,579	52,660	109,906	117,580	352,739	3	4,530	9,444	41,976	10
Cortland,...	108,862	31,925	77,992	74,419	227,034	3	3,848	5,741	25,081	6
Delaware,...	135.633	43,749	90.651	93.599	272.229	3	5,221	8,190	36,990	7
Dutchess,...	199.993	61.693	139 797	147,923	471,096	3½	5,618	12,149	55,124	10
Erie,...	148,732	46,214	102,735	104,058	274,638	2¾	6,982	14.631	78,635	13
Essex,...	90,495	23,969	66,770	65 418	198,104	3	3,045	5,286	25,102	8
Franklin...	47,790	12,773	33,781	34,191	102,830	3	2,883	3,356	18,692	9
Fulton,...	38,546	11,972	26,574	25,267	81,097	3	2,279	4,203	18,579	9
Genesee,...	156,578	43,750	112,424	117.342	360,998	3	3,513	6.509	28,845	9
Greene,...	48,541	16,486	29,992	29,179	91,318	3	4,397	6,884	31,957	7
Hamilton,...	2,644	883	1,761	1,744	4,608	3	311	,428	1,882	6
Herkimer,...	75.964	22,947	52,317	52,762	158,769	3	4,383	8,552	37,424	9
Jefferson,...	184,526	58,513	127,959	123,233	380,633	3	11,002	13,772	64,999	6
Kings,...	108	24	70	38	250	6	829	12,896	78,691	9
Lewis,...	40,657	11,995	28.427	28,894	89.229	3¼	3,162	4,237	20,218	6
Livingston,...	218,258	56,850	116,408	169,727	514.741	3	3,379	7,300	33,193	10
Madison,...	263,132	78,278	190,043	187,840	571,274	3	5,394	9,615	40,987	8

Monroe,	17[illegible],952	48,391	125,906	126,116	402,926	3¼	6,112	14,231	70,899	11
Montgomery,	56,260	19,547	36,490	37,012	120,217	3½	2,924	6,592	29,643	9
New York,	22	5	17	....	....	....	275	63,927	371,233	105
Niagara,	80,594	23,809	55,810	56,629	180,687	3½	4,074	6,784	31,550	8
Oneida,	194,589	56,580	127,780	136,760	409,747	3	9,384	17,435	84,776	9
Onondaga,	190,429	54,118	136,093	136,866	423,863	3½	8,196	15,812	70,175	9
Ontario,	257,821	70,326	187,608	193,557	630,739	3½	5,181	9,405	42,592	8
Orange,	45,819	12,817	34,009	37,251	120,708	3¼	4,921	10,590	52,227	10
Orleans,	90,525	24,982	65,285	66,677	207,960	3	3,541	5,759	25,845	8
Oswego,	76,698	27,220	54,771	57,152	168,100	3	5,448	10,310	48,441	9
Otsego,	270,564	75,542	182,122	187,782	548,868	3	7,896	11,745	50,509	6
Putnam,	14,062	3,791	10,229	8,483	28,980	3½	1,119	3,009	13,258	13
Queens,	21,054	6,376	14,727	13,288	41,347	2½	3,070	6,168	31,849	11
Rensselaer	170,552	45,608	118,884	121,021	375,902	3	6,004	13,437	62,338	10
Richmond,	148	17	130	135	156	1½	510	2,608	13,673	20
Rockland,	2,830	795	1,843	1,848	5,770	3	1,068	2,772	13,741	13
Saratoga	99,706	28,002	69,904	69,694	213,463	3¼	5,246	9,582	41,477	8
Schenectady,	19,461	7,069	12,588	12,531	39,949	3	1,136	3,635	16,630	16
Schoharie,	75,131	24,554	50,333	50,168	122,887	2½	4,036	7,053	32,488	8
Seneca,	71,965	19,624	53,011	53,549	168,400	3¼	2,675	5,459	24,972	12
St. Lawrence,	168,314	51,275	118,498	119,241	356,713	3	8,847	11,885	62,354	7
Steuben,	217,658	54,554	157,811	155,784	424,340	3	6,820	11,212	51,679	8
Suffolk,	49,851	13,593	36,894	35,696	81,271	2½	4,009	7,767	34,579	8
Sullivan,	19,545	6,952	12,596	13,144	40,531	3	2,286	4,019	18,727	9
Tioga	54,293	17,326	36,603	38,219	100,695	3	2,938	4,933	22,456	7
Tompkins,	135,787	40,099	96,173	95,588	306,240	3	4,824	8,668	38,168	8
Ulster,	46,522	17,431	30,023	32,497	94,101	3	4,753	10,546	48,907	12
Warren,	28,831	8,701	20,635	20,641	66,868	3	2,238	3,372	14,908	7
Washington,	254,866	66,746	199,311	202,848	579,056	2½	5,151	9,203	40,554	8
Wayne,	130,562	36,316	86,751	95,443	280,256	3	5,540	9,348	42,515	8
Westchester,	21,567	6,136	15,312	14,506	54,567	4	4,369	9,858	47,578	11
Wyoming	166,365	46,249	117,948	115,581	362,015	3¼	3,977	5,767	27,205	7
Yates,	130,134	33,699	95,715	96,441	285,396	3	2,692	4,822	20,777	10
Total,	6,443,855	1,870,728	4,505,369	4,607,012	13,864,828	3	253,292	539,379	2,604,495	10

FACTS WHICH SEEM TO BEAR UPON THE CAUSE OF THE POTATO DISEASE.

The same week when the potato-vine exhibited the first indication of disease, many trees in the vicinity of Albany were affected in a manner similar to this plant. The leaves of several elms for instance began to dry and grow brown upon their edges, and in a few days it terminated in the death of those leaves, when they fell off. Besides the elm, a few maples, horse-chesnut, plum, bass, button-wood, and the vine, were affected in a manner quite similar to the elm. It did not appear that all the individual trees of the same species were attacked with this kind of blight. Those individuals however, whose leaves were rather succulent or juicy, were most liable to this affection.

This affection of the leaves, inasmuch as it came at the time we were first visited with extremely hot weather, and which was accompanied at times with a hot south wind, must be attributed to this peculiar state of the weather, or to an atmospheric influence. Several elm trees, and many button-woods have died, it would seem from the effect of some malady which has attacked in the first place the leaf. The operation of the malady is similar upon the potato plant. It has been observed that the most tender leaves dry upun their edges; the dryness extends soon to the whole leaf, but the most vigorous part of the herbage resists the attack the longest; but as the plant itself is gradually weakened by loss of the leaves, the whole herbage after a while dies. The tree however may and does resist for two or three seasons, the branches dying successively. The approximate cause of the death of the leaf, seems to be a dry, hot, and parching atmosphere: it may perhaps be only a predisposing cause. Real causes of disease are obscure; when, however, antecedents and consequents are so closely connected as in the cases we have been considering, we cannot refuse to give or attribute to the phenomena considerable importance, especially when they preserve the same standing and relation for several years in succession, as is the case with those affections of trees and potato plants.

We do not suppose that all the phenomena accompanying the potato rot, as it is sometimes called, can be satisfactorily explained on the ground that it is owing to the state of the atmosphere. But obscurities belong to every other hypothesis which has been offered. We cannot tell why, during the prevalence of an epidemic, many escape its attack. Why, too, many trees of the same species have escaped the blight; why many fields of potatoes remain unaffected. It is quite difficult to be satisfied why it is that potatoes should rot merely because the leaves have been injured in part. It is difficult to determine whether the affection of the herbage of the vine is a symptom of disease merely, or one of the causes connected closely with the decay of the tuber; and it is difficult to determine, on the other hand, whether the decay of the tuber produces the destruction of the herbage. These are the facts, however, the decay of the latter seems to precede the former, and the latter too is exposed to the withering influence of hot and dry winds. This, when taken in connection with the importance of the leaf to the life of the plant, seems to throw some light upon the subject. Tubers and roots to be healthy and sound require healthy leaves; and whatever injures their integrity, injures them also. This is a well known fact, still it is after all strange that the tuber should rot; that it should go through with regularity all the stages of a specific disease. But here again we must admit that the obscurity is not increased by the foregoing hypothesis. The insect and fungus hypotheses can claim no advantages on this ground. If plants are stripped of their leaves they usually die; they may survive the operation once; they are more likely to survive if the stem is cut directly off, unless it be below all the leaf-buds, as at the neck of the plant. Mowing the potatoe vines does not kill the plant, as the stem below contains many leaf-buds; but it is injurious to the crop under any circumstances. The fact that it survives and sets new tubers afterwards is no objection to this view.

We believe it will be found generally true, especially with some varieties, that if they are highly manured and grow rapidly, and are full of the peculiar juices of the plant, that they will suffer more from atmospheric influences than those that are unmanured and have grown rather slowly, upon a dry sandy soil. Vigorous plants have more generally escaped the rot than the feeble. We mean those of a hardy constitution. We remark again that probably if the disease of the potatoes is caused by atmospheric influences, we shall discover signs of those influences on o her ve etables; and if potatoes are diseased and kept dry after the disease has commenced, its progress is stopped, at least in many instances, as we have witnessed.

A mystery which overspreads the subject before us is the fact that some varieties which appear quite exempt from the disease, in some places, does not hold good in others. At first view it seems that the same variety ought to hold out at all times and places against the enemy. But it may be after all that varieties like species require a particular soil to raise them to a high standard of excellence. For instance, one variety attains its standard of perfection in a light soil only, whereas another variety requires a strong clay soil. They are secure from disease only when they are cultivated upon that soil which they require, to reach their mark or standard of perfection. Now some varieties, like some species of plants, are not so fastidiuos in their food, and hence do well if they have but a middling chance. The merinoes or long reds seem to be of this class. However all this may be, it is an important inquiry what soil is best suited to a given variety of potato. We know that some apples, the Newtown pippin for instance, must have a deep strong soil, and comes to nothing when planted in a poor soil. And why should there not be the same variety in the habits of varieties of potatoes as in apples and other fruits.

If then the above is a rational view of the fact, it will probably be supported by observation. The first question to settle after it is known that some varieties are more affected than others is, what kind of soil do they require, or what is the best soil to give them the perfection of the variety. Observations have been made upon potatoes in mass, so far at least as it regards the disease, as it has appeared upon different kinds of soil. One says that potatoes which were grown upon a clay soil were most affected. Another can see no difference, the disease appearing upon all kinds of soil alike. If observations were directed to one variety, or single varieties, and the disease with its symptoms and severity carefully noted, as they appeared upon different soils, more light would be thrown upon the cause of the disease, as well as upon the peculiar requirements of varieties of the potato.

THE NEW YORK SYSTEM.

It has been recommended by the most eminent geologists of Europe, to avoid in geological names, or in geological nomenclature, those words which may be regarded as hypothetical. Hence the word *transition* has been disused or gradually dropped, and many other changes in names have been effected on similar grounds. In consequence of the adoption of the recommendations of geologists in these particulars, other names have been employed which express a general fact, and hence instead of attempting a classification proper óf rocks and formations, a name simply has been given to a series which was derived from some place where the series was well developed. This plan of naming rocks has been extended also to the sub-divisions. The Silurian system for example, is a series of rocks well developed in Wales and the adjacent parts of England. It is a term derived from Silures; an ancient race of Brittons who inhabited this part of the kingdom. The system being established it may then be applied to a series of rocks of the same period in different parts of the world. As the relations of the Silurian series are known, we may at once recall to our minds the relations also of a series of the same age in any other part of the world; the age of the series being determined by their organic remains, or by their position. It appears to us however, that we need not adhere strictly to the use of the term Silurian, when there is a considerable deviation from the type, although the age may be that of the Silurian of England.

In this country we have unquestionably Silurian rocks, and many undoubtedly will use the name exclusively; still we may be allowed to suggest that where considerable difference of lithological constitution and of the distribution of fossils exists, whether it may not be better after all to employ some other term as a name for the system. In New York it has been often said that the Silurian is well developed. This is probably true; perhaps better developed or more suitable for the type of this series of formations and of this period, than that of Siluria itself. In consequence of the great differences which exist in the New York series and Silurian, we believe that the former has a preference to the latter. The difference may be summed up thus: 1st. It is more expanded downwards, that is, it has important rocks unknown to the system in England. 2d. It has important members in other parts of it unknown in England. And 3d, very few of the fossils belong to the same species; they are principally analogous forms, being related to those of Siluria, as our living molusks are to those of Europe. We prefer for these reasons the name New York system to Silurian system, and as there can be no doubt of the succession of these rocks, we believe the name may be applied with propriety to the rocks of the same age in other parts of this country. The question will unavoidably come up, where shall the line of demarcation be drawn between the New York and the adjacent systems? After a careful examination of the question, we feel quite confident that it might be extended in this country so as to include the Catskill division, or to extend to the carboniferous limestone. We have no very good dividing lines till we reach the base of the carboniferous. It is true that we find a few fish in this country, in the inferior part of the Catskill, or old red sandstone of Europe. But the molusks and conchifers belong to the same types as those below. The series is a continuous deposit here of similar matter, the succession of which is scarcely broken by conglomerates or disturbances of much importance. The extension of the New York system as proposed, excludes of course the Devonian of Phillips. We have little doubt but this last system can be made out here, as we have discovered some of its forms in addition to those which belong to the upper Silurian of Murchison; still it appears to us that geology is simplified by extending the New York system as proposed. It is proper to observe that Mr. Vanuxem's views led him to propose this extension in his report. We have however made these remarks from conviction of its utility by our own observations. By adopting this division we secure strong and palpable lines of demarcation, and it will free us from jarring opinions where the Devonian shall begin. There is more difficulty in fixing upon the dividing lines of two adjacent systems, than may appear at first sight. In the case of the Devonian, some propose to bring it down to the corniferous, an extension which decapitates the Silurian. Another proposes the Oriskany sandstone as its base, or the rock upon which it shall be based. The reason for this extension is, that Devonian fossils are found in these rocks. But this is reckoning or levelling only one way. It would not be difficult to show that the Silurian fossils go up nearly to the top of the Devonian series, and so often, that the whole base as proposed by Phillips, if the matter was to be decided in this way, would be thoroughly excised. The facts, then, as they stand now, present obstacles to the satisfactory adjustment of dividing lines between the two systems, and as fossils fail in establishing the line, we shall be obliged to do one of two things, adopt arbitrarily one system and exclude the other, or else do as has been done in other cases of greater importance when lines were wanted; appoint commissioners to run an equitable boundary, paying due regard to the prior claims of each system as they are established by anterior published and printed documents. In England however, if priority of publication should be made the basis of adjustment, the Cambrian system would come in for a large share of the lower Silurian rocks. We have little doubt but that the series containing the Bala limestone, which is equivalent to our Trenton, belongs legitimately to the Cambrian.

We have in another place shown, as we think, that one of the most important, as well as the clearest lines of division in the present Silurian system, is at the top of the Hudson river series, which terminates at the Oneida conglomerate. But we are not disposed to discuss the subject further at this time. We however propose to avail ourselves of the present opportunity to repeat, that as it regards the Silurian and Devonian systems, we should prefer extending the Silurian to the base of the carboniferous. The obstacles to this extension of the series are not insurmountable. We do not now see that principles will be violated, or well established rules broken, so far as the New Yerk rocks are concerned.

As to the name which shall be employed to designate this great series, we prefer that which has been adopted quite generally in this country, the New York system, so far as this country is concerned. The advantages arising from the perfection of the series, and the impossibility of mistaking it for any other, provided due care is taken in making comparisons, are quite important. The territory also, or the geographical boundaries aid their study, each section of the state being underlaid with a well-defined part of the system, except that adjacent to the Hudson river and Lake Champlain, where the Taconic system appears, and which supports some of the lower members of the New York system. We are willing however to adopt those names or divisions which have upon the whole the highest claim to favor.

REMARKS ON THE TACONIC SYSTEM.

[Containing in part the discussion upon this subject, at the meeting of the American Association of Naturalists at New York, September, 1846.]

Some apology is due perhaps to our agricultural readers, for the introduction of so much matter in which many have but little interest. As a general rule, we intend the interests of agriculture shall have the principal place. We must however, occasionally introduce matter whose bearing upon agriculture is or may appear quite distant, and in which many readers will feel that it is of no use whatever to them. When this is so, all we can say is skip it and turn over to something else.

The series of rocks termed the *Taconic system* by us, is the oldest in which organization appears. For this reason they possess a peculiar interest; and certainly the enquiry what was the construction of the organized beings which were first created, in what condition did life first appear, and in what was it clothed, are questions in which in common with many others we have felt a deep interest. The solution of these questions could not be attempted until the true palæozoic base had been reached, it must be determined what sedimentary rocks were first laid down. The determination of this point, as experience has fully proved, is not easy, neither can we be sure that we are always right in our decision, for time has so changed their appearance, that ordinary and common indications which the sedimentary masses give are nearly obliterated in the most ancient of the class. The same changes affect organic atoms, when they cease to be vivified; and when they pass from the dominion of life, they obey forever after the laws of inorganic nature, and undergo thereby a series of changes which may end in the obliteration of every trace of organism belonging to the former state, and which life had impressed upon them. But as these changes are modified by circumstances, we may often find that they have escaped the transforming powers of dead matter, and may have come down to us wearing some of the livery in the period in which they lived. The first work and which must be finished before we can attempt to speculate on the condition of the earth in its *transition* state, (pardon the word for there must have been a transition state,) is the determination of the palæozoic base. To this end, we have studied with great care a series of deposits which we consider as strictly of this character. That they are anterior to the rocks denominated the New York or Silurian system, we think we have proved beyond a doubt; if so, life and organization is carried back to a period anterior to that system.

The discussion referred to, had for its object the establishment of this proposition, and if our facts do not sustain us in the position, we may despair of establishing any proposition in this department of knowledge. We proceed to give the substance of our remarks.

"Dr. Emmons observed at the opening of the question in regard to the Taconic system, that it was necessary to be well acquainted with the Champlain division of the New York system. Thence he was led to speak briefly of these members, and especially to point out the fact that the Potsdam sandstone is often absent, in which case the calciferous sandstone becomes the inferior rock of the series. Thus at Little Falls this rock rests on gneiss, with which it appears to conform in dip. The succession of the rocks of the Champlain division was then given, which need not be repeated in this place, except that in this connexion it was stated that the superior part of the Potsdam sandstone, near Chazy, in Clinton county, N. Y., was formed of a breccia, which contained masses of a sedimentary limestone, an important fact, the bearing of which could not be misunderstood by the gentlemen present.

Dr. E. then stated that the Taconic rocks were limited by the Hoosick mountain range on the east, and by the Hudson river and Lake Champlain on the west, and he should confine his remarks to this section of country, although he was aware that the same system extended far north as well as south, and that it even existed in Maine, Rhode Island, and the upper peninsula of Michigan. The oldest rock of this system, is the granular quartz: a rock which was formerly ranked with the primary, but which was clearly separable from that system, on the ground that its inferior part is a conglomerate; thus proving its sedimentary origin. Oakhill, near Williams College, supports a mass of this character which reposes on granite. Stonehill, an eminence just south of the college, is composed of quartz alternating several times with a variety of slate, containing talc, needleform schorl and crystals of octahedral iron. The rocks of these hills conform to those which lie west and form the Taconic range, lying between New York, Massachusetts and Vermont. The line of demarcation then, between the primary of the Green Mountains and the Taconic rocks is clearly indicated by the conglomerate of the quartz.

The relations of the newer members of the Taconic system were then illustrated by a series of diagrams, which, as they were taken from observation, showed very clearly the fact that the older members of the New York system of the Champlain division repose directly upon the Taconic slate, or some other member of this system.

Many instances of superposition were cited, and so well established is this statement, that it is admitted by those who reject the views of Dr. E.; but in order to avoid the inference which must necessarily follow, it is maintained that the rocks have been overturned, and that the so called Taconic slate is merely the Hudson river slate, or shale slightly altered, having the lower limestone reposing upon it in an inverted position. This is considered inconsistent with the facts on the ground, that there is not only superposition, but succession; that the succession in the instances referred to is similar to the succession that everywhere prevails in the Champlain division, namely, first, the Potsdam sandstone, or calciferous sandstone, birdseye, &c.; and then Trenton limestone and its slate. A careful examination of the localities proved the succession contended for, and that the principal change of position which the rocks have undergone, is merely an elevation, or uplift, and the nature of this change was illustrated by reference to the falls of Montmorenci, where a force was evidently applied below the gneiss, which brought up that rock, supporting the whole of the Champlain division in the order in which the members were deposited. Uplifts of this character, extend from the Highlands of the Hudson to Montmorenci, and in no case are the rocks turned over, but they always appear in their true succession, and in many instances with two and three hundred feet of Taconic slate beneath. This fact goes to show where the line of demarcation between the Taconic and New York system should be drawn.

Dr. Emmons here alluded to the condition of the rocks in the valley of the Hudson river, where the shales are comparatively largely, and the limestones of the Champlain division are but feebly developed; which causes much obscurity in regard to their position; but taking the thin beds of limestone which contain the fossils of the limestones at well known localities as way boards, and a great part of the difficulty in regard to the Taconic system is removed. Superposition and succession was considered, as the main facts upon which the doctrines supporting the Taconic system rest, yet it was farther maintained that the fossils of this system are all different from the New York; and what is quite remarkable, no molusk or conchifer has yet been found in it, notwithstanding it has been examined more carefully than any other series of rocks in this country.

Conformity of position in the masses between the Hoosick mountain and the Hudson river was considered sufficient evidence to prove that they all belong to one series. Those who maintain that they are merely altered rocks of the Champlain division, admit of course the unity of the masses as it regards the period of their formation. The superimposed rocks of this division are excepted. They appear in insulated fields, and may be distinguished from the rocks of the Taconic system by their lithological characters, or the want of conformity to the latter."

To the above we desire to add a few remarks in consideration of the importance of the subject in a geological point of view. What was said on the occasion was designed merely as a statement of those facts which go to prove directly the existence of the rocks as an independent system. The most important fact is, as has been stated, the relative position of the two systems; and it is now uncontradicted, that in numerous places the New York system, or its lowest members, are superimposed upon the Taconic. This being the case, unless it can be shown that there is an overturning of the strata in such a manner as to produce an entirely inverted position, the system must stand. Observation, however, in no case favors this view of the question, inasmuch as where two members of the New York system exist together, they preserve the position in which they were deposited, and the only change they seem to have suffered is simply an elevation by a force acting beneath the Taconic slate, by which the whole is raised above the surrounding country. We find these rocks at a low level, even below the level of the adjacent country, uncovered by diluvial action. We find also the rocks preserving the same relative position, and moved but little from that in which they were originally deposited. Where movements have taken place at or near the junction of the two systems, it has been, as stated above, a simple uplift, and not an overturning in the mode maintained by the Profs. Rogers. If such was the true view of the case, either the Potsdam sandstone or the calciferous sandstone would be the superior mass, and the Trenton limestone and its slate the inferior. This position is never found to prevail.

Again, when the calciferous sandstone reposes on the Taconic slate, and the line of junction exposed, the phenomena presented prove the calciferous sandstone to have been a rock succeeding to the Taconic slate. The brecciated mass of slate and a little limestone prove this, and the inclosed masses of slate testify to its anterior existence to the limestone. It is by observations of this kind that we have established the succession. So the existence of masses of a sedimentary limestone at the top of the Potsdam at Chazy, prove the prior existence of the rock when the Potsdam was being formed. These are all elementary facts, which we should not be at the trouble to state, were it not that our views have been regarded as unsound and untenable. We have had occasion to regret, that superficial examinations only have been made by those who have made the strongest assertions; that some have been wedded to a theory or a nomenclature, which, if the Taconic system is received, must require very important modifications in order to be received, or be at all applicable to our rocks.

If the Taconic rocks are but lower members of the New York system, how happens it that not a molusk or conchifer has been found in them, inasmuch as the New York rocks abound in them to a remarkable extent. This very fact should have led geologists to suspect the truth of the view; for notwitstanding their age and the disturbances to which they have been subjected, they contain fossils of a delicate kind, and hence it cannot be said that they are destroyed by metamorphosis.

Again, if they belong to the New York system and are merely the lower subdivision of it, why is it that they are so much thicker than the whole New York system put together? How happens it that there is withal such a great preponderance of slate? There are naked and continuous beds of slate thicker than the whole New York system, which may be seen under conditions which show that there is no repetition of masses.

Why is it that the Stockbridge limestone, if it is but a repetition of, or identical with, the lower limestones of the New York system, is underlaid and overlaid also with slate; or, in other words, is inclosed in slate, whereas those limestones referred to are underlaid by a sandstone? If the Taconic rocks are metamorphic, where are the igneous rocks which have produced the change between the Hoosick mountain in Adams and the Hudson river?

The preceding questions we regard important, and ought to be answered by those who maintain the identity of the series between the Green mountain range, the Champlain and Hudson valleys, with the New York system.

The history of the opinion relating to the Taconic system may not be out of place. In 1837-8, we taught in our lectures at Williams College nearly the same doctrine which is now maintained by Messrs. Rodgers, namely, that the granular quartz, and the limestones, marbles and slates of Berkshire, were but extensions eastward of the lower New York rocks. We were led at the time to adopt this view from some facts which fell under our observation at Burlington, Vt. We attempted at the time to work out in detail the rocks under the guidance of this doctrine. We found, however, that we were opposed by facts which could not be interwoven together, and hence we were led to abandon it for the one we have since published. The first hints that were published in regard to this system appeared in Disturnel's State Register. We were requested to write a brief article on the geology of the state for that work. In making up our notes for this object, we found it necessary to fix upon some general subdivision of the rocks which belong to the state. We drew up an abstract of the plan and submitted it to the criticism of the Rev. Prof. Dewey of Rochester, whose knowledge of the whole subject entitled his opinion to great weight. Prof. Dewey approved of the division proposed in the main. It resulted in separating the rocks in the vicinity of the Taconic range, both from the primary and the New York transition as we then called them. The subdivisions then proposed in Disturnel's State Register, and which were adopted in the reports of the state geologists, were, 1. Primary; 2. Taconic: 3. New York System, divided into Champlain, Ontario, Helderberg, Erie and Catskill divisions.

It seemed that without a generalization of the geological series of rocks, they never could or never would be understood, and it has proved of the highest utility. Although the divisions lay no claim to a classification, and are merely geographical, yet it so happens that the divisions are geological also. This point we were anxious to secure, and after an examination of the fossils as they were then understood, we foresaw that the divisions must be maintained nearly as they were first proposed.

Since the first idea of an independent system was struck out, it has been our object either to confirm it, or else to learn those facts which would destroy it. But all our observations have tended to confirm it; and we now consider it established upon a foundation which cannot be moved. We have had the good fortune too to discover fossils in it, which carries back life and organization upon the globe far anterior to the period of the formation of the New York or Silurian system. What other discoveries remain in regard to the character of the organization of this early period in the earth's history is yet to be disclosed by observation.

ON THE ELEVATED TEMPERATURE OF THE WATERS OF THE GULF STREAM.

BY JAMES EIGHTS.

It is a well known fact, that a powerful current from the Indian Ocean sweeps round the Cape of Good Hope, where, meeting with a similar one from the South-west, or Antarctic sea, they unite, and flow in a northerly direction along the African coast. After circulating through the Gulf of Guinea, it passes directly across the Atlantic Ocean, forming what is called the great equatorial current. This current, on approaching Cape St. Roque, the most prominent point of the American coast, separates into nearly two equal divisions: the one flowing south, courses along the Brazilian shore, until it is deflected from the land near the Rio de la Plate, and is again thrown out into mid-ocean, so as to form a great southern circular current, or stream. The northern division, after passing into the Caribbean sea, and washing the shores of the Mexican gulf, emerges through the Florida straits, and runs at a rapid rate in a northerly direction, giving origin to the great central circular current, or gulf stream. A similar circular current, but far more irregular in its progress, may likewise be traced in the Northern ocean, but like that of the south, it has its course in a direction directly opposite to the waters of the gulf.

In accounting for the elevated temperature of the gulf stream, the opinion has been repeatedly advanced, that the waters constituting the great equatorial current, in coursing along the African coast, and crossing the tropical sea, obtained its heat from the atmospheric influences of the warm regions through which it flows.

That this is not the case, admits of easy proof. The southern portion of this great current, that which pursues its course along the Brazilian banks, maintains no higher degree of temperature than that, peculiar to the latitudes through which it flows, whereas it should possess the same degree of warmth as the waters of the gulf stream. We then, consequently, must seek for some other cause, and one readily presents itself, the moment we turn our attention to the geological features of many of the islands of the West India group. They appear for the most part, to owe their origin to volcanic agencies, with the exception of much of their lower portions, particularly those situated immediately along the sea coast; these are chiefly composed of travertin, or recent limestones. This limestone is of a light yellowish color, some parts of it being very compact, while a great proportion exhibits a concretionary or pisolitic structure, embracing recent corals, and comminuted shells in great abundance, which still have an existence in the neighboring sea.

This limestone has unquestionably been derived from thermal springs, which always abound in volcanic regions, and generally contain very considerable quantities of lime in suspension among their waters: many of these are well known to have an existence beneath the oceanic waves of this district, having been recorded by numerous voyagers, from times far remote, whose duties have hitherto led them to navigate these seas. But the most convincing proof is in the structure of these pisolitic concretions: they are of a spherical form, and of the size of a pea, and sometimes larger, being composed of concentric lamina, arranged around a particle of sand as a nucleus. Whenever one of these springs forces its upward way through a sandy bottom, a large number of these particles are disturbed, and set in motion by the rapid ebullition of the water, and are there kept continually revolving, until they become completely coated by these concentric lamina of lime, and at length having obtained a sufficient weight, they again fall by their own gravity; here a deposition of the lime having taken place, and continuing to do so until the concretions are firmly united in one solid mass, collecting the fragmentary corals, and shells, that lie strewed along the bottom wherever the springs occur. In the course of time, by the uplifting of these islands, this newly formed limestone is brought to the light of day, and disclose to view the appearance which they every where at present exhibit. It is to the numerous thermal springs in this portion of the globe, that I consider the elevated temperature of the water of the gulf stream, principally to owe its origin.

THE PROGRESSIVE CHANGES OF MATTER.

BY A. OSBORN.

Mankind are fond of the marvellous. Wonders and curiosities always have a tendency to excite the mind. In this age of the world, when knowledge among men is increasing, and when invention seems to have enlarged the human mind to its utmost capacity, we still see men straining their intellects after higher attainments, and seeking for new discoveries in this world of wonders. In these pursuits the mind is credulous, active, and unwearied. These inventions and improvements are but the changes of matter, or a change in the application or connection of things. The great change produced in the business and commerce among mankind by the motive and mechanical power of steam is caused by the connection of fire and water confined within certain limits, and the power produced thereby applied to machinery. Now as these new formations or combination of things are brought out and produced to the public observation, if of much importance they are regarded as wonders; but by a long acquaintance with them they are treated only as matters of fact. So it is in relation to the changes that have been, and still are going on among the elements of our globe. New changes, if of any magnitude, create wonder and astonishment to the generation of men who witness them, but subsequent races of human beings regard them as the mere existence of things; the previous existence and change lose their charm of the wonderful. Thus when volcanic eruptions occur, the whole surrounding country is thrown into astonishment and alarm; but the succeeding generations climb up the encrusted mountain without reflecting upon the former condition and change of things, or realizing the consternation of their ancestors. Our knowledge of past changes is extremely limited; the present condition of things, for the most time, engrossing our thoughts. These changes, however, are not thereby divested of their interest, nor does a knowledge of them fail to be useful to mankind.

Could the changes produced by the labors of man be brought within the scope of our observation, they would not fail to excite our wonder. In a past age we penetrated the shades of the "wild wood," and marked out, perhaps on the margin of some stream, a territory that can be scanned by the eye from one observation, covered with the deep dense forest, through which the wild beasts made their paths, and where the "airy tribes of life" failed not to charm them in the solitudes of nature. This period we conceive to be yesterday, to-day on the location we behold magnificent temples rearing their glittering spires higher than the primeval trees. New life and new light breaks in upon the pathways once trodden by forest animals. And at the same elevation and over the same spot of ground where the "bird of wisdom" may have perched, and during the shades of night hooted its forebodings of the coming storm, the speculator may now repose in his chamber, sighing over the changes in the affairs of commerce, and doling the tempest of the coming future. Now should these changes be regarded as a matter of fancy rather than as a matter of fact, we may go into some city in the western country, and consult that personage so often mentioned in the public journals, *the oldest inhabitant.*

The labors of man in annihilating the ponderous forests and spreading out cultivated fields to the light of day, would be wonderful indeed, were not the change gradual and familiar to us all. A reverse order of things has at times taken place during the history of man. Where we now traverse a wild uncultivated country, nations may have flourished and fell. Where the "fox looks out from the windows, the rank grass waving round his head," the massive walls of Balclutha "rose in grandeur and tottered in ruins."

When we turn our attention more particularly to the succession of changes in the labors of man, we find in many of them an approximation to that point beyond which they cannot advance. In the early history of mankind intelligence was transmitted from one locality to another by fleet pedestrians. To this mode succeeded the charioteer, and in this latter mode various improvements were made, both as it regards the vehicle and the highway. Carrier pigeons have been employed, but this mode was limited, and could not be of general utility. Signals placed upon eminences was another mode of conveying news from one part of a kingdom to another. The application of steam for the spread of intelligence among men is highly important. But no change can be made, or combinations of matter formed into new conditions, whereby the speed of intelligence can be more rapid than that of the magnetic telegraph. Hence we may look upon a progression of changes in the labors of men, both as it regards the agricultural and mechanic arts. These changes occupy the human mind with no small degree of interest. Their history is the biography of the human family.

In the works of nature we find a succession and progression of changes on a most magnificent scale, the evidence of which is every where seen. The condition of things during the advance of these transmutations must at times have presented in the light of day, scenes beyond the conception of mortals. There are two antagonistic forces that appear to be always disturbing the repose of matter. Heat generated in the interior of the earth, raises up, by its expanding power, whole districts of country, known as continents and islands. Currents of water flowing over the surface of these continents are continually bearing matter downward to a lower position. This appears to be the great order of change to which the surface or crust of our globe appears to be subject. When therefore we aver that the present surface of the earth on which we live, and upon which we perform so many wonderful labors, was at one time in the earth's history, covered with the remnants and rubbish of broken rocks to a height of many thousand feet, and perhaps miles, and in that high position rivers flowed and cataracts foamed, we may tax human credulity beyond its power of endurance. The configuration of the earth's surface is now every where diversified with the river-valley and the streamlet's gorge. These too have all been formed by the excavating force of running water. Perhaps this latter averment may appear more probable than the former. In following the course of a river from its outlet to its source in mountainous countries, we almost every where meet with its tributary streams, the banks of which are generally precipitous. We may here begin to comprehend more fully the graphic finger of nature. The waters wore their wonted pathways after the formation of the river valley. When travelers of civilized nations began to visit the valley of the Nile, and contemplate those stupendous pyramids and other massive monuments of rock, it was somewhat difficult to conceive from whence the materials were procured; but as these travelers visited the upper Nile, and became familiar with the quarries in that locality, they could see the origin of these wonders of the lower Nile. So time-enduring were these rocks, that holes drilled in them for the purpose of cleaving blocks, remained almost as perfect as when the workmen abandoned their labors. Slabs of this material were partly finished. Although these quarries were abandoned nearly three thousand years ago, the remark was made that you now see where the workmen left off laboring. In taking a more enlarged view of a river in mountainous districts, as the Hudson for instance, we can see that its cataracts have formed a deep channel from its mouth to Glen's falls, where the waters for the time being seem to have left off their labors. The same remark can be made of the Mohawk river at the Cohoes, of the West Canada creek at Trenton. The same phenomena are seen in almost every river and rivulet on the face of the earth. The proof that rivulets or tributaries have worn their channels from the river valley, becomes more apparent from the fact that the kind of material of which their banks are composed, is carried onward toward the river, and most frequently turns its channel to the opposite bank.

Before going into a detailed statement of the changes that have taken place on the surface of the earth, we will state the order or laws by which new formations are made. Every body whether animal, vegetable or insect is formed from the elements of preexistent bodies, and necessarily implies a transposition of matter. The tree although it grows out of the earth without any perceptible diminution of the soil, yet nevertheless derives its substance from other sources. It is but a concentration of invisible particles by which a visible and tangible body exists, as an illustration by which unseen elements are brought into visible forms. Salt dissolved in water ceases to be visible, no trace of its elements or parts can be detected by the eye. But by evaporating the water, its presence becomes apparent. Hence we learn that water is the solvent of saline substances. By evaporation water is dissipated in air, and after ascending to certain heights, it is condensed into drops and falls upon the earth. Here we also learn that the atmosphere is the solvent of water. From the above illustrations it will be no difficult task to conceive of the transmutation of things from one form to another. Hence we are to infer that the constituent parts of a tree are principally contained in the atmosphere. The science of chemistry and botany have brought to light, in a measure, the manner in which these elementary substances are accumulated in the formation of a tree. A casual observer cannot fail to notice, that the woody part of a tree is made up of concentric rings, that each ring is formed during the existence of the leaves of the tree, and its years by the number of these rings may be accurately ascertained. This growth or formation of the tree has but two simple processes, through the medium of the roots and leaves. The roots have their spongioles, through which a fluid passes up the tree from the ground to the leaf. The leaf also contains its orifices or inhaling organs by which another substance is imbibed; these two substances combined, pass down the tree between the bark and woody portion, leaving a deposit in their descent, forming through the process of drying, the bark and woody fibre. We can therefore have a clear and well defined idea of the manner in which a tree obtains its growth. Hence we infer that the constituent parts of a tree once existed in a fluid form and in other localities. Now what we affirm of one tree we may affirm of all trees, of all vegetable bodies that exist in the atmosphere, and we can thereby escape all confusion of ideas in obtaining a knowledge of the growth of a forest of trees, however extensive.

In the formation of a river there is likewise one uniform process prevailing; a process perhaps brought more within the scope of the unassisted eye, than that of the growth of the tree. We may have entertained the idea that the rivers which now traverse the surface of the earth, have existed "from the beginning" in their present form and location. Whereas from the manner in which they are formed, the traces which they have left of their former existence, we are forced to believe, that the generations of rivers have been as numerous as the generations of men. The rains supply the flowing volume of river currents. A river is formed by a certain quantity of water and a given velocity according to the peculiar formation of the earth's surface embracing its sources and tributaries. The proofs in relation to the existence of extinct rivers, may hereafter be given in a more detailed statement. The present order of rivers appear to us as having assumed permanent channels. A river is incidentally mentioned here for the purpose of considering it as the principal agent by which inert matter is moved along the surface of the earth. The immense masses of earth every where abounding with all their varied mixtures of coarse and fine material, with all their rugged outlines, have been brought to their present condition principally by the force of running water. Hence we learn that matter is always liable to change its position by some physical law, and in every change some new body is formed with new combinations and thereby unfolding schemes of Infinite Wisdom. It may be necessary to consider what is meant by a progressive change. This is, perhaps, as manifest in the animal economy as any fact we can adduce for an illustration. We commence with the simple formation of the univalve, and ascend the scale of organized bodies, possessing vitility and thought, until we arrive at the formation of human beings.. Here every new body in the series was marked by a peculiar combination of its elementary parts. We may here distinguish a progressive change from a continuous change. In the formation of the body of a quadruped, the constituent parts of which it is composed, necessarily, as we have before stated change their position, but during the existence of this race of animals, for instance the horse, there is a succession of bodies, and a succession of changes, and this is but a continu ation of the same link in the chain of animal life. Now when the elements of organized bodies are formed into a human body we obtain a new idea of animal existence, the change in this instance has been progressive.

The changes that have taken place among ponderable bodies on the earth's surface, have also been progressive. . We have before stated that the two antagonistic forces prevailing over matter, have at times formed new continents, and have wrought many interesting changes upon their surface. We refer to the force of heat in the bosom of the earth, and the force of running water. The former raises whole continents out of the water mountains high, the latter reduces them again beneath the ocean's level. These two forces are employed in rocking the great balance beam of nature! Hence there has been a succession of continents and of oceans. The tendency of matter has therefore at one time been in a certain direction, at another period it has been reversed. On the North American continent the great tendency of matter has been in a southern direction, in former ages of the world it had a northerly course. From this we are to infer that a continent once existed in regions where the Atlantic ocean now rolls its waters. The proof of the existence of this ancient continent we may hereafter bring forward. For the present we assume such to have been the fact. From its ruins which have been scattered over other localities, we can see how ill adapted it must have been for the existence of man. We have before stated that man stands at the head of created beings. He shines pre-eminent in the world of mind: his intellectual powers become manifest from his labors in the material objects around him, however delicate and frail his own physical frame may be. Constituted as he now is, he could not have lived on the old continent. The atmosphere being then charged with such suffocating gases and exhalations, and the animal economy being also so numerous, venemous, and gigantic, that had man been created at that period of the earth, he would scarcely have survived the day of his nativity. The subsequent emergence of continents, produced a great change in the material world. The animal races appear to have been brought within the control of man; the air became pure and wholesome, and new species of trees and plants now became useful to man. What could he do to distinguish himself without being associated with the present condition of things? What could he do in this climate without the forest, the metallic ores and the mineral substances? All these are more fully appreciated in this age of continents; and appear to be well calculated to mature the labors of his mind. We can therefore look upon every new continent as bringing forward a new order of things. Here we trace those two progressive lines of mind and matter, until they centre in one point, and exclaim with the poet:

> "From harmony, from heavenly harmony,
> This universal frame began ;
> From harmony to harmony,
> Through all the compass of the notes it ran,
> The diapason closing full in man."

In contemplating the changes that have taken place in the succession of continents, the two immediately preceding are necessarily the most prominent and the most interesting to us. In almost every location we see rocky formations, termed *aqueous* rocks, distinguished from the *primary* by that name. In some districts of country they lie near the surface, but are more generally seen by an out-crop upon the hill-side and upon the banks of water-courses. Spread over these formations of rock is a loose material (that is not indurated) called drift, from the fact that it appears to have been driven along the surface. This drift material is composed of the fragments and disin'egration of rocks, and for us it is highly important to consider, for on it "we live and move and have our being." To interest the eye and engage the hand we are surrounded by this material in all possible forms and composition; the massive clays, the banks of sand, and the piles of gravel. To have brought matter to its present condition, there must have been a gigantic force employed. In contemplating the forces that were actiqe formerly, in removing matter from one locality to another, we have the most prominent views of their extent in referring to that time when large masses of primitive rocks were removed from their original beds far into the adjacent country. These blocks are called *boulders*, and we find them scattered about districts of primary formations, in a kind of zone or belt, diminishing in size as they are the farther removed from the parent rock. We sometimes meet with these boulders upon high ranges of country; some of them are of immense magnitude, weighing by estimation a hundred tons or more, and from fifty to a hundred miles from their starting place. This will open to us a discussion of the theory of boulders, which in connection with the drift formation, will be our subject for the next number.

ANALYSIS OF SOILS.

BY CHARLES T. JACKSON.

In order to ascertain the agricultural value of a soil, it becomes necessary to examine its mechanical constitution and chemical composition. We may notice the integrant minerals of which it is composed while making the mechanical analysis, and thus infer its geological origin, for the mineral ingredients of all soils were once solid rocks, and the integrant minerals are rarely so completely decomposed as to conceal their original nature.

In a mechanical analysis, we sift the soil in sieves of different degrees of fineness, using always the same sieves in comparative examinations of soils. The coarsest sieve may have $\frac{1}{10}$ inch meshes, and should be made of copper wire. The 2d sieve should have $\frac{1}{50}$ inch meshes, and may be made of copper gauze. Sift the soil through the 1st sieve, and weigh the gravel and grass roots left upon it. Then sift the soil through the 2d sieve, and weigh the sand left on that. The soil which passes through the 2d sieve is fine loam, which may be sandy, clayey, or calcareous. The fine loam may be mechanically divided still more by stirring it up with water, and after allowing the coarse matter to subside, the fine slime may be peured off, and more water may be poured on the coarse matter, and by several decantations the finer matter will be washed away, and the water will come off quite clear. This method is very instructive, for we very readily perceive the minerals of the soil in the clean particles that remain.

It is convenient in a mechanical analysis of soil to operate on about 1000 grs. of the dry soil. Inspect carefully the various minerals of which the gravel, sand and washed loam consist, for the coarser particles are those which would become fine soil by disintegration and decomposition, and therefore indicate the supply that may be expected. Thus mica and felspar are minerals filled with potash and soda, and by the action of carbonic acid from decayed plants, and the organic acids of the soil, they are made to yield their alkaline matters and suffer decomposition. Carbonate of lime or limestone also yields to decomposing vegetable matters and forms soluble salts. It also takes the sulphuric acid from generating copperas as it forms from iron pyrites, and forms gypsum, while the diminished carbonic acid either goes to dissolve part of the carbonate of lime as a bi-carbonate, or rises as a gaseous emanation, and is absorbed by the foliage. The above remarks are all we have time now to add to this section of our analysis. Reflecting men will discover many other advantages of the mechanical examination of soils, and we leave the subject for their consideration.

2. *Chemical Analysis of Soils.*

Chemistry investigates the nature of soils more minutely than any other science, for by the chemist's art all the hidden properties are brought out and fully exposed. He deals with atoms invisible even to the most powerful microscopes, and the laws of their combination are by him at once discovered. It is the application of this science to agriculture that is to redeem it from empyricism and guess-work; and when farmers have advanced far enough in science to understand the work of the chemist, they will have made a gigantic stride in the improvement of their art. I would not endeavor to make any one believe that in the present state of agricultural education that much can be expected from the application of chemistry by raw hands. The farmer will for some years have to work under the direction of chemists. They cannot be expected to know enough of the science to apply it safely themselves, much less can we expect them to leave the plow for the laboratory.

The chemical analysis of a soil is one of the most difficult and complicated tasks that can be given to a master in this department, and it is extremely absurd to suppose that any one who has not had a thorough education in a well-organized laboratory, can possibly make a chemical analysis of soil that will prove of any practical value. We regard all the short-cut methods given in agricultural papers and catch-penny publications as arrant quackery, calculated to lead those who are unacquainted with the subject into great errors, or to cause a waste of time and money; for the farmer who neglects his work and purchases materials for analytical operations he can never perform, is evidently a loser thereby.

Chemical analyses of soils are divided into two departments. The first includes the determination of the mineral ingredients of the soil, and the second the organic matters. In preparing a sample of soil for mineral analysis, we remove the organic matters by combustion, and then have only the mineral ingredients to operate upon. By noting the weight of the dry soil before and after combustion, we learn how much organic matter has been consumed, or how much the soil contained in the gross way, but the nature of the organic matters is not learned; and that, as we shall see, constitutes another branch of analysis.

It is usual to take 100 grains of soil dried at a temperature of 300 deg., and to burn it in a platina dish on capsules placed in a fine clay muffle in the furnace. When all the carbonaceous particles are burnt, the capsule is withdrawn and the soil is carefully removed from it into a delicate balance and weighed. Suppose it loses 8 grains in weight; we set down, organic matters 8 per cent.

The soil is next digested in a glass flask with chlorohydric acid and water. The water being poured upon the soil first so as to cover it, and the acid then is added, a few drops at a time. Notice whether there is any effervescence in the flask. If so then a carbonate of some base is present, probably carbonate of lime, either as an original ingredient or as the product of combustion of some organic salt of lime. This question can be settled at once by testing some of the unburnt soil in the same manner. If it does not effervesce with acids, then all the lime is in combination with some organic or with nitric acid. This question will be examined farther on, when we speak of the salts in soils. he chlorohydric acid is boiled with the soil for a sufficient length of time to dissolve all the soluble mineral ingredients, generally half an hour suffices to effect the solution. The acid solution is next filtered through double counterpoised India paper filters, and all the soil is washed out of the flask with boiling distilled water, and is thrown on the filter. The filter of course is contained in a glass funnel, with its neck inserted in a proper flask to receive the filtered liquid. Wash the filter and the siliceous matter left on it so long as any acid reaction is discovered in testing a drop of the wash water at the neck of the funnel. A strip of blue litmus paper is used as the test, and should not be reddened by the wash water. The filters may then be removed, placed on bibulous paper in the drying closet and dried. Then the two filters are to be separated and burnt apart, and the outside filter ashes is put in the weight pan, and the inner with its insoluble silicates into the other pan, and the difference of weight is that of the insoluble silicates. Let us suppose it to be 85 grains; then 6 grains of mineral matter had been dissolved by the acid, and 84 per cent of insoluble silicates remains. The latter is to be laid aside for farther analysis as we shall describe farther on.

We now return to the soluble mineral matters which we have separated by the filter. This solution is to be treated with a few drops of strong nitric acid, and it is then to be boiled in order to per-oxidize any salt of iron it may contain. Then if, as it usually is, it be very acid with chlorohydric acid, we add pure aqua ammonia in excess, and heat it to simmering, and then filter on double filters. Per-oxide of iron and alumina are thus collected on the filter, and if the soil contained oxide of manganese it will also be thrown down with the per-oxide of iron. Phosphate of alumina and phosphate of iron are thrown down also. Wash the filter thoroughly with boiling hot distilled water, and when the soluble matters are all washed out, (as may be known by collecting a drop of the liquor from the funnel neck on a piece of platinum foil and evaporating it to dryness) dry the filters, separate them, burn them separately, and weigh; the weight is that of the per-oxide of iron and alumina. This may be set down for the present, but this matter is to be farther analyzed, as will be described presently. The alumina and per-oxide of iron might have been separated while in their gelatinous state, by the action of a boiling solution of pure potash, but we should have lost the advantage of a check weight, which is gained by weighing them as mixed.

Having noted the weight of the alumina and per-oxide of iron which we will call 5 grains, we have next to separate the lime from the ammoniacal solution, filtered from the per-ox. iron &c. For this purpose add a sufficiency of a solution of oxolate of ammonia, to precipitate all the lime as an oxalate, which may be known by observing when more of the oxalate of ammonia is added, that no white precipitation is produced. When this is the case, set the flask in a warm place, say in the drying closet or on the furnace plate, and let the precipitate have time to form and subside. This will generally take place in a single night. We then filter on double equal filters, and wash and dry as in the preceding cases. Then burn the oxalate of lime at a dull cherry red heat, and it is converted into carbonate of lime. If a higher temperature is employed, part of the carbonic acid may have been driven off, and if such is the case, it is necessary to add a few drops of a solution of carbonate of ammonia to the burned lime, and to heat it again to dull redness. The weight of carbonate of lime obtained is set down, and after we have determined in what state it existed in the soil, we calculate those salts of lime, and express the proportions as deduced from the carbonate obtained. Let us suppose we obtained 1 per cent of carbonate of lime. Next we have to examine the solution from which we have precipitated the lime, and the next substance we shall find in it will be magnesia. This is best thrown down by adding a solution of phosphate of soda, and if ammonia is not present in excess a little aqua ammonia is to be added and the magnesia will be thrown down as a phosphate of magnesia and ammonia, which requires some time to form and precipitate. Therefore leave the solution in a warm place for twenty-four hours. The phosphate may then be collected on a filter, as in the previous cases, and washed with water containing a little ammonia. This precipitate when ignited is converted into the biphosphate of magnesia, on which it is customary to estimate 40 per cent of it as magnesia, which gives a very close approximation to the true proportion. Let us suppose the weight of the biphosphate of magnesia obtained was 2 per cent; this would be equal to 0.8 per cent of magnesia in the soil. We shall have by other operations to determine in what state this substance actually existed in the soil, and then we can calculate the salts discovered. Potash and soda, which may have been present in the solution, we can only determine by difference in the weight of the products offered and that of the matter dissolved. We may estimate them thus for the present, but shall have to determine them more accurately by other operations. Let us then add up our substances, and we shall see what we have already separated, and the difference will be the weight of those salts which we have not yet determined.

Potash and soda, or some of their saline combinations, which are to be sought for by separate operations, will probably complete the weight of the matter operated upon.

In the present stage of the analysis we have,

Organic matters, - - - - -	8 grs.
Insoluble silicates, - - - -	84
Alumina, per-oxide of iron, &c., -	5
Carbonate of lime. - - - - -	1
Magnesia, - - - - - -	0.8
	98.8

Amount brought up, - - -	98.8
Substances not yet determined, - -	1.2
	100.0

We shall describe the method of separating the alkalies after completing the description of other parts of this analysis.

Let us return to the examination of the insoluble silicates and examine the nature of the bases which are united with the silicic acid. The weight was 84 grains. In order to effect this analysis we have to render the silicates soluble in acids. This is done by melting them in a platina crucible, with thrice their weight of pure carbonate of soda. Soluble alkaline silicates being produced we have no difficulty in dissolving the whole in water and chlorohydric acid. The solution is to be made entire, and is to be rendered acid. Then it is to be evaporated to entire dryness, in a porcelain capsule, and the heat is kept up so long as any vapor and fumes are given off. Then allow the capsule to cool, and moisten the whole of the dry mass with chlorohydric acid, and dissolve the soluble matters in distilled water. By this process the silicic acid is rendered insoluble, and the bases which were united with it are readily soluble in acid. Collect the silica on double filters as before described, wash so long as any acidity remains; and then dry and burn the filters separately, and weigh the silicic acid while it is still warm. The weight we will suppose to be 78 grains; then 6 grains of the bases has been separated and is in the solution which we have filtered. This solution is to be treated with a little nitric acid, and boiled to peroxidize the oxide of iron, so that it may be precipitated entirely by ammonia. Aqua ammonia is then added to the solution in excess beyond saturation, and all the alumina and per-oxide of iron will be separated in the form of a gelatinous precipitate. This is to be collected on a filter, and must be washed with boiling water for some time. Then the precipitate may be removed from the filter with a silver or platina spatula, and is to be placed in a large silver crucible and boiled with an excess of pure potash (potass a l'alcohol) until all the alumina is dissolved by the alkali, and the per-oxide of iron remains of a brown color. We ascertain when a sufficient quantity of potash has been added to dissolve all the alumina, by letting fall a drop of chlorohydric acid into the solution, when a little of the alumina will be thrown down, and if there is an excess of potash it will soon redissolve. Collect the per-oxide of iron on double filters, and wash so long as traces of alkali remain. Then dry and burn the filters separately, and weigh as before described, Let us suppose the per-oxide of iron weighs 2 grains.

We next have to separate the alumina from its potassic solution. This is done by rendering the solution acid by means of an excess of chlorohydric acid, and then by adding a solution of carbonate of ammonia in excess, which throws down all the alumina in the state of a white jelly. Collect it on double filters, wash with boiling water so long as any spot remains on evaporating a drop of the filtered solution to dryness on a piece of platina foil; dry and ignite, and weigh the filters separately, and note the weight of the alumina. Let us suppose it to be 3 grains.

We next return to the ammoniacal solution from which the alumina and per-oxide of iron had been separated, and analyze that. We add to it an excess of oxalate of ammonia, which precipitates all the lime as an oxalate; filter wash and ignite, and weigh the carbonate of lime produced by burning the oxalate, and from the weight of the carbonate we calculate the quantity of lime that existed in the silicate. Let us suppose that the carbonate of lime obtained weighed 1 grain, then since carbonate of lime contains 56.29 per cent of lime, we shall have 0.56 lime that was combined with silicic acid in the insoluble silicate.

After separation of the lime from the solution we throw down the magnesia by means of phosphate of soda, ammonia being present in excess. Phosphate of magnesia and ammonia is precipitated, and after remaining in a warm situation for twelve hours, the solution may be filtered, and the phosphate collected. Wash, dry, ignite, and weigh the bi-phosphate of magnesia produced, and 40 per cent of it will be magnesia. If we obtained 0.6 bi-phosphate of magnesia, 0.24 would be the proportion of magnesia, that was combined with silicic acid in the insoluble silicate.

On adding together the products of this analysis, if we are sure we have lost nothing, we may by difference of weight between the insoluble silicates employed and the sum of the ingredients obtained by analysis estimate the weight of the alkalies which we have not separated, It is a good plan to divide the insoluble silicates into two equal parts by weight, and to operate on one-half of it for the alkalies only, while the other operations are done on the other half. In that case we have to double the weight of each product in setting down the results of the analysis. On adding up the results of this analysis of the insoluble silicates, we obtain pure silicic acid 72 grains.

Per-oxide of iron, - - - -	2
Alumina, - - - - - -	3
Lime, - - - - - - -	0.56
Magnesia, - - - - - -	0.24
	5.80
Alkalies by difference, - - - -	20
	6.00

When we have to determine the alkalies in the insoluble silicates, we reduce a given weight of it to fine powder by grinding it in an agate mortar until all grittiness ceases to be felt under the pestle, then the powder is mixed with four times its weight of carbonate of baryta, and is placed in a platina crucible, and fused at a white heat. The silicates are decomposed by the baryta and the whole becomes soluble in chlorohydric acid and water. Dissolve out from the crucible the whole mass, filter, evaporate the acid solution to entire dryness, and redissolve in water and filter again. Treat the filtered solution with a sufficiency of sulphuric acid to precipitate all the baryta as a sulphate which is insoluble in water and acids; filter, treat the solution with a little nitric acid, and boil; add an excess of aqua ammonia to throw down the alumina and per-oxide of iron. Then add a solution of oxalate of ammonia to throw down any lime that may be present. The solution is now free from any fixed bases except the alkalies, and may be evaporated to dryness in a porcelain capsule and redissolved in water, filtered, and evaporated, and heated to redness in a platina capsule to expel all the ammoniacal salts. There remains in the capsule a white mass of saline matter which consists of the sulphates of the alkalies. Their weight is to be ascertained by counterpoising the capsule in the balance and then dissolving out the alkaline salts, the clean and dry capsules being restored to balance, and again brought to equipoise; by adding weights to the capsule we learn the weight of the saline matters that had been removed.

The saline solution is next to be decomposed by means of chloride of barium dissolved in water. The barytic solution being added a little at a time, until there is no longer any precipitate of sulphate of baryta. The solution is then to be filtered, and may be again evaporated to dryness, and the weight of the mixed chlorides of potassium and sodium may be determined. Then redissolve in a little water and add a solution of chloroplatinic acid in excess, and evaporate again to entire dryness, but at a temperature not much above that of boiling water. Pour pure alcohol into the capsule, and dissolve out the chloroplatinate of soda, and the chloroplatinate of potash will remain undissolved. It is to be collected on double filters, dried, and one filter is to be weighed against the other; the difference of weight is that of the chloroplatinate of potash, from which the weight of the potash is calculated. The weight of the potash being known it is easy to deduce that of the soda by difference, or we may decompose the chloroplatinate of soda, by sulphydric acid gas, and filter and evaporate to dryness. Convert the soda into a sulphate by sulphuric acid, drive off the excess of sulphuric acid by heat, and weigh the sulphate of soda, from which we calculate the proportion of pure soda.

If any magnesia was present in the silicate analyzed, another series of operations are required for its separation from the alkalies. We convert the sulphates into chlorides, as above described, and then add an excess of black oxide of mercury to the solution, and boil in a platina capsule. Then dissolve out the alkalies and filter the solution. The magnesia is thrown down by the oxide of mercury, and by driving the mercury off by heat we obtain the magnesia which is to be converted into a sulphate by sulphuric acid, heated to redness and weighed.

We can also analyze the insoluble silicates by driving off the silicious matter by the acid of fluorine in the state of fluo-hydro-silicic acid gas. This is done by mixing the finely pulverized silicate with fluor spar, and placing it in a platina crucible, adding pure sulphuric acid (Nordhauren) which decomposing the fluoride of calcium, disengages fluorine in combination with hydrogen, and carries off the silicic acid in vapor or gas. We heat gradually to redness to drive off the sulphuric acid. When the silex is removed we dissolve the soluble sulphates in water, and most of the sulphate of lime remains insoluble. We remove the remainder of the lime salts with the alumina by adding first ammonia in excess, and then oxalate of ammonia. The sulphates of the alkalies and of magnesia only remain in the solution, from which they are separated as before described.

Having completed the analysis of the insoluble silicates, we have now to return to the more complete separation of the ingredients obtained from the first solution. Alumina and per-oxide of iron, oxide of manganese, with phosphate of alumina and iron, may be found in that precipitate. The quantity of the precipitate is too small for the quantitive determination of all the ingredients above mentioned, but we can make the qualatative examination, and then by operating on another and larger lot of the same soil, we may obtain a sufficiency for a more thorough analysis.

We may then dissolve the 5 grains of alumina, per-oxide of iron, &c., in chlorohydric acid, and dilute with pure water. Take a portion of the solution and add ammonia in excess, which will reprecipitate the alumina, per-ox. iron, &c. Collect the precipitate on the filter, and wash it; remove it to a capsule by means of a platina spatula, treat the gelatinous precipitate with acetic acid, which will dissolve all but the phosphates of alumina and iron. Collect them on a filter; wash and dry them. Then by means of the blowpipe, with boracic acid and a fine steel wire ascertain if phosphoric acid is present by forming a phosphorate of iron, which is a white brittle substance. (See Berzelius on the Blowpipe.)

Take another portion of the solution, and precipitate the per-oxide of iron, by means of a boiling solution of pure potash. Collect the per-ox. iron, &c., on a filter, wash the precipitate, and then re-dissolve it in chlorohydric acid, and add a considerable excess of acid. Then add ammonia until the solution is saturated and is of a red color, and a little per-oxide of iron is precipitated. Then add a solution of neutral succinate of ammonia, which will precipitate all the per-oxide of iron as a succinate. Filter and wash very slightly with water containing a little ammonia. To the filtered solution rendered neutral add a solution of carbonate of potash and carbonate of manganese will be precipitated as a white precipitate, which collect on a filter; wash, dry and examine by means of the blowpipe and tests. The alkaline solution of alumina may be treated as described under the head of analysis of the insoluble silicates.

By working on a sufficient quantity of the precipitate, the proportions of phosphoric acid, ox. manganese and alumina may be accurately determined by the above described method. And an approximation may be made by dividing even the 5 grains of precipitate, and working on the parts for each of the above mentioned ingredients.

In searching the soluble matters for alkalies, we omit precipitating the magnesia by phosphate of soda, and take the solution from which we have thrown down the lime and evaporate it to dryness and expel the ammoniacal salts. We have then only the chlorides of the alkaline metals and manganese present, which are separated by treating the solution with black oxide of mercury, and boiling so as to throw down the magnesia. Then the filtered solution will give by evaporation and a red heat in a platina capsule the chlorides of sodium and potassium, which are to be separated by chloro-platinic acid as before described.

3. *Analysis of the Soluble Salts in a Soil.*

We have also to determine what soluble salts exist in the soil. It is necessary to operate on 1000 grains of the soil in order to obtain an appreciable quantity of saline matter. We boil the soil in distilled water, then filter, evaporate the solution to dryness in a platina capsule, and heat sufficiently to burn off all the organic matters. Then we dissolve the salts in water and test for the acids and bases which are present, namely, for sulphates by means of a solution of acetate of baryta; for chlorides by means of a solution of nitrate of silver, if the solution is neutral a little phosphate of silver may also be precipitated. The precipitate may be analyzed to ascertain if any phosphate is present.

We search for the bases of the salts on a part of the same solution, namely, for lime by a solution of oxalate of ammonia; for alumina by ammoniac; for oxide of iron by ferrocyanate of potash; for magnesia by phosphate of soda and ammonia; for potash by chloroplatinic acid; for soda by observing if a portion of the solution evaporated to dryness on a slip of platinum foil turns a blue alcohol flame yellow.

If the nitrates are suspected to be present, observe on burning off the organic matter if any deflagration takes place. Nitrates of potash, soda, or lime, leave when deflagrated the carbonates of their bases, but nitrate of ammonia leaves no solid residue. It deflagrates very readily, and is often present in soils.

Sulphate of ammonia is to be sought for before burning off the organic matter, for it would be expelled by the heat. It may be separated by distilling a portion of the dried saline matter, which is to be done in a tube retort; the sulphate of ammonia, together with the muriate of ammonia, will be condensed in the cool neck or receiver. It will form a white crust in the tube, and may be dissolved out and tested by chloride of barium solution and by means of potash. The presence of chlorohydrate of ammonia is determined by testing the solution, for chlorohydric acid by means of nitrate of silver, which will give a white curdy precipitate if chlorine is present.

Soluble silicates of potash and soda are also to be sought for by evaporating the salts after acidulation with chlorohydric acid, to entire dryness, and redissolving in acidulated water, which will take up every thing but the silicic acid of the insoluble silicates. The proportion in which these salts exist in soils is so small that we are often obliged to make a solution of several pounds of the soil before the saline matters can all be quantatively determined.

To discover the gaseous contents of a soil we have only to place a quantity of the soil in a flask and connect the flask by means of a syphon tube with a flask containing a solution of baryta water, and from that flask a tube connects with the bell glass of a pneumatic cistern. On boiling the soil in water, carbonic acid is copiously extricated, and precipitates the baryta from its solution in the state of insoluble carbonate of baryta, which being collected, dried and weighed, will indicate the proportion of carbonic acid gas in the soil. The gas collected in the bell glass is probably atmospheric air, and may be analyzed to determine how much oxygen and nitrogen it contains. It will be found to contain less oxygen than ordinary atmospheric air. I have never discovered any free hydrogen or sulphydric acid gas in cultivated soils, but the latter gas is often abundantly present in swamp muck and peat soils, where per-sulphate of iron has been decomposed by the organic acids. The proportions of oxygen may be learned by abstracting it from a given measure of air, either by protosulphate of iron, or by explosion with hydrogen gas. Sulphydric acid gas may be determined by passing the gas through a solution of acetate of lead the latter being placed beyond the baryta solution. From the proportion of sulphate of lead precipitated, we can calculate the sulphydric acid gas.

4. *Analysis of the Organic matters in Soils.*

This is the most difficult department of agricultural chemistry, and it has been unfortunately neglected by most writers on the subject. The processes are more easily described than executed, and much time is required for their performance. I refer not to those imperfect organic analyses which consist in burning the organic matters in their mixed state with oxide of copper, and in calculating the gases produced, but the separation of the proximate principles in their pure state or in definite combinations with certain other bodies. We well know that combustion of the isomeric bodies with oxide of copper, does not enable us to distinguish them from each other; while by other processes they may be readily distinguished. Hence I attach the most importance to the latter method.

In examining the organic matters of soils, we have to operate on a considerable quantity of the soil, in order to obtain a sufficiency of the matters for analysis. Generally 1000 grains of a soil is a sufficient quantity to operate upon. We first ascertain what matters water will dissolve from the soil by digesting the soil with water at 98 deg. F., for some days. Then filter and evaporate the aqueous solution to dryness at a steam heat or under the bell of an air pump with sulphuric acid placed in a shallow dish below it to absorb the vapor. By a peculiar apparatus of my own contrivance I am enabled to apply a steam heat in vacuo, and thus to evaporate any solution of organic matter with rapidity. The various salts and a certain proportion of the organic acids are dissolved out from a soil by water. They are separated by processes such as I shall describe farther on.

Having dissolved all that water will remove from the soil, we next digest it in alcohol, which removes a certain proportion of the organic acids and extractive matters. This solution is analyzed in a similar manner to that of the aqueous solution.

After removing thus all the salts soluble in water, and the organic substances soluble in alcohol, we digest the soil in a solution of carbonate of ammonia, which decomposes all the organic salts, and takes up the organic acids, which readily unite with ammonia, while its carbonic acid goes to the bases and converts them into carbonates. The vessel containing the soil and carbonate of ammonia is slightly stopped or covered with a cap of paper and set in the drying closet, and kept warm for twenty-four hours at least, when the dark copper colored solution is poured off into a filter, and more solution of carbonate of ammonia is added to the soil, and the digestion is kept up so long as any color is obtained, and the whole is filtered. The filtered solution is then to be saturated, and treated with a slight excess of pure acetic acid, and a solution of acetate of copper is added so long as a brown precipitate falls. This precipitate is apocrenate of copper. The solution is to be placed in a warm place and kept at a temperature of 170 deg. F. until all the apocrenate of copper subsides. Then it is filtered and the apocrenate is collected on double counterpoised filters of India paper, and after washing out the excess of acetate of copper, the filters are to be dried at a steam heat, and weighed one against the other. The difference of weight is that of the apocrenate of copper. A portion of this apocrenate is removed from the paper and analyzed, and the proportion of the organic acid in the apocrenate is determined. This analysis I shall describe farther on.

Having thrown down all the apocrenic acid, we next render the solution slightly ammoniacal by means of a solution of carbonate of ammonia, and crenate of copper precipitates if acetate of copper is in excess. If not add, drop by drop, more acetate of copper until all the crenate is thrown down. This salt is of a pale, greenish white color. The solution is to be allowed to stand for twenty-four hours at least, in a warm place, at a temperature of 170 deg. F., until the crenate separates. Then it is to be filtered on double counterpoised India paper filters, washed slightly, dried at a steam heat, and weighed. Then a portion of the crenate is to be removed from the filter and analyzed, and the quantity of crenic acid on the filter will be known.

We have next to separate the humic acid; in order to do this, we have first to remove all the copper from the solution by passing a current of sulphydric acid gas through the solution until all the copper is precipitated as a sulphuret. Then after allowing the solution to remain in a warm place over night, we filter the solution and then evaporate to near dryness at a temperature below boiling, and if possible it should be done in vacuo. The solution being now free from sulphydric acid gas, we add a little pure water and then drop in a solution of subacetate of lead, which precipitates the humic acid in the state of a buff-colored humate of lead. This precipitate is easily collected on the filters, and is to be washed and dried at a steam heat, and weighed. Then a portion of it is analyzed, and the proportion of humic acid on the filter is calculated. If we now remove the subacetate of lead from the solution by passing sulphydric acid gas through it, we shall find that the solution is of a honey-yellow, and still contains organic matters. Evaporate the solution to dryness in a platina capsule, and you will obtain extract of humus, which extract I have ascertained is a compound of two distinct proximate principles, one of which is precipitated by a solution of protonitrate of mercury, and the other by nitrate of silver. These substances have not yet been analyzed or fully described.

The insoluble substance called humine I do not find in the solution of carbonate of ammonia and I regard it as a product of evaporation at too high a temperature, for it does not appear when we evaporate at a steam heat in vacuo.

The insoluble organic matters remaining in the soil after digestion with carbonate of ammonia may be called humine. It is capable of being converted into humic acid or into the other organic acids by action of the atmosphere and slow decomposition in the soil. Glucic and apoglucic acids probably exist in the extract of humus, but I have not yet satisfied myself with regard to them. I find them in brown sugar and in the sap of the maple and birch, and in saturated or "exhausted" bone black of the sugar refinery. Bone black has the remarkable property of retaining apoglucic acid, and hence we obtain it most abundantly from that substance after it has been used in refining sugar.

It should be observed that if the soil contains phosphates decomposable by carb. ammonia, that phosphoric acid will be thrown down as a phosphate of copper with the crenate. Hence that acid must be sought for and deducted from the crenate. I find it in most of the crenate of copper obtained from peat, and sometimes it is in considerable quantity, giving a darker green color to the crenate.

In analyzing the apocrenate of copper we may either separate the copper by mixing the pulverized apocrenate with distilled water, and passing sulphydric acid gas through the mixture until all the copper is separated as a sulphuret, and then filter and evaporate the apocrenic acid to dryness; or we may burn off the apocrenic acid and weigh the oxide of copper obtained, and by difference in weight determine the proportion of apocrenic acid. The same method may be pursued in the analysis of the crenate of copper. The crenate is however much more easily decomposed by sulphydric acid gas, and the crenic acid if collected and dried off in a shallow glass vessel, separates readily from the glass in the form of a thin honey-yellow scale.

Humate of lead is decomposed by sulphydric acid gas, and sulphuret of lead separates readily. Filter the solution, and evaporate to dryness. The composition of humate of lead may be learned also by converting the oxide of lead into a sulphate, and calculating the quantity of oxide of lead from the sulphate. When these organic acids are required in their pure state for combustion with oxide of copper, it is necessary to form these salts a second time, in order to avoid admixture. The analysis by oxide of copper determines the proportions of oxygen, hydrogen and carbon. The nitrogen must be determined by a separate operation, a mixture of lime and soda being used, and the nitrogen being converted into ammonia, which is to be precipitated by chloroplatinic acid, and calculated from the weight of the chloroplatinate of ammonia produced.

The apocrenic, crenic and humic acids having been analyzed, it is unnecessary to repeat the operation, it being only necessary to obtain the well known combinations with metallic oxides, as above described. When a new organic substance is discovered, it is necessary to make an ultimate analysis of it, in order to fix its composition and to classify it among organic matters that have been analyzed.

Apocrenic acid consists, according to Hermann, of

Carbon, - - -	62.57
Hydrogen, - - -	4.80
Nitrogen, - - -	15.00
Oxygen, - - -	17.53

Its atomic weight is 1698.

Saturating capacity, 5.8.—*Berzelius and Hermann.*

Crenic acid is composed of

Carbon, - - -	40.24
Hydrogen, - - -	7.69
Nitrogen, - - -	7.50
Oxygen, - - -	44.57

Hermann.

Its atomic weight is 1323.3.

Saturating capacity, 7.56.

Humic acid, according to Sprengel, is composed of

Carbon, - - -	58.
Hydrogen, - - -	2.1
Oxygen, - - -	39.9

According to Mulder, humic acid from peat of Harlem lake yields when dried at 140 deg. Cent., and analyzed,

Carbon, - - -	60.13
Hydrogen, - - -	4.75
Nitrogen, - - -	3.61
Oxygen, - - - -	31.55

He supposes the nitrogen is derived from ammonia contained in the peat, but it is more probable that it came from the apocrenates and crenates which were not separated from the humic acid.

CHARACTERISTICS OF ANIMALS.

BY A. CAULKINS, M. D.

What are the *specific* characters as pertaining to man? The infant at the breast exhibits its instincts as obviously as the colt or the calf; but the parallelism fails as intelligence dawns and days advance. One difference in the front rank is observable in the phenomena of memory. The memory of the brutes is spontaneous, and independent of the will; that of man is perpetually exercised in bringing forward new combinations and trains of thought. Unfledged birds remain passive in the nest till the mother's chirp falls on their ear, when they stretch their mouths agape for the food she has brought. Brute memory too is bounded by the narrow circle of the material and visible, beyond which the human mind is perpetually sallying, to range abroad over the interminable vistas of fancy,

"In climes beyond the solar road."

Another diversity is the educability of man. But for man, to what would the education of the horse or the ox amount? The improvement at best is rather shadowy than real, a partial expansion of instinct, rather than a transformation, as in the pointer and the pacer. The mocking bird may indeed be incited to imitate songs foreign to its own, but the hen, with all her careful looking after her eggs, is amused with an ovoid chalk-ball. The rabbit burrows underneath a rock, as all generations of rabbits have done before, and the beaver of to-day erects his dam upon the model of the Noachic epoch. The Canary bird is a musician by birth; the child becomes such only after repetitious efforts and tedious application. Is there no incongruity of constitution here?

Instinct may indeed along definite ranges seem almost to transcend reason. The razorbill poises its egg with mechanical accuracy upon a pointed rock. The duckling liberated from its shell rushes for the muddy pool, diving and swimming with the dexterity of the old brood, and to the consternation of its foster-parent, the hen. The eagle pounces upon the hawk in a cycloidal curve, the line of maximum regularity and velocity. The wasp was a paper maker long before the primitive voyagers on the Hoang-ho. The determination of the geometrical figure that in its application should obviate all vacuity of space, to wit, the sexagonal prism, and the ascertainment of the truth, that three planes constituting a solid angle above form a roof of greatest resistance—what costs the geometer hours of delineation and study—the bee not yet a week old accomplishes in the qnincunx dispcsition of its cells. Instinct is even more weatherwise than the Torricellian guage.

> "How restless are the snorting swine!
> The busy flies disturb the kine;
> The sheep are seen at early light
> Crossing the mead with eager bite;
> 'T will surely rain!"

Laughter has by some been held peculiar to man, but mistakenly. The expression is an emotional one rather, and is in analogy with the friskiness of the dog under the caresses of his master, and in the grimaces of the simiæ, some species of which show a decided propension to the ridiculous, and the ironical contortion of face in the baboon is indeed a "grin horrible."

But there is a principle of distinction to be adverted to, broad in its bearings, weighty in its consequences. The inferior tribes being constitutionally circumscribed by the finite circle of perception, and being furthermore from the absence of an independent volition held in vassalage by the senses, can never make an advance beyond the most elementary generalizations. Man, automatically as it were, or otherwise through the exercise of his will as an auxiliary, makes a *per saltum* stride immeasurably beyond, through an indefinite series of generalizations upon generalizations. Thus man and man only *reflects*, that is, he only takes cognizance of his own cogitations and feelings objectively. The sense of right and wrong, therefore, the consciousness of moral obliquity, is the peculiar inheritance of human creatures. "*Hinc me tuunt, cupiuntque, dolent que, gaudentque.*" The dog may sneak off to his hiding place out of apprehension of chastisement, the tiger may slink away foiled by the steadfast eye of the huntsman, but here the analogy terminates.

In consonance with such view man is seen to be invested with imagination by eminence. The dog is never transported in his dreams beyond the kitchen fire or the walls of the farm house; man has "taken to himself the wings of the morning." Pug may seize the brush and daub the wall over with characters amorphous and unmeaning, or play pantomime with his master's razor by slitting his own weasand across, or affectedly thrum the strings of a violin, or "spectacle bestrid" gravely chatter over a newspaper, and all without a solitary conception of what he is about beyond the mere ideas of attitude and sound. Where was ever yet seen a cow or a horse upon a terraced bluff or a castellated hilltop, wrapped in the vision of the landscape around? How superlatively ridiculous to recite a chronicle of the Cid in the ears of a troop of wild horses, or to harangue a gathering of apes on casuistic lore or the moral sublime!

Another definitive peculiarity as pertaning to man, viewed as a model rather than a formative cause, is language. Elementary sounds indeed, the vocal expressions of emotion, and what artificial language presupposes for its basis, are appreciable by the mammalia in common. These effect by consonant modulations of voice an intercommunication of sentiments, interchanging their joys or imparting to one another their fears. The domesticated species furthermore are soon taught to connect familiar things with names, and to associate with simple phonetic phraseology, the corresponding acts. The parrot hails the wayfaring man with its idle gibberish, associating a successional sound with some sensible idea, but unlike the child, it never attains to any appreciation of words in their transferrable relations, in respect of subject and predicate, modality of action, time and place. What story-book reader ever mistook the flattering echo of a parroquet for articulative intelligence? Artificial language, the medium of abstract thought, and the exponent of all the complicated generalizations of the mind, and in such view the grandest monument of human skill, presumes a power of analysis immeasurably transcending a mere catenation of sounds whether imitative or instinctive. On such grounds, man and the brute stand at as wide a remove as infinity and infinitesimality.

The idea of number involves the power of generalization in its most abstract and absolute form, and here a chasm opens, broad as fathomless. The motion in its inmost definiteness amounts in none save man to more than plurality as distinguished from individuality, and presumes in no shape the obscurest conception of a scheme of rotation. The baited bull is ready to cope with one horseman but not with half a dozen; the tiger, a match for an hunter or two, recoils before a company. The dog at dominoes is guided by the pictorial, and not by the numerical sign, for he plays indifferently either piece, being the number sought. What elephant ever solved the simplest mathematical problem, as that "two and two make four?" Now man on the contrary, calculates not the visible and tangible only, but overleaping the outposts of space-time, he would scale the azure vault above to track the cometary whirls, or range the stellated arch of the lacteal way, till dazzled by the fadeless splendor of their fires, or lost in the abysmal swamp of their gyrations.

Thus man by virtue of his generalising powers, as contrasted with other orders among the host of living beings that walk the earth, becomes invested with the prerogative of genius.

> "Indulsit communis conditor illis
> Hirtum animas, nobis *animum* quoque."

But for the presence of man, what face would this terraqueous orb of ours present? Solitary wastes, arid plains, pestilent fens, sombre forests, savage mountains and blighted fields—

> "A vast, immeasurable abyss,
> Outrageous as a sea, dark, wasteful, wild."

Here the lion would make his habitation; here the owl would hold his court; day resounding with the panther's screams, night echoing to the growlings of bears; trees withering under the locust, flowers wasting before the caterpillar. But when the crowning work of creative energy unfolded into being, then indeed the earth first "rose out of chaos." Then the desert was made to blossom, then the wilderness resounded with song. What has man done; rather what has he left undone? While other tribes succumb to opposing agencies from without, man has signalized his birth-right by subjugating to himself such agencies. But for him the weak had been trampled down or exterminated by the strong; now the huge elephant and the fierce rhinoceros, under whose feet man is but a grasshopper, are subdued to his service or awed into distance. The craggy mountain has been cleft asunder. The earthquake's abysmal chasm has been arched over, the "caves of the earth" have been laid open, rivers have been turned from their courses and seas hedged in by barriers of walls, the turreted peaks of the rolling clouds have been channeled with ærial boats, the sun himself has been spanned as with a measuring reed, and the thunderbolt even, *ictus fulmineus*, has been tamed to the guidance of a little hand, and sound, and thought, and speech, have been made to sweep, with sunbeam swiftness from north to south and from west to east, along the chain links of the lightning!

The contrast widens as we look into the interior chambers of man's spiritual frame. The pleasures of sense, the transcient delights of the hour — the "being's end and aim" to other animals — seem to man but as intercalary points in the vast cycle of fruitionary themes, among which his soul is fain to expatiate. Man ever aspiring after the unseen and untried finds his solace and encouragement in the "earnest expectation" of that future; but where is the dog or the elephant, or the chimpanze, that conceives of a pleasure or a pain beyond the fleeting hour?

"Their raptures now that wildly flow
No yesterday nor morrow know;
'Tis *man alone*, that joy descries
With forward, and reverted eyes."

The inferior orders, incapable of penetrating beyond the vestibule of generalization, are in consequence unequal to the conception of an extraneous, impalpable, aboriginal cause endued with personality, omniscience and ubiquity, and of the incidental conviction of human dependence and amenability, are for like reason unsusceptible of the experiences and enjoyments attaching to an existence essentially spiritual. Are they then possessed of a soul? Yes, but of a sensuous, perishable one. Has man then no pre-eminence above a beast? "If a man die shall he live?" Shall there be a palin genesia of the human soul in a new theatre of existence? Nay, says the Pyrrhonist, "as one dieth so dieth the other — the spirit (breath) of men goeth upward, and the spirit of a beast goeth downward to the earth." Where, exultingly exclaims a modern zoologist, is the soul of the homunculus? Do we not see it built up before our eyes, maturing with the body, decaying with its decline, and finally — ex nihilo nihil, in nihilum redit — going with the last expiratory collapse into annihilation? The argument is but a sophism, a *post quod non.* What if the soul in its existing phases is indissolubly associated with a corporeal mechanism, is it therefore an inseparable nonentity? Is that too much for the Author of Being to reconstruct and modify what himself originated and contrived? If indeed "shadows, clouds and darkness" environ and obscure this heaven-born emanation — "semine ab acthereo" — what shall dispel the euthanasial solace in its prospective transmigration to the fadeless elysian of cherubim and seraphim, where shines that "holier light, offspring of heaven?"

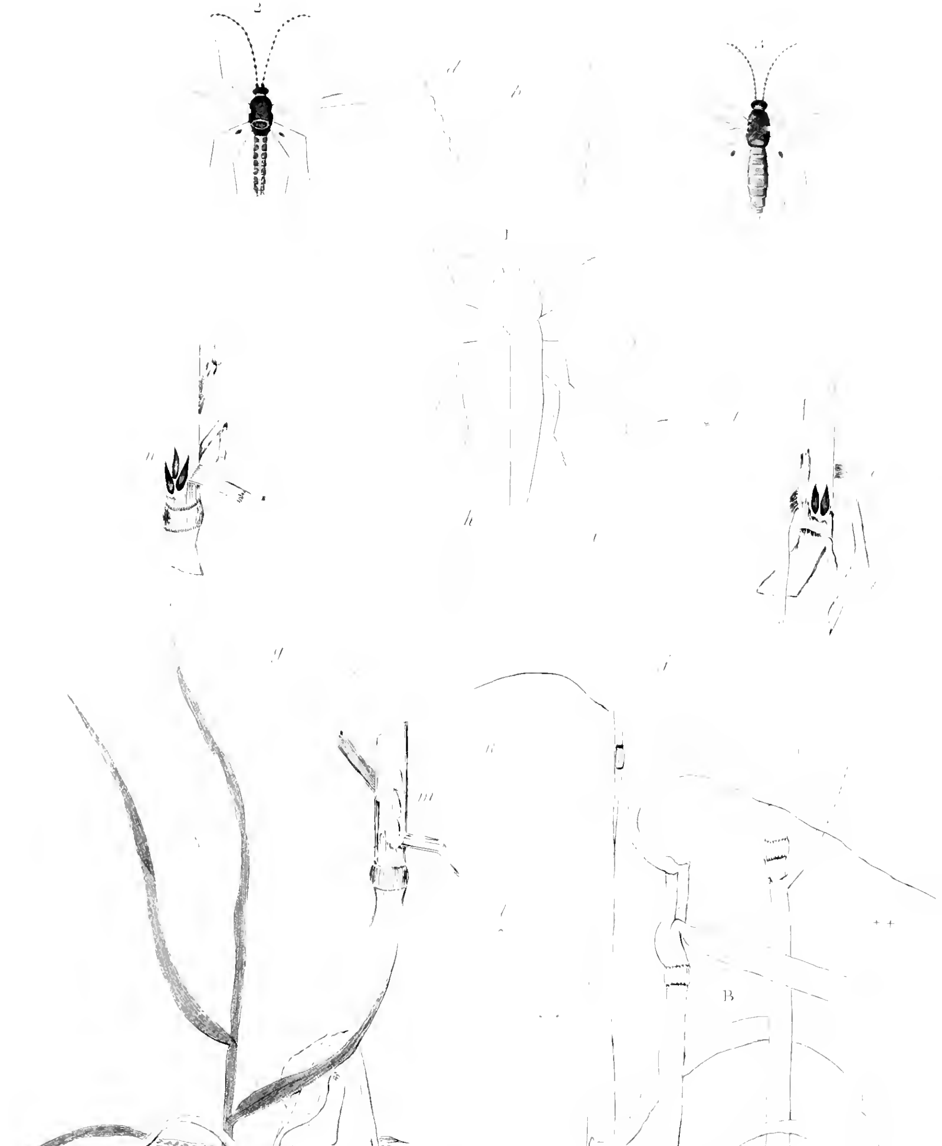
"Bright to the soul Hope's seraph lands convey
The morning dream of life's eternal day;
Then, then the triumph and the trance begin,
And all the phœnix-spirit bursts within!"

INSECTS INJURIOUS TO VEGETATION.—No. IV.

BY ASA FITCH, M. D.

THE HESSIAN FLY.

The insect which we are about to consider, has for a long period been, at times, a severe scourge, in every district of our country. It is more formidable to us, says Dr. B. S. Barton, than would be an army of twenty thousand Hessians, or of any other twenty thousand hirelings, supplied with all the implements of war. Hence it has forced itself prominently to the notice both of agriculturists and men of science. No other insect of the tens of thousands that teem in our land, has received a tithe of the attention, or been chronicled with a tithe of the voluminousness



A Fitch Del

Engraved by John E Curtis, for the Quarterly Journal of Agriculture

that has been assigned to this species. Our scientific journals, our agricultural magazines, and our common newspapers, have each accorded to it a conspicuous place in their columns. As may well be supposed, almost every point in its history, has by one and another of its observers, been closely investigated, and laid before the public. Very little that is new, can therefore at this day be embodied in an account of this species. The most that an observer can accomplish, is to add his testimony in confirmation of facts that have been already announced. The most that a writer can aim at, is to gather the various papers that are scattered through volumes sufficiently numerous of themselves to form a library, sift from them whatever they contain of importance, and arrange the facts thus acquired, into a connected and symmetrical memoir. Such is the object of the present essay; to carefully review the various accounts that have been hitherto published, extract from each the items of value which it contains, compare these with personal observations made under favorable circumstances during the past twelve months, and with the materials thus acquired, write out a history of this species, more ample in its details than any that has been hitherto attempted, and containing a complete summary of all that is known of this insect down to the present day.

It is a European Insect.

For several years subsequent to the first appearance of the Hessian fly in this country, it was universally believed to have been derived from abroad. When, however, the severe devastations which it was committing upon this continent became known in Europe, public attention was so strongly excited as to lead to an extensive and thorough search for the insect there. The result of this investigation, as given by Sir Joseph Banks in his report to the British government, was, that "no such insect could be found to exist in Germany or any other part of Europe." It was in consequence, received as an established fact, and assented to on all hands, that this was an exclusively American species. Of late years, however, new light has been shed upon this subject;

and we now proceed to detail the evidence which induces us to believe that the Hessian fly is indeed a European insect.

It would appear that this insect, or one identical with it in its appearance and habits, did exist, and commit severe ravages in Europe, long anterior to its appearance in America. In Duhamel's *Practical Treatise of Husbandry*, (London, 1759, 4to, p. 90,) and also in his *Elements of Agriculture*, (Lond. 1764, 8vo., vol. i., p. 269,) after alluding to a worm in the root of oats, he says, "I suspect it to have been an insect of this kind that *destroyed so much wheat* in the neighborhood of Geneva, and which M. de Chateauvieux describes thus: 'Our wheat in the present month of May 1755, sustained a loss, which even that cultivated according to the new husbandry has not escaped. A number of *small white worms* have been found on it, *which*, after a time, *turn to a chesnut color;* they place themselves *betwixt the leaves* and gnaw the stalk; they are commonly found *betwixt the first joint and the root;* the stalks on which they fix are immediately at a stand; they *grow yellow and wither.* The same accident happened in 1732: these insects appeared about the middle of May, and did so much damage that the crops were scarcely worth anything.'" This account, though perhaps too brief and imperfect to justify a decided opinion, corresponds much more exactly with the Hessian fly, than with any other insect of which we have any knowledge. Acquainted with it as our men of science in this country were, we are surprised they so readily and unanimously succumbed to the sentiment that the species was indigenous to America.

In 1788, as we are informed in the *Encyclopædia Britannica*, (art. Hessian fly, § 5,) the Duke of Dorset addressed a letter to the Royal Society of Agriculture in France, enquiring if the Hessian fly existed in that country. "The report of the society was accompanied with a drawing of two insects, one of which was supposed to be the caterpillar of the Hessian fly, from its attacking the wheat only when in the herb; beginning its ravages in autumn, reappearing in the spring, and undergoing the same metamorphoses." From an obscurity in the phraseology of the subsequent paragraph, and a reference therein to the memoirs of the Stockholm Academy, a doubt is excited, whether the society did not regard the Hessian fly as identical with the *Oscinis frit* (Linn.) Lat., which infests the ears of barley in Sweden, and consequently whether the French species was not the latter. But, as the society regarded their insect to be the Hessian fly, it is somewhat singular that its history was not investigated and distinctly recorded, before the announcement was so confidently put forth, that this species could not be found in Europe.

But, more recently, clearer evidence upon this point is furnished us. Mr. Herrick, in his valuable article in *Silliman's Journal*, (vol. xli., p. 154,) informs us, that Mr. J. D. Dana, who had been much associated with him in making a thorough investigation of the habits of the Hessian fly and its parasites, being on a voyage in the Mediterranean, "on the 13th of March, 1834, and subsequently, collected several larvæ and pupæ, from wheat plants growing in a field, on the Island of Minorca. From these pupæ, were evolved on the 16th of March, 1834, two individuals of an insect, which his recollections (aided by a drawing of the Hessian fly with which he was provided,) enabled him to pronounce to be the *Cecidomyia destructor*. More of the perfect insects were evolved in the course of the month, one of which deposited eggs like those of the Hessian fly. In letters, dated Mahon, April 8 and 21, Mr. D. sent me five of the insects, and several of the pupæ. They arrived in safety, and after a careful examination, I saw no good reason to doubt the identity of this insect with the Hessian fly. The Mahonese asserted that the insect had been there from time immemorial, and often did great damage both there and in Spain." And further, "on the 28th of April, 1834, Mr. D. collected from a wheat field just without the walls of Toulon, in France, several pupæ and one larvæ like those before obtained. On the 4th of June, 1834, he obtained similar pupæ from a wheat field near Naples." We doubt whether there was living, at that day, two persons better qualified to determine the identity of these insects with the Hessian fly, than Messrs. Herrick and Dana. Testimony from such a source needs no comment.

Finally, the year previous to that in which Mr. Dana made the above examination, it appears that the wheat crops in some parts of Germany, were seriously injured by an insect which was generally regarded as the Hessian fly. M. Köllar, of Vienna, in his treatise on injurious insects, (London, 1840, p. 119,) relates that in the autumn of 1843, complaints were made that the wheat on the estates of his imperial highness, the Archduke Charles, at Altenburg, in Hungary, had been considerably injured by an unknown insect, of which the following account was forwarded to the archducal office. "Till the end of May the wheat was in excellent condition, but about the commencement of June, the ears began to hang down, and the stem to bend, and in a few days patches appeared in different parts of the fields which were of rather poorer soil than the others, with the plants entangled and matted together, as though lodged by heavy rains. . . . . More than two-thirds of the straw was lodged in less than a week; and the heavy rains which fell in the latter half of June, so fully completed the work of destruction, that the wheat fields looked *as if herds of cattle had gone over them.* The cause of this damage was sought for, and we soon discovered at the crown of the root of each of the wheat plants, or at the first joint, within the sheath of the leaf, whole clusters of pupæ of an unknown insect. Those plants, the roots of which had been attacked, died off; and the spot to which the insects had fastened themselves on the still soft straw within the sheath of the leaf, was found to be brown, withered, and tough, yet *without any apparent wound.* The straw which had become lodged, produced small ears, with few and imperfect grains, which ripened with difficulty, and the straw was twisted, and of a very inferior quality."

Nearly a hundred miles south-west of Saxe-Altenburgh, a similar account is simultaneously given by Baron Von Meninger, agricultural director of the Duke of Saxe-Coburg. According to his report, "In the fields of Weikendorf, and other neighboring localities, caterpillars were found which had devastated whole fields. These caterpillars had their first abode near the ground, in the first joint of the straw, where they were found in whole families, in a sort of nest. The largest were about the length of two lines. Their color was pale green, with a small black dot above. . . . . The straw became dry at the first joint, and fell over or leaned on its neighbor. The upper part of the straw received its nourishment from the atmosphere alone, and the ears formed: but they continued in a sickly condition, and could only produce small, shrivelled grains. The life of the caterpillars (their duration as naked worms?) appeared to be from about twenty-four to thirty days. As the straw ripened, the insects changed their color into a brownish hue, shrivelled up, and finally disappeared."

M. Köllar, who seems to have known nothing of the American history of this insect beyond what he gathered from Mr. Say's brief account, obtained some of the diseased straw from Germany, in which, he says, "many of the brown pupæ were found. I opened the pupæ-case, and was able to determine with great probability, partly from the form of the pupæ, and partly from the unchanged caterpillar in the pupæ-case, that it must be a small fly. I only ascertained this from the minute description and drawing of the insect from Mr. Thomas Say, in a North American journal, in which a stem of wheat, with the pupæ within it, is exactly represented as I have seen our wheat.

Mr. Westwood, in a note appended to this account, says, it is perhaps questionable whether the species, of which the above details are given by M. Köllar, is identical with Say's *Cecidomyia destructor.* He even intimates a doubt whether the European species is a Cecidomyia, for, from all that had been observed, this genus in its pupæ state, is naked, like the other Tipulidæ, and not enclosed in a case. Having himself received specimens from Dr. Hammerschmidt of Vienna, and still in the straw near the roots, he found the insect "enclosed in a leathery case," on opening which, he discovered the *larva* shrivelled up and dead. Now this nice point, so particularly noted, and so strikingly showing the acuteness of discrimination possessed by that eminent naturalist, we think must dispel the last lingering doubt as to the identity of the American and European insects. As will fully appear in a subsequent part of this paper, the Hessian fly presents this singular anomaly, that its pupæ is coarctate, or enclosed in a case like those of the *other families* of dipterous insects, but *unlike* all the pupæ of the Cecidomyians and other Tipulidæ that have been hitherto observed! The very fact, therefore, which leads Mr. Westwood to suspect the European insect is not a Cecidomyia, all but demonstrates that *it is the Hessian fly!*

Its Introduction into America.

The existence of the Hessian fly in Europe being premised, so many circumstances conspire to render it probable that it was introduced into this country in the mode originally supposed, that scarcely a doubt can now be entertained upon this point.

When the habits and transformations of the insect itself are considered, it will be perceived that these interpose great obstacles to its being transported across the Atlantic, at a period when two months or more were required for the voyage. Its passing through two generations in a year, make its continuance in any one stage of its existence comparatively brief. The first of these generations occupies about seven months, from October to April inclusive. This generation is nurtured at the roots of the young plants, and there is no probability that any of these plants would be taken up, so that the insect could thus be conveyed away. The second generation is nurtured in the lower joints of the straw. The worm attains maturity in May, becomes a dormant "flax seed" in June, continues in this state till August, when the fly comes out to deposit its eggs in September. Though most of these flax seeds remain in the stubble when the grain is harvested, numbers of them are so high in the straw, as to be gathered with it. But they are so firmly imbedded in the straw, and enveloped within the sheathing base of the leaf, that it must be rare that any of them are detached by the flail in threshing, so as to find their way among the grain, and thus with it be carried to a distance. As the flax seeds moreover, evolve the perfect insect in August, it must be equally rare that a solitary fly comes from the straw after that date. These facts clearly show that there is *but one mode*, and *but one month in the year*, in which this insect could probably have been conveyed to this country at that time, to wit, *in straw* landed upon our coast *in August*. If landed at a later date, the flies would have completed their transformations, and made their escape, or perished in their confinement; if earlier, there is no probability that the straw could have been of the growth of that year, consequently it would have contained no live insects. Our present knowledge of the habits of this insect thus affords us a singularly accurate test, for ascertaining the truth of the original theory respecting the mode in which it was introduced.

And how do the facts furnished us by the military history of those times, accord with what we have seen to be almost essential contingencies to the importation of this insect? Early in July of the year 1776, General Sir William Howe arrived on the New York coast from Halifax, with the troops which had evacuated Boston, and debarked upon that part of Staten Island which lies within the Narrows—one of the reasons which induced him to make this part of the continent the central point of his operations being, that "Long Island was very fertile in wheat and all other corns, and was deemed almost equal alone to the maintenance of an army." (*Bisset's Hist. Geo. III.*) We are informed in *Marshal's Life of Washington*, (vol. ii., p. 424,) under the date of *August*, 1776, that "the reinforcements to the British army were *now* arriving daily from Europe." Lord Howe's strength was hereby augmented to twenty-four thousand men, about half of whom (as is probable from the statement, page 416,) were newly arrived "Hessians and Waldeckers." The most of these were from Hesse Cassel, a district but about a hundred miles distant from Saxe-Coburg and Saxe-Altenburg, where, as we have already seen, the same insect did much damage to the wheat crops in 1833. And again, under the date of August 25, (p. 437,) it is stated, that "*on this day*, General De Heister landed with two brigades of Hessians. The next day he took post at Flatbush," on Long Island, about six miles distant from the main encampment on Staten Island.

In juxtaposition with this account, let us now place the statement of one, who, Sir John Temple, the British Consul General at New York tells us, "had been more curious with respect to this insect, than any other person with whom he was acquainted." Says Col. Morgan, (*Encyc. Britan.*) "the Hessian fly was first introduced into America, by means of some straw made use of in package, or otherwise, landed on Long Island, at an early period of the late war; and its first appearance was in the neighborhood of Sir William Howe's debarkation, and at Flatbush." So many circumstances concur to evince the truth of the account here given by Col. Morgan, to its very letter, that we think no one will hereafter hesitate to give it full evidence.

We have searched in vain for the date of the embarkation of the Hessian troops, or the number of days occupied by them in crossing the ocean. It is possible they may all have left Europe anterior to the harvest. But in Germany, as in this country, as is shown by M. Köllar's statement, the infested straw becomes broken and tangled, and turns yellow, early in June. Had a company of soldiers needed straw for package, no objections would have been made to their going into a field of this kind, and with a scythe, gathering what they required, weeks before the usual time of harvest.

We have nowhere met with but one statement, which goes directly to prove that this insect is indigenous to this country, or existed here anterior to the arrival of the Hessian troops. The late Judge Hickock of Lansingburgh, N. Y., in a communication to the Board of Agriculture in the year 1823, and published in the memoirs, (vol. ii., page 169,) says, "a respectable and observing farmer of this town, Col. James Brookins, has informed me, that on his first hearing of the alarm on Long Island, in the year 1786, (doubtless, 1776 is intended,) and many years before its ravages were complained of in this part of the country, he detected the same insect, upon examining the wheat growing on his farm in his town." If this insect, observed by Col. Brookins in 1776, was the genuine *destructor*, it is a little singular that to betray its real character, it patiently awaited some fourteen years, to be reinforced by its kindred from Long Island, who reached it by regular advances made year after year—that on their arrival, and not till then, it acquired the skill and courage to go forth and lay waste the crops through all this section of country for several successive years. The strong probability is, that it was some other insect which was found by Col. Brookins.

Its Civil History and Bibliography.

We now proceed to adduce such facts as we have been able to collect, respecting the devastations of this insect in different years, or in other words, to trace out with as much precision as the data before us will enable us to do, its civil history, from the period of its first appearance, down to the present time; and in connection with this, to notice the different memoirs and other papers of value that have been published respecting it, so far as we have had an opportunity of becoming acquainted with them.

Anterior to the revolutionary war, the Hessian fly was unknown in this country. No allusion to an insect of this kind has been found in any American work, or in the journal of any foreign traveler, nor since its appearance has it been intimated that any of our citizens had ever observed it previous to that time.

All accounts concur in stating that its first appearance was upon Staten Island, and the west end of Long Island. There is some discrepancy between different writers, as to the particular year in which it was first observed. Dr. Mitchell states (*Encyc. Britan.*) that "it was first discovered in the year 1776." The ravages of the insect, however, are so much more conspicuous and liable to attract attention from the broken and tangled condition of the straw as it approaches maturity in June, than they are when a portion of the young shoots are discolored and withered in October, that there can be little doubt but it would first be observed at the former period. Had Dr. Mitchell, therefore, received definite information upon this point, it would doubtless have been coupled with the statement, that it was noticed at or before the harvest in that year, and consequently anterior to the arrival of the Hessian troops—which fact, he, confident as he was that this was an indigenous insect, would not have failed triumphantly to have stated. It is hence believed, that Dr. M. has assumed this date, from the current report that this insect was introduced by the Hessian soldiers, knowing this to have been the year of their arrival.

From the "flax seeds" casually lodged in the imported straw, only a few flies would probably be evolved, to deposit their eggs upon the young wheat in the autumn of 1776; nor would these have multiplied to such an extent in the following spring as to attract attention at the time of harvest. But, increasing with each successive brood, by the harvest of the following year, 1778, we might anticipate its being observed, and by a year thereafter, it would become so numerous, that its real character would no longer be in doubt. And in accordance with this, we are informed by Colonel Morgan, that "the fly made its first appearance in 1778:" and Mr. Clark, who in 1787 went to Long Island expressly to gather authentic information respecting this insect, says in his report, "on the best enquiry I could make, during my stay there, I satisfied myself in the following particulars, namely; first, that the Hessian fly made its first appearance there about the year 1779, so as to injure, and in some cases to destroy their crops of wheat." An anonymous writer in *Carey's Museum*, (vol. i., p. 143,) gives the same year as about the period of its discovery.

We therefore regard the year 1779 as most probably the date when its ravages actually commenced. The crops of wheat were severely injured or wholly destroyed by it in King's and Richmond counties, during several of the following years; and each succeeding generation regularly enlarged the sphere of its devastations in every direction.

Quite early in its history, the important fact became accidentally discovered, that certain varieties of wheat are capable of withstanding its attacks. In the year 1781, a prize schooner loaded with wheat, was taken in the Delaware river, and carried into New York, whence the cargo was sent to the mill of Isaac Underhill, near Flushing, Long Island, to be ground. Mr. Underhill's own crop of the previous year having been so entirely destroyed that he had no grain for seed, he took what he required for sowing from this cargo, and reaped therefrom upwards of twenty bushels per acre, whilst few of his neighbors for miles around had any to reap, so calamitous were the operations of the fly. To his praise be it recorded, he distributed his entire crop, in small quantities, and at a moderate price, among his neighbors, for seed; and all who made use of it were similarly successful. The "Underhill wheat" at once became noted, for effectually resisting the attacks of the fly, and for many years subsequently, as we shall have frequent occasion to notice, was eagerly sought for and successfully cultivated, where all other varieties of this grain failed. (*Vaux and Jacobs, Clark.*)

In 1786, the fly first reached Col. Morgan's farm, at Prospect, New Jersey, about forty miles south-west of Staten Island. It was first observed in May, and by October was so increased, that some farmers in Middlesex, Somerset, and Monmouth counties were induced to plow up their young wheat and sow the fields to rye. Other fields, less injured, were allowed to remain until the succeeding spring, when their appearance was so disheartening, that many of them were plowed up and sowed with spring grain.

Eastward its progress would appear to have been much more rapid than towards the west and south, for this same year it had reached a hundred miles, nearly to the east end of Long Island, and was detected on Shelter Island. "It was first perceived a little before the harvest, and appeared to have come from the west end of Long Island, in a gradual progress of between twenty and thirty miles in a year. Before the harvest the species appeared to be few in number, but in the fall it was found to have greatly increased, and appeared in great numbers on the green wheat, and was observed to do most injury to that which had been most early sown." (*Havens*, p. 71.)

Public attention was now becoming strongly directed towards this formidable foe. The New York Society for Promoting Useful Knowledge, issued an advertisement, requesting information respecting it. Two communications were soon received by them, and were directed to be inserted in the secular papers. These are the first published documents relating to the fly, that have occurred to our notice. They are copied into *Carey's American Museum* (Phila. vol. i., p. 324–326). One of them, dated New York, September 1, 1786, gives a brief but pretty accurate account of the situation and habits of the insect, particularly in the fall and spring. The other, dated Hunterdon, New Jersey, January 1, 1787, after hastily alluding to its habits, proposes as remedies, late sowing, on rich land; drawing elder bushes over the young plants; and passing over the wheat with a heavy roller to crush the worms.

In the *Pennsylvania Mercury* of June 8, 1787, is published a letter from Col. George Morgan, addressed to the Philadelphia society for promoting agriculture. He suggests the importance of their appointing some competent person to fully investigate the habits of the Hessian fly, and the remedies to protect from it, after the example of the Paris Academy of Sciences, which had commissioned Messrs. Duhamel and Tillet to enquire out the history of the Angoumois grain moth; he alludes to contradictory reports respecting the Underhill wheat, copies the paragrahs already given, from M. Châteauvieux, as "answering in every respect to our Hessian fly," and gives an account of the ravages of the insect in his vicinity, and its habits so far as observed.

The *Mercury* of September 14th, contains another letter from Col. Morgan, correcting some inaccuracies in his previous communication, and giving some additional interesting items. He says, "those who are doubtful whether the fly is in their neighborhood, or cannot find the eggs or nits in the wheat, may satisfy themselves by opening their windows at night, and burning a candle in the room. The fly will enter in proportion to their numbers abroad. The first night after the commencement of the wheat harvest this season, they filled my dining room in such numbers, as to be exceedingly troublesome in the eating and drinking vessels. Without exaggeration, I may say, that a glass tumbler, from which beer had been just drank at dinner, had five hundred flies in it, within a few minutes. The windows are filled with them when they desire to make their escape. They are very distinguishable from every other fly, by their (having) horns or whiskers."

Accompanying Col. Morgan's letter is a brief report, made by Thomas Clark, who, at the request of his neighbors had gone to Long Island, to gather correct information respecting the fly, and the means of escaping its depredations. He became well satisfied that the Underhill wheat was fly proof, and could be obtained in any desired quantities, at the moderate price of $1.25 per bushel. He also reports the interesting fact, that the fly had now become so reduced in its numbers on the west end of Long Island, that many of the inhabitants supposed there had been none the present year, though he himself saw it there quite common still. Since 1779 their crops had been destroyed more or less every year, until the present.

In 1788, a communication in *Carey's Museum* (vol. iv., p. 47), from Buck's county, Pa., informs us that in the vicinity of Trenton, N. J., so much as the seed sown would not be harvested. Many farmers had plowed up their wheat crops in the spring, and planted them with corn. The fly also in this year commenced its ravages in the state of Pennsylvania. "Near seed-time last year, many persons on the Pennsylvania shore saw the insect so thick in the air as to appear like a cloud, coming over Delaware river."

Following this communication, is a paper signed "a landholder," who regards the eggs as laid in the grains of ripe wheat, and sowed with them; and proposes procuring seed from places not infested with the fly, as a remedy.

Messrs. Vaux and Jacobs, farmers of Providence, Pa., in July, 1788, made a tour through New Jersey and Long Island, for the purpose of gathering information respecting the fly, and the best modes of withstanding its attack. Their account is published in the Pennsylvania Packet of August 21st, and is mainly occupied with a description of the Underhill wheat, and a full confirmation of previous reports respecting it.

On the east part of Long Island, where, as already noticed, the fly arrived in 1786, it so rapidly multiplied, that the following year many fields were nearly destroyed, and this year, the third of its presence, the wheat crop "was cut off almost universally." The red-bald, which was the common winter variety there raised, and the spring wheat, were equally affected. Rye in many fields was much injured, and a field of summer barley was wholly destroyed. (*Havens*, p. 73.)

Wheat in large quantities, was at this period exported hence to Great Britain. Accounts of the appaling havoc that this insect was making, excited the attention of the government there, and aroused their fears, lest so dreadful a scourge should be introduced into that country, by means of the American grain. "The Privy Council sat day after day, (says *Kirby and Spence*, vol. i., p. 50,) anxiously debating what measures should be adopted to ward off the danger of a calamity more to be dreaded, as they well knew, than the plague or pestilence; expresses were sent off in all directions to the officers of the customs at the outports, respecting the examination of cargoes; despatches written to the ambassadors in France, Austria, Prussia, and America, to gain that information, of the want of which they were now so sensible; and so important was the business deemed, that the minutes of the council, and the documents collated from, fill upwards of 200 octavo pages." In consequence of the information laid before them, a proclamation was issued by his Britannic majesty, on the 25th of June, 1788, prohibiting the entry of wheat, the growth of any of the territories of the United States, into any of the ports of Great Britain. It is very singular, that although the *entry* of American wheat was thus interdicted, it was still allowed to be *stored* at the different seaports, thus affording the obnoxious insects, if any of them had been contained in the grain, a very convenient opportunity to escape and make their way into the country!

When the news of the closing of the British ports against American wheat reached this country, the measure was at once regarded as having resulted from misinformation respecting the habits of this insect. The supreme executive council of Pennsylvania immediately addressed a letter to the Philadelphia Society for Promoting Agriculture, requesting the society to investigate and report to the council the nature of the Hessian fly, and particularly whether the quality of the grain is affected by it. The society promptly replied, "that from every communication made to them on that subject, they are decidedly of opinion that it is the plant of the wheat alone, that is injured by this destructive insect, that what grain happens to be produced from such plants, is sound and good, and that this insect is not propagated by sowing wheat which grew on fields infected with it." They also refer to the letters of Col. Morgan, and of Messrs. Vaux and Jacobs, as containing the best information extant, relative to the natural history of the insect, and the most successful method of preventing its depredations. (*Carey's Museum*, vol. iv., p. 244.)

Dr. Currie took an active part in showing the government and people of England, that the information which had led to the closing of the ports against the entry of American grain, was wholly erroneous; and in eight or ten months the government bought the stored wheat at prime cost, kiln-dried it, and resold it at great loss. The prohibition was taken off almost immediately thereafter. (*Memoir of Currie*, ii., 65.)

The Hessian fly "reached Saratoga, two hundred miles (north) from their original station, in 1789," says Dr. Harris, though on what authority is not stated. Of its correctness, however, there is no doubt. From the statements of several persons who were residing in Washington and Saratoga counties so long ago as this date, it appears that the crops in this district of country, (at that day second to no other in the quantity of wheat which it produced,) first began to fail about the year 1790 or 1791. The insect reached here by a regular progress from the south, coming nearer and nearer each successive year. It continued to infest the crops during a number of the following years, sometimes severely, at others but moderately. On two or three occasions, many of the fields in Saratoga county were entirely destroyed. I do not learn that in this vicinity their devastations at any time reached this extent. About the year 1803, their last depredations were committed. From that time this insect has never been observed in this vicinity, that I can ascertain, until the autumn of last year.

In 1792, the recently instituted New York Society for the Promotion of Agriculture, Arts, and Manufactures, issued part first of their *Transactions*, containing (p. 71–86), "Observations on the Hesssian Fly, by Jonathan N. Havens." This is the most valuable memoir that had hitherto appeared upon this subject, and few of those of a later date surpass it. After sketching the ravages of the fly in different years in his own vicinity, Judge H. describes with much precision its situation and appearance in the respective stages of its existence, showing that it passes regularly through but two generations in a year, instead of three or four, as anterior writers had stated. As remedies, he recommends sowing none but the bearded wheats, and burning or plowing up the stubble soon after harvest. This last important measure had never before been proposed; Judge H. had been led directly to it, by his close investigations of the habits of this insect.

The American Philosophical Society this year appointed from among its most competent members, a committee (Thomas Jefferson, B. Smith Barton, James Hutchinson, and Casper Wistar), "for the purpose of collecting and communicating to the society materials for forming the natural history of the Hessian fly." This committee immediately issued a circular, requesting all persons acquainted with any facts relating to this insect, its depredations, and preventives, to communicate the same by letter to their chairman. The numerous points upon which information was desired, were particularly detailed in an extended series of questions, which clearly indicate the importance which they attached to this subject, and the thorough investigation which they purposed making. It cannot but be regretted that this business, committed to such capable hands, was not pursued and brought to a close with the same zeal with which it was evidently commenced. We have met with no report ever rendered by them. (*Carey's Museum*, vol. xi., p. 285.)

At this time, as we infer from a clause in the circular just alluded to, and also from some passages in Dr. Mitchell's address before the New York society of agriculture; (Transactions, vol. i., p. 32,) the insect was becoming so rare in all the more densely settled parts of the middle states, which had been first overspread by it, that it was the common opinion that it would soon vanish from the country entirely. Notices of it in the magazines and newspapers become more rare, and it was evidently ceasing to be regarded with that intense solicitude which it had hitherto excited. It was, however, with unabated vigor, continuing its progress southward. A letter from Prospect Hill, Delaware, dated June 12th, 1792, (*Carey's Museum*, vol. xi., p. 301,) states that the fly arrived there " in prodigious clouds," about the middle of the preceding September. It describes the place where the eggs were deposited on the young wheat, the growth of the worm, and the perishing of all the plants, except those growing upon a rich soil, and adds further testimony in favor of the Underhill wheat.

In 1797, Dr. Isaac Chapman, of Bucks county, Pa., prepared one of the best accounts of this species that has ever appeared, containing the details of his own careful observations upon the insect and the time of its appearance in its different stages. These observations lead him to recommend as the most certain safeguards against the fall attack, late sowing, and against the spring attack, a quick vigorous growth, to be obtained by procuring southern seed and sowing it on a rich, elevated and dry soil. His paper is published in the fifth volume of the *Memoirs of the Philadelphia Society for Promoting Agriculture*, a volume which we regret having been unable to find in either of the largest libraries of this state. We are therefore obliged to depend for its contents upon second hand accounts. Dr. C. states that the fly was this year found upon the west side of the Alleghany mountains.

The eighth volume of the *Encyclopedia Britannica*, published this year, gives (pages 489–495) an extended article under the head *Hessian Fly*, consisting chiefly of a summary of the several documents laid before the privy council during their investigations.

In Dr. B. S. Barton's *Fragments of the Natural History of Pennsylvania*, issued in 1799, the author announces (p. 23) his intention of publishing " a memoir upon that destructive insect called the Hessian fly." It is probable that whatever communications were addressed to the committee of the Philosophical society, had been consigned to his hands. We are not aware that the promised memoir ever appeared.

"About the year 1801, the Hessian flies first made their appearance in the neighborhood of the city of Richmond. We saw but little mischief that year. But in 1802 they were much more destructive—1803, they swept whole fields—about the same in 1804." (*H. M'Clelland, Amer. Farmer*, vol. ii. p. 234.)

In the year 1803, we arrive at the first notice of this species, of a scientific nature. Dr. Mitchell, in a short article in the *Medical Repository* (vol. vii., p. 97, 98), entitled " Further ravages of the wheat insect, or *Tipula tritici of America*, and of another species of Tipula in Europe," states that it is now understood that our insect is a Tipula. He alludes to the extent of this genus, (ninety-four species being enumerated by Weber,) and though he has often examined our insect, and bred it so as to observe its transformations, he declines giving a decided opinion whether or not our species is different from all those that had been described. He refers to the species " treated as a nondescript" by the Rev. Mr. Kirby, in the *Linnean Transactions*, copies its name and technical characters, and closes with the remark, that whether Mr. Kirby's insect is a new one or not, it is not the same animal which has been so injurious in this country. Had the doctor but added a few words descriptive of our species, he would undoubtedly be entitled to " the barren honors of a synonym." Respecting the depredations of the insect at this time, we learn from him, that " during the cold and dry spring of 1803 these creatures again infested the wheat more than they had done for many years. Many crops were cut off early in June, and the ground plowed up for other purposes."

During a long interval we meet with no further notices of this species. Its depredations would appear to have been so slight, and public attention was so much engrossed with other affairs, that nothing, as we have discovered, is recorded of it.

At length, in 1817, it is stated to have renewed its ravages in various sections of the country. In the neighborhood of New York and of Philadelphia, it is evident that it was unusually abundant, and in parts of Maryland and Virginia, it was perhaps more destructive than it had ever been before.

It was on the 24th of June in this year, that Mr. Say read before the Philadelphia Academy of Natural Sciences a paper entitled "Some account of the insect known by the name of Hessian fly, and of a parasitic insect that feeds on it." This contains an accurate technical description of the insect, on which he bestows the name *Cecidomyia destructor*, and also of its most common parasite, referred by him to the genus *Ceraphron*, and also named *destructor*. This paper was published in the *Journal of the Academy* (vol. i., p. 45–48), issued in the course of the ensuing month, and was followed in August by a copperplate illustration of these insects, drawn and engraved by Mr. C. A. Le Sueur. "A local habitation and a name" were thus conferred upon this world-renowned species, by which it has ever since been definitely specified and arranged in works of science.

In the *American Monthly Magazine and Critical Review* for August, 1817, (New York, vol i., p. 275–279,) appeared a paper bearing the title, "An account of the wheat insect of America, or the *Tipula vaginalis tritici*, commonly called the Hessian fly." This paper gives the substance of Judge Havens's memoir, and professes to copy a technical name and description which had been published by Dr. Mitchell in the *New York Gazette* of July 3d. But whoever refers to the *New York Gazette*, will find no attempt at a technical description, nor no name except that of *Tipula tritici*, which is in one instance, casually as it were, made use of. The word *vaginalis* is therefore an interpolation of the writer in the *Magazine;* and as he, at least on some subsequent occasions, refrained from bringing this name farther into notice, when a fair opportunity was presented him for doing so (as editor of *Hooper's Medical Dictionary*, &c.) we doubt not, when the excitement of the day was past, he deeply regretted that he had ever drawn up an article so derogatory to himself as that which appears in the *Magazine*. We should therefore suppress all allusion to this subject, with the hope that it might pass wholly into oblivion, but that the article from the *Magazine* has of late years been copied into some of our agricultural journals, and has been referred to in terms of commendation by some names of respectability. With the currency thus unfortunately given to it, it will be read by hundreds who can never see the *New York Gazette*, and who will thus deem that one of our most distinguished savans had degraded himself by a paltry attempt to forestall Mr. Say in giving to this species a technical name.

Gen. John H. Cocke this year communicated his observations to the Albemarle Agricultural Society of Virginia. Having well ascertained that the fly deposits its eggs upon the blades of the wheat, at from a half to three inches from the central stalk, and that these remain there four or five days before they hatch, he recommends feeding off the crop, by pasturing sheep upon it; thus destroying the eggs, and depriving the fly of its wonted place for depositing them. "A King William Farmer" dissents from this advice, and thinks covering the seed to the depth of three inches the best safeguard against the fly. "A Frederick County Farmer" and Dr. Merriwether oppose this, and a controversy ensues, reaching through several communications in the *Richmond Enquirer* and *National Intelligencer*, and afterwards continued in the *American Farmer*, till in 1820 it was brought to a close by a valuable article from that distinguished agriculturist, the late James M. Garnett, (*American Farmer*, vol. ii., p. 174,) accompanied by an illustration, clearly demonstrating the correctness of the statements first put forth by the King William Farmer. The facts thus elicited will be more fully considered in a subsequent part of this essay.

In 1820, Edward Tilghman, of Maryland, described (*American Farmer*, ii., 235) the place and mode of deposition of the eggs, he having in numerous instances watched the fly in the very act of ovipositing. At a later day Mr. T. has favored the public with a more full and exact description of this process. (*Cultivator*, viii., p. 82.) James Worth of Pennsylvania, also in 1820 minutely described from his personal observations, the situation of the egg, its hatching, and the journey of the worm down the leaf to its usual nidus. (*American Farmer*, ii., 180.)

In the second volume of the *Memoirs of the New York Board of Agriculture*, issued in 1823, is a communication (p. 169–171) on the Hessian fly, from Judge Hickock, who deems a fertile soil the best safeguard. In the third volume of the same work, published in 1826, (p. 326–338,) is a paper by the indefatigable secretary of the board, the late Judge Buel, giving a condensed summary of all the information respecting this insect, contained in the accounts of Judge Havens, Dr. Chapman, and the different writers in the *American Farmer*.

In 1840, Miss Margaretta H. Morris, of Germantown, Pa., in a communication to the American Philosophical Society, revives the theory of "a landholder," already noticed, that the egg of the fly is deposited in the grain, and that obtaining seed from uninfected districts will therefore be the best safeguard. The report of the committee upon this paper, is inserted in the society's *proceedings* of November, 1840, and the paper itself is published in the society's *Transactions* (vol. viii., p. 49–51). Communications bearing upon the same subject were also made to the Academy of Natural Sciences, in 1841, by Dr. B. H. Coates. (*Proceedings Acad.*, vol. i., p. 45, 54 and 57.)

In 1841, Mr. E. C. Herrick, librarian of Yale College, gives "a brief, preliminary account of the Hessian fly, and its parasites," in *Silliman's Journal of Science* (vol. xli., p. 153–158). This paper announces the interesting fact of Mr. Dana's having met with apparently the same insect on the shores of the Mediterranean, details the writer's own accurate observations of the changes from the egg to the flax seed state, and enumerates four different parasitic insects that prey upon it during these periods of its existence, by which "probably more than nine-tenths of every generation of the Hessian fly is destroyed." Another valuable paper from Mr. Herrick appears in the *report of the Commissioner of Patents* for the year 1844, (p. 161–167,) giving a most exact and particular history of the transformations of this insect, and a summary view of the various remedial measures that have been proposed. Both of these papers evince the close and patient investigation which the writer had made, and the utmost carefulness in announcing nothing beyond what he had clearly ascertained.

Dr. T. W. Harris's invaluable "report on the insects of Massachusetts injurious to vegetation" was also completed in 1841. An excellent summary of all the leading facts pertaining to the history of this species, is given in this work (p. 421–433,) and its generic place, upon which point Mr. Herrick, Latreille and others had intimated doubts, is correctly settled.

The numerous agricultural periodicals of our country, abound with notices of this insect, more or less extended and valuable. To specify these notices in detail, at least as respects some of these periodicals, would require a reference to almost every number issued. Wherever important facts are derived from these sources, in the course of this essay, they are accompanied by a particular acknowledgement in each instance: an additional reference in this place, is therefore deemed unnecessary.

We close this section of our subject, with a condensed view of the depredations of this insect in the different parts of our country, during a few of the past years; the materials for which, are furnished us, in those valuable documents, the yearly reports of the Commissioner of Patents.

In the year 1842, the ravages of the Hessian fly would appear to have been quite limited. Pennsylvania suffered the most severely. The wheat crop in this state is estimated to have been twenty per cent less than it was the preceding year, and of four different causes that produced this diminution, the fly is placed first. Some parts of Maryland, and also of Ohio, were visited by it. In the latter state, it appeared to be increasing so much, that serious apprehensions were beginning to be felt respecting its future ravages.

In 1843, it was so abundant in western Pennsylvania in June, that it was thought it would diminish the crop twenty-five per cent. Through Maryland, and the great wheat-growing valley of Virginia, it was noticed at the same time as committing great havoc in many fields, and threatening a very decided failure in the crop: at harvest, however, the yield was found to be much better than was anticipated. In Ohio it was less injurious than in the preceding year. Upon some parts of Long Island it was observed, but in limited numbers.

In 1844 it seems to have been much more destructive than in either of the pereceding years, and to have made its appearance prominently in some districts where it had been unobserved before. Thus, through all the northern parts of Indiana and Illinois, and the contiguous parts of Michigan and Wisconsin, it did much injury, and in many places occasioned almost a total failure of the crops. Near Goshen, Ia., a person writes, the fly is taking the wheat here at a dreadful rate, destroying some pieces entirely: some fields have been plowed up, and corn planted therein. The *Prairie Farmer* states that the wheat crop has suffered severely in various sections by the fly. In Will county, Ill., says the *Chicago Journal*, several entire fields of both winter and spring wheat have been destroyed by the Hessian fly. In Michigan also, it is reported to have made sad havoc, particularly in light sandy soils. From different places in this state, we are told as follows: "In some cases the injury was so severe, that the farmers had to plow up their fields and sow them over again." "There is not more than one-fourth of the surplus of 1843, owing to the wet season and the ravages of the fly." "The wheat crop is almost an entire failure. The insects took it last fall, and the rust in the spring, and then again the insects a second time." It is also stated that the same enemy had made its appearance in great force at the close of the season, in the early fall sown wheat. From different parts of Ohio, the crop was reported in May and June to be suffering considerably from the ravages of the fly. In the vicinity of Masillon it had never been so destructive before, whole fields being entirely destroyed. In the neighborhood of Rochester, N.

Y., also, the fields suffered some, particularly those having a sandy soil, and that were early sown. On the west end of Long Island, its ravages were also bad, many farmers not having more than half a crop. Both in the eastern and western sections of Pennsylvania, the fly lessened the produce of this year. In Bucks county it was particularly destructive. One person states, in the month of June, that where he had expected to gather 1,200 bushels or more, he could not now hope for 300. Though it is noticed on both shores of the state of Maryland, the injury done by it here appears to have been but slight.

In 1845, through those districts of Michigan, Indiana, and Illinois, where it committed such havoc the last year, it is said by different persons to have wholly disappeared. The *Prairie Farmer* however, states that it was still present, doing more or less injury all over the state of Illinois. Ohio sustained but little injury. It is not noticed north of Maryland, in the central parts of which state it is reported that on nearly all the light lands the Hessian fly made serious ravages, and in many instances rendered the crops totally worthless. In Georgia, moreover, its ravages in the counties around Milledgeville are said to have been dreadful: whole fields were totally destroyed, and others yielded not more than a fourth of an ordinary crop.

We regret that we have not at hand the requisite information, for tracing with equal precision the ravages of this insect during the present year. From such notices as we have casually observed in the public papers, we presume that through the country generally, it has been unusually numerous. In this vicinity, some fields have produced less than a fourth of what they would have done, but for the invasion of the fly last autumn, after an absence of over forty years, and its great increase in the spring. On sandy soils in Saratoga and the north-west parts of Rensselaer counties, several fields were observed early in July with the wheat stalks so "few and far between," that no harvesting of them would be attempted; whilst many others had been, at an earlier period of the season, plowed up and occupied with spring crops. In the western section of the state, it has also been quite destructive. The loss from the fly alone, says the *Genesee Farmer*, (vol. vii., p. 251,) will doubtless be at least 500,000 bushels. In those districts of Illinois, Wisconsin, and Iowa, which are contiguous to the Mississippi river, it appears to have been common, and also in eastern Pennsylvania. From a minute in the proceedings of the trustees of the Maryland Agricultural Society, we learn that "so great ravages have not been committed by the Hessian fly, since 1817. On some of the best land wheat has been plowed up, and other portions are so much injured, that they will not be worth harvesting. At least one-half of the crop of Talbot county has been destroyed." And in the upper counties of Georgia, it is said, "the fly has committed such ravages upon the wheat, as scarcely to leave enough seed for another year."

Its Name and Synonyms.

It is a somewhat trite but very true adage, that "names are things." Every one who has had occasion to search through files of our agricultural journals for information respecting any particular insect or other malady to which our crops or herds are subject, well knows what doubt and perplexity is often occasioned from having two or more names used by different writers for the same thing, and also from having two or more distinct things designated by the same name. To illustrate this, let us refer to the *Patent Office Report* for 1844, p. 26, where, in thirteen consecutive lines, we read as follows: "Near Onondaga county the wheat is said to be injured by the *grain worm*. . . . . In Schoharie we find complaints of the *weevil*. . . . . In Schenectady county the ravages of the *fly* were great. . . . . In parts of Columbia county it suffered from the *maggot*. . . . . In Dutchess a yellow *worm in the head* destroyed it." Of a truth, "what a host of enemies!" By way of climax, we only require some wiseacre who has never seen the insect or lived within a hundred miles of it, to say, "Good people, you are all wrong; *wheat worms* is the correct name for your insect"—and we are furnished with a tolerably complete list of the popular synonyms of the *Cecidomyia tritici!* But who, not intimately conversant with its American history, would suspect this single species of being designated by such a profusion of terms. Who, on reading the page referred to, of the *Patent Office Report*, (and it is a correct transcript of the very words which are in popular use,) but would receive its statements as conclusive evidence that we had in eastern New York at least four or five kinds of destructive insects preying upon our wheat crops. Such mistakes are the inevitable results of a diversity of names. So important therefore do we deem this topic, that we are induced to assign to it a distinct head.

It is very fortunate that no confusion of the kind just alluded to, has ever existed with reference to the species under consideration. Its popular name, *Hessian fly*, was first bestowed upon it by Colonel Morgan, soon after its appearance on Long Island. Some two or three of the earliest writers allude to it by the names of *Hessian bug*, and *Hessian insect*, but these designations were speedily dropped, and Hessian fly became universally the only name by which it was definitely distinguished, not only in this country, but in all parts of the world where the English language was spoken. Even when it was by every one deemed to be a native insect, and the epithet *Hessian* was therefore remarked by different writers as most inappropriate, still it was in such universal use, that no one had the presumption to propose a different name. Certainly, then, at the present day, when scarcely a doubt can be entertained but that it is a Hessian species, any attempt to foist upon it a new popular name, must prove signally unsuccessful.

But, Mr. M. B. Bateham, editor of the *Genesee Farmer* in 1843, and subsequently of the *Ohio Cultivator*, bestows upon this species the name of "wheat-fly."* If love of novelty, or fondness for innovation, prompted this gentleman to discard a name which all the rest of the world had concurred in, he could not possibly

* We have been informed, by different persons, who are or have been residents of western New York and Ohio, that in familiar conversation in those districts, the species under consideration is alluded to simply as "the fly." If any epithet is prefixed to this, it is always the word "Hessian;" they recollect in no instance to have heard it called the "wheat-fly."

have been more unfortunate in his selection of a new one — the name *wheat-fly* having been at least fourteen years previously appropriated to a different insect, by Messrs. Loudon, Gorrie, Shirreff, and several other writers in the British periodicals; having been used by the compilers of popular treatises on insects, one of which, republished in this country, has been for several years past circulating in almost every school district of this state (*Harper's Family and School Library*, Insects, vol. ii., p. 226–228); and having, moreover, been adopted for the same insect in this country, to omit names of less note, by Dr. Harris, in his *Report* — a work so superior to any similar treatise that has ever appeared, and embodying such a large amount of most valuable information upon the injurious insects of this country, that it must long remain a standard authority upon all matters of this kind.* With such wide currency to the name wheat-fly, what must community think the extent of the reading of that man to be, who adventures to proclaim that this name belongs to the *Cecidomyia destructor*, NOT to the *Cecidomyia tritici!* It could scarcely excite more surprise if he was to inform us that his orthography of the specific name *tritica* was correct, and that we were wrong in writing it *tritici.*

Mr. B.'s successor in the editorial chair of the *Genesee Farmer*,

* We may here state some additional reasons which induced us in our former essay, to adopt the name "wheat-fly" in preference to that of "wheat-midge," the name by which the *C. tritici* has been designated by Mr. Curtis and some other recent writers.

1. The insect itself, is, next after the wholly inappropriate name of "weevil," most commonly called "the fly," we believe, in all those districts where it is most abundant and has been longest known. It is never called "the midge." Why, then, should we speak one common name, and write another; or have in print as the common name, what we well know *is not* the common name.

2. No other insect in the world has a trivial name better established than the Hessian fly. Both it and the *C. tritici* will undoubtedly continue to be common insects in this country, and very frequently spoken of. If one is called the Hessian *fly*, and the other the wheat-*midge*, every person not well acquainted with this subject, will imbibe the idea that they are very different insects, their names being so dissimilar; whereas, they are most closely allied to each other.

3. It has often been remarked as a great desideratum, that the technical and common names of species in natural history, should correspond with each

we perceive is partially inclined to "follow in the footsteps—" &c. In his volume of the present year, (p. 152,) the subjoined paragraph occurs. "In the *Farmer's Dictionary*, it is recommended "to seed early," as a preventive against injury from the wheat-fly." Far be it from us to accuse our esteemed friend of misquoting his author. But if he will look again into the work alluded to, he will read under the title, "*wheat midge* or *fly*," that "early or late sowing will do little towards saving a crop;" whilst under the name "*Hessian fly*, occurs the unquestionably bad advice to "sow early."

The scientific name, *Cecidomyia destructor*, bestowed upon this species by Mr. Say, is the only one belonging to it, neither the name *Tipula tritici*, nor *Tipula vaginalis tritici* having any legitimate claims to be retained as synonyms. Mr. Say's name might at first view be thought liable to criticism, as being in no wise distinctive, many other species of Cecidomyians being also *destroyers*. Yet this species is so preëminent in that particular, as to throw the injuries inflicted by each of the others quite in the back ground. We hence think it will be conceded that the name is signally appropriate. Placed beside it, all its kindred are mere depredators—this alone is THE *destroyer*.

other; or, in other words, that the common names should in all cases where practicable, be translations of the technical names. *Cecidomyia tritici*, literally rendered in English, is *gall-fly of the wheat;* but inasmuch as this species does not produce galls, there is an obvious impropriety in retaining that word. *Wheat-fly* thus becomes the most direct translation of the technical name, that the habits of the insect admit of. No one will maintain that wheat-*midge* is a translation.

But, inasmuch as the name *fly* is bestowed upon such a vast host of insects, of different families, and even different orders, we by no means disapprove of the attempt of recent English writers to bring the word *midge* into current use, as a generic or family term for all the minute species of Tipulidæ.

NEW PUBLICATIONS.

THE AMERICAN HERD BOOK,

Containing Pedigrees of Short Horned Cattle, to which is prefixed a Concise History of English and American Short Horns. Compiled from the best authorities, by Lewis F. Allen. *Buffalo, press of Jewett Thomas & Co.* 1846, pp. 240.

This is the first American herd book which has been published, and if books are commendable in proportion to their usefulness, over and above all the entertainment they give, this certainly merits a high eulogium. Breeders are not only benefitted by it, but the whole community. The number of cattle will not probably be increased by a herd book, but a better kind will take the place of the poorer, the benefits of which extend to all who consume milk, butter, cheese, or beef.

We might say many things in commendation of this work. We shall, however, be content with saying a few; for those who know the author, know also that he was fully competent to prepare this work, and make it what is essential to its usefulness, an impartial and faithful history of this breed of cattle in this country. The time had come when a herd book should be made; it could not be delayed much longer without detriment to this interest, and very few men in this country were qualified for this task, and to perform this no one would unless he was an enthusiastic admirer of this kind of stock, for the task would be a dry one as any one could see before hand. We believe therefore, that Mr. Allen undertook the work from a conviction of its want, and was urged on to it by an inherent love for the cattle. A spice of enthusiasm runs through all its pages, without which no one can perform a task creditably and usefully. It contains much interesting history, and matter useful to any one who has spirit enough to keep a cow of any breed; and the bare pictures of the animals will be worth the cost of the book to any one who wishes to study the good points of an animal. We really hope the work finds as good a market as it deserves.

THE TREES OF AMERICA,

Native and Foreign, Pictorially and Botanically delineated, and Scientifically and Popularly described, etc.; illustrated by numerous engravings. By D. I. Browne, *author of the Sylvia of America. New York, Harper & Brothers,* 1846; *large* 8*vo. pp.* 520.

This department of botany has not been cultivated in this country so much es it deserves. Interesting as a study, and useful in many respeets to all classes of men, it has notwithstanding been neglected. Even the humble and less useful plants are much better known, as they are more generally studied. The cariees, a eoarse family of grasses, which can neither be used for warming oneself, nor to satisfy the calls of the stomach, nor to adorn a door-yard, have been more talked about, and even studied, than our oaks and pines. We do not know how this neglect has happened. Our ships are eut from the forest; the materials of our dwellings were onee stately trees; the comforts of the fireside would be unknown without wood; the chairs upon which we rest, together with the tables and furniture of our rooms, are made from some of our fine native trees. Still many are ignorant of the species of trees to which they are indebted for so many comforts. The subject reminds us of an anecdote of a clever Scotchman who went to get a set of curly maple chairs made from timber of his own raising, but finding his maples were not of the right sort, deelared he should have to eut one of his *Loombardy poplars* for his chairs. So we think that many persons politically and religiously intelligent, would be as likely to cut a Lombardy poplar for chair timber as any other tree on their premises.

However this may be, there is a want of information on the forest and fruit trees. Some excuse may have been made on the ground that a good treatise, one adapted to popular use, was wanting. It is true that information has not been accessible till now. The work of Micheaux is expensive, and never was intended for a work for the people, and has never circulated in this country. Mr. Brown's *Silvia Americana* we believe has not circulated very extensively, and because a taste for the study of trees has not been cultivated. Loudon's *Arboretum Britannicum* is also a large expensive work, which is rarely found in this country, except in public libraries. Mr. Brown's work takes away all excuse for ignorance of our forest and fruit trees. It is a cheap book for the information it contains, and moreover it is well executed by the Harpers; the form, paper, and other points essential to a good book, are found in this volume. The author has followed Loudon very closely in his *Arboretum.* He has given the natural class to which the species belongs, and the generic and specific distinctions; after which there is a general and popular description of the tree and its varieties, (with the necessary cuts) mode of culture and uses, to which is added its geography and history, and its legendary tales or history, which is often of an interesting character. The work, aside from its practical value, is entertaining, and is a book which may be read with pleasure by the general student.

FARMERS' MISCELLANY.

ABSORBING AND RETENTIVE POWER OF SOILS.

The absorbing and retentive power of soils for water, is in proportion to the quantity of organic matters which they contain.

The question respecting the power by which soils absorb and retain water is deemed by most experimental chemists as one quite important. It has engaged the attention of many distinguished men, as Davy, Chaptal, and Boussingault. We are not aware, however, that any of our agricultural writers and chemists have determined the true grounds upon which the quantity of water is either absorbed or retained. We engaged not long since in a series of experiments, having for their object the determination of those powers as they exist in the soils of New York. We made for this purpose a selection of soils to test as far as possible the power which the different elements of a soil absorb and retain water. Among these were specimens of sand as fine as it ever exists in the fields; stiff clays, marls, or nearly pure carb. lime. To test still farther the influence of vegetable matter on the power of soils to retain and absorb water, the same specimens were dried and exposed over night. They were weighed in the morning, and were found to have absorbed each about seven grains of water. From all the facts it appeared that clay, common soil, marl, etc., when their vegetable matter, with which they are intimately combined, is destroyed by ignition, they possess the same power of absorption, or of absorbing water from the atmosphere, and also of retaining water when thus moistened or wet. The results of these experiments were corroborated by specimens of matter taken from a marsh, which when thrown out upon dry land remained a month or more wet and moist though exposed to the summer sun. This substance was like pulp, homogeneous throughout, and when analyzed was found to contain from 85 to 90 per cent of vegetable matter. It differed from ordinary peat in being composed of extremely fine vegetable matter.

These experiments demonstrate the importance of vegetable organic matter in a soil not simply as material for food, but as the principal means by which water is both absorbed and retained in soils. Water stands in the same relation to plants as blood to animals. Unless the seed can get water, it never germinates; if the plant cannot get water it dies. All our sands contain considerable vegetable matter, and so long as it exists in them they are capable of absorbing moisture from the atmosphere, and hence the reason why they produce crops unexpectedly, is owing partly to this cause. Organic matter in combination with sand has greater ability to absorb than when in combination with clay. It has the advantage of drying too more rapidly for the same reason.

The finer the organic matter in soils is, the better is the power both of retention and absorption. This was manifested particularly in the peaty matter referred to as being remarkably retentive of water, which could be explained only on the ground of its extreme fineness.

The good effects of frequent hoeing and stirring the soil, is explained on the principle that a fresh quantity of vegetable matter in the soil is exposed directly to the atmosphere. The importance of a thorough incorporation of organic matter with soil is another fact of importance. The supply of vegetable and other organic matter must be obtained from peat beds and muck swamps, whose importance will be found to increase daily.

TAKING A JOURNEYMAN.

James Allen and John Watson were apprenticed at the same time to a wheelwright who constructed such instruments of locomotion as were used in the village of Carlton and its vicinity.

They were industrious and steady lads, and looked forward to a life of independence to be secured by the labor of their hands.

During the progress of their apprenticeship, the village of Carlton made great advancement in civilization and refinement. In several parlours Turkey carpets took the place of those of domestic manufacture, and cane-bottom chairs, of Windsor ones.

"Mother," said little Susan, "does it hurt boughten carpets to keep the rooms shut up?"

"No, dear, what makes you ask such a question?"

"Because Mrs. B.'s front door is always open now, and it did'nt use to be before she got her new carpet."

Mrs. B.'s front door opened into her parlour, and the house stood so near the street as to enable every passer by to see the new carpet.

There was a great rage for "boughten" things in general, as well as carpets in particular in Carlton. A stray magazine by some means found its way into the village, and led to divers efforts to realize the picturesque ideas bodied forth by the specimen of the fine arts it contained, in the shape of a fashion plate. Ere long there was an influx of young men with broadcloth coats, who sat all day in Dr. Bollman's office learning to be doctors. A considerable part of the process seemed to consist in making tooth-picks of goose-quills. It soon began to be regarded as ungenteel for farmer's daughters to practice the art of milking: those who were constrained to adhere to it, changed the hour of practice to after dark. The word *servant* began to be used in the village vocabulary, though its use was chiefly confined to those house-keepers who had always done their own work, and whose circumstances excluded all idea of change in that respect.

Thus the village was improving in refinement, and the apprentices were improving in the art of making and mending wagons. When the term of their apprenticeship had expired, they were well acquainted with the business at their calling.

Just at this time their master died, and the village was without a wheelwright. The young men concluded to remain and open each a shop, that no other member of the craft might be induced to come in and illustrate the effects of competition.

Watson remained in the old shop, and Allen rented one directly opposite Dr. Bollman's office. Both of them had as much work as they conveniently could do.

Allen had a decided taste for the society of the ladies in general, and of one in particular He was a straight, fine looking fellow, appeared very well dressed on the Sabbath, and was, on the whole, very well satisfied with the impression he made on the beauties of the village.

As his shop was directly opposite Dr. Bollman's office, Allen could not but observe the young men of broadcloth coats and goose-quill tooth-picks, as often as he looked across the way. He would have preferred more agreeable objects of contemplation, but at first he did not care much about it. But soon other facts forced themselves on his attention. The young ladies of the village were seized with a great desire of walking, and while giving indulgence to that desire, they always took the side of the street nearest to Dr. Bollman's office, though the opposite side was gravelled and shaded with elms. Perhaps they were afraid that insects would drop on their naked shoulders, from the branches, if they ventured under them. These facts did not strike Allen pleasantly, nor did the frequent walks which the young doctors took with fair damsels hanging on their arms. When Ellen Graham was seen with them, he was greatly troubled.

This broadcloth and nothing to do every day, was a bad thing for him. On Sunday *he* had broadcloth on, and was a match for the best of them; for the rules of proportion were not strictly adhered to in the construction of any of their forms. But one day to seven was a fearful odds to contend against.

Watson used to call at his friend's shop occasionally, but he seldom staid long, because Allen always stopped working when he was there. This was contrary to his own practice: he could talk and work at the same time.

"Do you see those fellows over there?" said Allen to him one day, as he called at the shop, "Yes," replied Watson, looking for the first time into the door of Dr. Bollman's office, "what of them?"

"There is not much of them, but they trouble me some."

"How?"

"By their noise and nonsense."

"If I worked here I guess I should make about as much noise as they do: at any rate I don't think I should take notice enough of them to be disturbed by them."

During this colloquy, a singular biped entered the shop. He was quite a natural historian, being familiar with the dwelling-place of every mink, muskrat and ground-hog in the parish. He could have destroyed them all in a week, but he was as careful of them as if he were their acknowledged proprietor, killing only the increase, thus keeping the original number good. His object in visiting the shop was to get a wagon mended on credit. He was never known to pay a debt but once, and that was by mistake.

He listened to the colloquy above recorded, and learned the state of feeling on the part of Allen towards the young scions of medicine. He took his cue from it, and proceeded as follows towards the attainment of his object. "Them fellows will make smart doctors over there, wont they?" said he to Allen, after Watson had withdrawn.

"Why?" said Allen.

"Because they will be so full of knowledge through and through. You see the place to stow away knowledge is the head; now most people take it in at the eyes or ears, which are hard by the stowing place, but them fellows take it in at the toes, so that it runs clean through them. See them now, there they are at it. The books is on the table, and their feet are on the books. They are sitting in low chairs, so that the knowledge entering their toes may run down into their heads. They ought to take out a patent for their new mode of studying." I have already remarked that he succeeded in getting his cart mended upon credit.

Allen might now be seen occasionally towards the evening of week days with his Sunday clothes on; and by this means he regained his standing with the fair of the village. Ellen walked with him several times, and passed Dr. Bollman's office without looking in at the open door. His visits to her became frequent, and it began to be whispered that they were engaged, or soon would be.

They were in truth nearer to it than would be inferred, from a remark made by Ellen to a friend, who, soon after his visits began to grow frequent, complimented her on the good looks of her future husband. "Do you think," said she, "that I would marry a wagon-maker? If I ever marry, I will marry a gentleman."

What a pity that Allen did not hear the remark! It would have saved his broadcloth and his time to say the least.

Ellen's feelings ere long became to be so much interested, that she began to wish that Allen was a gentleman. She next began to speculate on the possibility of making him one. Finally she concluded that it would do to marry him if he would keep a journeyman, and call himself a carriage-maker.

She succeeded in communicating to him the idea of a journeyman. He was willing to put it into execution; but he desired to have the sanction of his fellow-craftsman's example. Accordingly he went to see him for the purpose of sounding him on the subject. He found him with a very large amount of work on hand.

"Why dont you engage a journeyman?" said Allen.

"I have one engaged," replied Watson.

"A good one?"

"First rate in my way of thinking."

He spoke of himself, but his friend misunderstood him. He resolved to follow at once his supposed example. He engaged a journeyman from a neighboring township. In consequence Ellen was more gracious, and he was tempted to put on his Sunday clothes more frequently.

The journeyman was the very beau ideal and prince of a journeyman. He was able and willing to do every thing. He felt a far deeper interest in the prosperity of the shop than its owner did. It was plain that with such a journeyman Allen might absent himself, and the business receive not the slighest detriment. He thought so at least, and acted accordingly. He went to see Ellen nearly every afternoon. He went with her to call on the young ladies of the village. He met with the young doctors and was invited to the office. He accepted the invitation and was very graciously received. They sent for a large quantity of beer just for his sake, and when the boy waited for the pay, they made great efforts to get their hands out of their pockets to prevent him paying for it, but without success.

In the mean time the journeyman had the shop pretty much to himself. He accordingly varied his employment. A large part of his time was spent in extracting diverse noises from a cracked fife, with interludes of whistling occasionally, by way of relaxation he would use the axe or saw.

One day Allen was sitting by the window in Mr. Graham's front room conversing with Ellen in a very interesting manner, when Mr. Graham passing by the window remarked—"I've just been down to your shop to get my wagon mended, but you were not there."

Now this was a very simple statement of fact, but our shrewd rough farmers sometimes convey a great deal of meaning in a few simple words. Thus did Mr. Graham on this occasion.

"My journeyman will mend it," said Allen in reply to Graham's remark.

"No he won't, he aint there."

"I guess he has gone to ride: he will do it in the morning."

"No he won't."

"If you are in a hurry, I will do it myself to oblige you."

"I don't want it done to oblige," and he passed on. Allen looked uncomfortable.

"Papa is cross and tired," said Ellen, "never mind it."

Allen did mind it and soon withdrew, deeming it expedient to go and mend the wagon, which he supposed was left at his shop. He did not find it there. He then went to Watson's where he found it.

"When did Graham say he must have his wagon done," said he to Watson.

"He said any time in the course of the week would do," was the reply.

When Graham went with his broken vehicle to Allen's shop and found it closed, he went on to Watson's and found him hard at work. "Well young man," said he, "I am glad to see you stick to your business. It is the only way to thrive."

"It's the only way for me," said Watson, not stopping his work for a moment.

"It is the only way for any body. You hold on to that creed and you will do well enough. But it is a creed which is going out of fashion pretty fast."

"When must you have your wagon?"

"Any time during the week will do."

"Come for it on Saturday then if that will suit you."

"Just as well as any way."

On Saturday he came for the wagon. "All right," said he, as he examined it, and having paid for the repairs, he drove off. Pretty soon he stopped and looked upon the ground as if in a brown study: he then drove on again, but soon stopped and walked back to the shop.

"If you want any money for any stock or any thing," said he to Watson, "I have a hundred dollars or so which I have no use for."

"I can't think of paying interest on money if I can possibly get along without it, and I don't see but that I can."

"Don't Gibson want to sell you this shop?"

"Yes, and he charges me a high rent to make me buy; but I won't run in debt."

"That is the right doctrine to thrive by, and I ought not lead such a man as you into debt; but bless your heart do you think that I would take interest of a man who is trying to do what you are? When I see a man trying to get along in the right way, and is not above his business, I like to give him a lift. I've an interest in seeing industrious, honest, prudent men get along well. What does he ask for the shop?"

"Two hundred dollars."

"How much have you?"

"About a hundred."

"How much charged?"

"About a hundred more; but it is not safe to get in debt on the strength of that."

"I know it; but you go and bargain for the shop and come to me for the hundred."

"My old fellow-apprentice will want to buy a shop," said Watson with a knowing look.

"What does he want a shop for? To get another journeyman to fiddle in? I shall expect to see you before long. Good day."

From this time Allen's visits became less frequent at Graham's and ere long ceased altogether.

In a week or two Graham was again at Watson's shop. "Why hav'nt you been along?" said he.

"I concluded it was'nt best to buy till I could pay down: but I'm much obliged to you for your kind offer."

"What is the reason it is'nt best, when you are paying twenty-five dollars rent for what you can buy for two hundred?"

"It is only waiting a little longer and working a little harder, and I can bring it about myself. Since you were here I have had some paid in, and I have several good jobs under way. By working nights through the summer, in the fall I can buy it and pay for it, and owe nobody. Just as much obliged to you though as if I had the money from you."

"You've got the real republican grit in you. You would do for governor, and I'll vote for you yet: you can't hinder me from doing that."

In the fall the shop was bought and paid for, and from time to time small parcels of lumber were collected and neatly piled up on the premises. In a year's time, a small framed house went up; and while it was being finished, a little black-eyed girl who had worked for Mrs. Washburn for several years, might be seen now and then at the store, buying crockery, sheeting, &c., and at the cabinet maker's ordering a bureau, and tables, and chairs. These were paid for out of her wages. When the house was finished and paid for, she became a joint occupant of it with Watson, and people called her *Miss* Watson.

If you had visited the village ten years afterwards, you would have found the house enlarged and handsomely furnished, and occupied by Mr. and Mrs. Watson, and several young Watsons male and female.

Old Mr. Graham had voted for Watson, not for governor, but for member of congress, and had the satisfaction of knowing that his vote was not thrown away. When he was declared elected, the old man remarked, "I'm pretty well satisfied with a country that will put forward men like that. He never had a journeyman in his life: he has always done his own work, and he'll do it now in congresss, you see if he don't."

FRUIT AND FRUIT TREES OF YATES COUNTY.

BY S. B. BUCKLEY.

As climate has an important influence on the productions of a country, especially its fruits, a few remarks on the climate of this county will be given. Yates county is situated in 42 deg. 30 m. north latitude, and its longitude is nearly the same as that of Washington city. The Seneca and Crooked lakes, both of which lie partly within the borders of this county, have an important bearing on its climate. The Seneca lake, whose Indian name was Canesaga, signifying beautiful water, is truly a beautiful sheet of water, which owing to its great depth, and to its being fed probably by springs, is never frozen over, and steam boats ply on its surface during the winter. Fruit trees near the lake bloom at least a week or ten days sooner than those which are situated ten or twelve miles distant; also the wheat harvest commences about two weeks before the harvest of many sections fifteen to twenty-five miles from the lake; so that laborers frequently come from those parts and assist us through harvest, previous to cutting their own crops. With us the wheat harvest generally begins about the middle of July, but this season, which was unusually early, wheat was cut on the 9th of that month. Deep snows are uncommon, snow rarely falling to a depth of more than a foot, and a large portion of the winter the ground is nearly bare. The last winter was uncommonly severe, the snow falling on the night of the 14th and morning of the 15th of February to the depth of nearly three feet. This lasted until the 3d of March, when thawing commenced under the warm sun, raising to life flies, and other insects of the diptera order. On the 4th the snow was reduced to about a foot in depth, and on the 10th spiders made their appearance, the sun being pleasant and warm. Small spots of earth becoming visible. The 13th the ground was bare, excepting where the snow had been drifted. The snow went off so sudden, accompanied by heavy rains, as to cause large floods on all the streams, which did much damage in many places. On the 14th the blue birds (*Silvia sialis,* Wilson) made their appearance, they being among the feathered race with us the first harbingers of spring. The next day brought the red-winged starling, (*Sturnus predatorius*) accompanied by the friendly robins (*Turdus migratorius*). The 20th several species of sparrows arrived, and plowing commenced among farmers. On the 24th many insects were in motion, and a family of caterpillars were in life upon an apple tree. For the month of March 1846, the mean barometer was 29.31

Max. alt., 29.74
Min. alt., 28.75

Mean thermometer, 36.67
Max. alt., - - 61
Min. alt., - - - $\bar{0}$
Rain, 1.81.

April 1st. Meadow larks (*Sturnus ludovicianus*), turtle doves *Columba carolinensis*), king fishers (*Alcedo alcyon*), made their appearance, and the pools of water were noisy with the croaking frogs. The 4th the alder and maple were in full bloom, also the blue flowers of liverwort (*Hepatica triloba*), and the bloodroot (*Sanguinaria canadensis*), began to appear in the woods. The 9th the grass began to wear a greenish hue, elm trees were in blossom and the barn swallow (*Hirundo rufa*) arrived, bull frogs spawned, and black ants were busy. On the 12th snow fell sufficient to cover the ground, but soon disappeared, and on the 15th grass was sufficiently abundant to dispense with foddering, cattle and sheep had required little hay since the first of April. The 21st apricot trees in bloom, also the American amber, bigereaux, and mayduke cherries. The 24th the wild cherry (*Cerasus virginianus*) was in bloom, and willow leafing out. The 28th there was a heavy frost, and ice formed on water; the sugar-maple and ash putting out their leaves. The 30th, plum and peach trees in bloom, also the dandelion and pigeon weed (*Lithospermum arvense*). During the past month, the sowing of spring wheat, barley, oats, and flax has been done, so that farmers are generally ready to prepare their ground for planting corn. The mean barometer for the past month is - - - 29.46

Max. alt., - - 29.80
Min. alt., - - 29
Mean thermometer, - 47.63
Max. alt., - - - 78
Min. alt., - - - 23

Rain, 94.

May 9th. Pear and apple trees were blossoming, and the woods began to assume a green appearance. On the 21st there was a frost, but not sufficient to do any damage. The 25th red clover began to bloom, being earlier than usual, so that farmers began to cut clover on the 15th June, about ten days before the usual time. Mean barometer for the month of May, 29.27

Maximum altitude, - - - 29.55
Minimum altitude, - - - 28.82

Rain, 1.54.

The mean temperature of June 1845 was the same as that of June 1846. In 1845 the first frost sufficient to kill potato tops was Oct. 18th, and now, Oct. 5, 1846, we have had but a very slight frost, not sufficient to kill buckwheat. There are probably few portions of the United States that are more favorable to the cultivation of fruit than this section. We have a great and decided advantage over the southern and western states, with respect to frost, which often kills the fruit in those states. During three years which I spent in the state of Alabama, frost killed the peaches, so that we had no fruit two years of the three. The fruit crop there was so very uncertain, that very little attention was paid to its cultivation. It often happens that the warm weather in February will cause the peach trees to bloom, and afterwards a cold spell in March blasts the fruit, and in large portions of the western states the same circumstance often occurs, though at a later period in the season. Through the southern range of counties in this state, namely, in Allegany, Steuben, Chemung, Tioga, &c., fruit is very uncertain on account of its being nipped in the bud by frost, and I presume the same is true throughout the mountainous region of Pennsylvania. From which it will be seen that our fruit growers have little to dread from competition, should they turn their attention to the raising of apples for export. Here apples, pears, peaches, plums, cherries and quinces grow in great perfection. Of applès the most common grafted kinds are the greening, called by some the Rhode Island greening, and said to be different by others who are acquainted with the New England apple. With us it is an excellent winter apple, and a good keeper, being easily preserved until July. The Newtown pippin is cultivated by some, and here ranks as a second rate apple, and hence by many it is considered unworthy of cultivation. The Roxbury russet is fast coming into extensive cultivation, though as yet we have but few bearing grafts of this apple. The northern spy is fast coming into cultivation, and deservedly ranks among the first of our apples, both for its late keeping, fair size, and agreeable flavor; it being the best for eating during the month of May. The Baldwin apple begins to attract attention, yet it is so rare that it is rather difficult to obtain grafts for insertion. The Spitzenburgs are extensively cultivated, and general favorites. The Talman sweeting ranks among the best of our winter sweet apples. The yellow swar is also cultivated and much esteemed. We have the wine apple, which is an excellent fruit, and the Vandervere. There is also an apple much esteemed by many called the cat head, but different from the one described by Downing. Besides which there are several species not mentioned in Downing's work, which are much prized by many. Such as the King apple, different from the one named in the *Fruits and Fruit Trees of America,* of which fine specimens were at the State fair. There is an apple much esteemed in Canandaigua and vicinity, called the Lacker apple. This is a seedling which is said to have originated in the garden of a Mr. Antis of that village. It is a good keeper, of the medium size, is subacid, and has a very fine flavor. The land-office apple is a favorite with many. This sprung from trees planted by a Mr. Williamson, a Scotchman, and agent for the Poultney estate, who planted them in the vicinity of Bath, Steuben county, from which they have been introduced here. They are of medium size, very smooth, tinged with red on one side, juicy, slightly tart, and keep till May.

The apple-tree borer (*Saperda bivittata*), has made sad havoc, to such an extent as in some places to destroy more than half the trees in a few orchards; however this is among careless farmers who have suffered the insects to prey with impunity upon their trees, while others, by destroying the insect while committing its depredations have preserved their trees without any material injury.

Of pears, the variety cultivated here is not near so great as it should be — the pear tree with us being more hardy than the apple. The harvest pear, vergalieu, butter, seckle, beurri, dick, brown beurri, bon chretien, and several others which I am unable to name. Our pear trees are little subject to d.sease, there being many trees in the county upwards of forty years old, maintaining a youthful freshness and vigor.

Of the principal varieties of plums cultivated, the first and most numerous are the green and yellow gages, blue gage, blue damson, West Bolmar, Washington, magnum bonum, yellow egg, Flushing gage, and imperial gage.

The curculio is very troublesome in many sections, sometimes destroying the entire crop. I have found the most effectual remedy against the ravages of this insect is to let hogs run among the trees during the early part of summer. The trees in many sections are much injured by the knots or black gum. In some places the trees are entirely destroyed; however the growing intelligence among farmers and gardeners will probably soon stop the farther spread of the disease.

There has been little attention paid to cherries among a large proportion of the farmers in this county. The Kentish, or common red cherry, the black heart, and black mazzard being the kinds generally cultivated. In addition to these, the mayduke, yellow Spanish, black Tartarian, American amber, bigareau, carnation, white bigareau, black eagle and Elton, are fast coming into notice.

The most common peaches cultivated, are the red and yellow rareripe, and still more common than the preceding are several inferior sorts, which ripen about the first of October. Within the last two or three years, thousands and tens of thousands of peach trees, embracing the best kinds, have been transplanted. I think that with proper cultivation the peach will be one of our best as well as most abundant fruits. It certainly attains a high flavor, and the trees are little subject to disease. I have bearing trees which were planted by my father at least twenty-five years ago. The Isabella grape succeeds well, and bears abundant crops. I have seen branches loaded with fruit, which took root and grew the present season from the extremities of the old branches which had been bent down last spring and buried in the soil.

There is a great and growing attention to the cultivation of fruit among farmers and those who have land enough for a garden. This affords good business for the nurserymen, who are stimulated by the increased demand to obtain new varieties. When we reflect how much the happiness of a family may be increased by having an abundance of the choice varieties of our different fruits, it is strange that every body does not strive to obtain such comforts and luxuries when it can be done with a little trouble and a little expense. Yet still we have farmers who will send to their neighbors to get plums, peaches, quinces, and other fruits, for preserving and other use; though for the honor of our country the number becomes less every year.

Note. For the meteorological observations in the foregoing article, I am indebted to my neighbor J. Tremper.

BLACK HAWK.

We recently had an opportunity to study the peculiar excellencies of this horse. Mr. Howard of the Cultivator first called the attention of the public in this quarter to him as a valuable stock horse; and we now feel bound to say, that the recommendations of this good judge of horses was by no means exaggerated, *in our opinion*—which we add as a suffix, to satisfy the captious, for undoubtedly one's own opinion is his own right. Notwithstanding the suffix, we feel justified in going farther, and saying, that Mr. Howard's account of the horse falls short of the true and absolute, as psychologists might say. Not that the gentleman did not fully appreciate the horse's excellencies, but was fearful that if his statement came up to the mark, it would be considered an exaggeration. We care nothing, however, for such charges; hence boldly say, that he is the best horse north of Mason and Dixon's line; and we have no particular objection to crossing that line: and thus you have it in full. Believe or not believe, as you choose, it is all one to us; and we shall add no suffix as above. When you see a horse which is so near perfection, in shape, size, bottom, intelligence, kindness, speed, and stock, that you cannot see where it is to be mended, it is time to begin to say that he is the best animal on trotters. He is dignified in his demeanor, noiseless in his calls of reception, gentle in his behavior to strangers, graceful in his step under an easy rein, but the signal given, and his rush is like the eagle upon his prey.

In the Cultivator his figure has the following defects: back a little too concave or hollowy, chest less capacious, neck less high at base, tail too slim and less hairy at the insertion, lower jaw too prominent near the base. A slight cut or hollow in the flank, which does not exist in the original. Yet it is as given, one of the best figures of a horse which we have lately seen; but those defects are perceptible with the figure and horse before you.

Some may say he has not size; but it is time to begin to discard excess of shanks, and belly, and bone. Black Hawk is a true breed, so it proves in his stock. His power is based upon his chest. His hoofs are perfect, and made of a material which holds the shoe to the last. He is owned by Mr. N. H. Hill, Boston, but is kept upon the premises of D. Hill of Bridport, Vt., a gentleman who fully appreciates his qualities.

HORSE STEALING.

Great complaint is expressed by the whole community at the west, of the horse thieves who infest the country. It is stated that as many as twenty horses have been stolen in Kane county, Illinois, alone. This fact shows the magnitude of the evil, and its real extent; though probably the case of Kane county presents it in an extreme; but it shows the full extent of the liability of the inhabitants to this kind of depredation. A remedy has been proposed by a writer in the Prarie Farmer. While we are ready to coincide with this gentleman in his views of the sin and rascality of this species of theft, we are not ready to go with him in his mode of punishment. We are not ready to return to the old mode of punishment, that of death, for stealing even a poor man's horses, as cruel, unfeeling, shabby and mean as it is. We need not state the principal reason, as it lies in our own mind, for dissenting from the writer in the remedy he proposes, it will take too much room. But we will state this, that we have no confidence in the punishment of death as a means of deterring from crime. If death was certain to overtake the individual for his theft, then it would undoubtedly operate effectually as a bar to the crime. The certainty of punishment to the extent of the law, is a more effectual means for preventing crime. If the thief, when convicted, was sure of being deprived of his liberty for ten years, without the prospect of a pardon, it would operate as effectually as the punishment of death, to deter from horse stealing. We would advise to this course. Let farmers form themselves into clubs for the detection of horse thieves, and post up through the country, bills, advising the community of their determination to bring to justice thieves of this description.

When detected, let not the punishment exceed the bounds of justice, but let a part, and the first part of the business of the thief be to pay up from his earnings at some work, the expense of catching him and value of the horses, if not recovered, or if recovered, the damages they have sustained; let him pay up those bills to the owner out of the sweat of his brow. This will do him good — he will feel better for it — he will pay one debt and will learn the cost. After this matter is settled up with the injured party, let the state punish him for a violation of the law. By this order of proceeding, we do not mean to convey the idea that individual wrong is greater than public wrong, or the violation of wholesome laws, but the party injured is put first, because he is less able to wait for his pay.

We have always felt that the principle of paying up obligations of this kind have been greatly overlooked by legislators; they have looked merely to the satisfaction of the law of the state, while the individual sufferer is left unprovided for. For instance, if a horse is stolen the owner must incur considerable expense to recover it at any rate. Now the uncertainty of success in pursuit, and the certainty that nothing can be obtained at best, for the property, is a discouraging feature in the case. But if along with the prospect of recovering the property and the thief, he could feel that after due time, he would have the means furnished of paying his expenses, and the loss of property as in any other case of damage, it would greatly aid in an effectual and persevering pursuit, especially if means could be furnished in case of their want by individuals. We think then, if a thief when he enters upon his first punishment understood that his first business was to pay up for the injury done to the party, it would do him more good than hanging him; it would effect what we want, that is, not the punishment of the individual, but to deter stealing. We know, however, the imbecility of law, the perversity of the heart, and the great difficulty of providing for the administration of the law, and the want of human success in overcoming and subduing the latter. Still we know that excess of punishment or provision for it in the law is injurious, we know that many of the crimes committed upon society are due to the customs prevailing and sanctioned by society; and so long as this is the case, let society keep on the side of justice, avoiding the appearance of cruelty or severity in all cases. When wealth and outward show, as it is in this country, is a passport to society, when misfortune, which deprives one of this passport, without regard to merit or integrity, is so common, we can hardly expect the community to be rid of thieves and dishonest persons.

FENCING.

We have rarely given advice about fencing. The truth is we have lived where stone and rails are plenty, and have not experienced the evils arising from scarcity of materials. We are satisfied that the kind of fence which is best and most profitable must be determined by circumstances. Stone fence in one case is the cheapest and best; in another, chesnut or ash rails; in another, board fence; and in another still, a ditch and hedge, or wire fence. If an ornamental fence is wanting, other questions arise than those which spring from necessity. The important question in fencing is to meet certain conditions. A fence of some kind must be had, and a farmer's duty is to decide what is best for each particular case. Where timber or stone is scarce, a ditch with a low board fence might answer and serve until a hedge of poplar and thorn intermixed has grown. The poplar grows rapidly, and so does the button-wood. The truth is, that many of our common trees, if properly headed down, will make quite a respectable hedge or foundation of a barrier. Hence shrubs or trees of a rapid growth, especially those which are hardy, and bear bending and cutting, may be selected for that purpose.

It may not be uninteresting in this connection to give the names and properties of the different trees and shrubs which have been employed for hedges. Those which have taken the highest rank are the thorns, of which there are a number of species. The genus of plants to which these belong, is the cratægus, a name derived from the Greek *kratos*, strength. The advantages which the thorns possess are these; they are long-lived, may be raised easily from seed or by grafting or budding, and may be cultivated on any soil which has a tolerable depth; they are hardy and grow with considerable vigor, and may be trained in any way to suit the designs and wants of the cultivator. They are all shrubs or low trees, and if left to themselves have symmetrical, spreading branches, a neat small trunk, and comparatively a wide-spread flat head; making a fine, close shade. The beauty of the cratægus when in flower or fruit, is worthy of attention. The foliage is always fine. The wood is very hard and compact.

The most common thorn is the *Cratægus crus-galli*, a low but beautiful tree when left to grow by itself. It attains the height of twenty feet in woods and favorable open grounds; though in the latter situation it is more depressed and spreading, and forms by itself a more picturesque object. It is found from Canada to Florida. It is well known that its branches are formidable from the abundance of sharp, stiff spines, which stand out from its branches, and which seem to say, "hands off." The leaves are of a deep green, somewhat glossy above, but dull beneath. It flowers in April or May, and bears in early autumn a small scarlet fruit, which sometimes gives the tree a beautiful appearance.

Another cratægus, which has been esteemed for hedges, is the Washington thorn (*C. concordata*), the disk of whose leaves are cordate, ovate, with angular lobes. It has a close, compact head. It grows from fifteen to twenty feet high, and prefers the rocky banks of streams. It flowers about the first of July, and forms a terminal corymb, which in the end bear a small, flattish, globose fruit, of a bright purple color. It is said to have been first cultivated by Mr. Main, of Georgetown, in the District of Columbia. It may be cultivated in all parts of the Union, from New York to Georgia.

A smaller tree of this genus, growing also throughout the United States, is the *C. punctata.* Leaves are obovate, wedge-form, glabrous above, and serrated; fruit dull-red, dotted, pleasant taste, and fall with leaves.

Thorns, as already stated, may be cultivated in one or all of the modes which have been from time to time pursued. It is necessary, however, if it is determined to form a hedge, to raise the plants from seed, by the same practice as that which is pursued in raising the apple or pear. When the plant is three years old, it may be taken up, and from the roots of a single plant from ten to twelve cuttings may be obtained. The cuttings which have been obtained, and which ought to be four inches long, may be planted in rows eighteen inches apart, with the thick end upwards, projecting from the ground one-quarter or one-half inch, and about four inches from each other. They must be well fastened in the ground, and the dirt well pressed upon them. This mode of propagation operates like grafting, or budding, in securing the peculiar property of the individual, either as it regards fruit or spines.

Hawthorn (*C. oxyacantha*), sharp-thorned cratægus, common hawthorn. This is the common hedge thorn of England; it grows thirty feet high, and those of fifty feet are said to occur. The leaves are glossy and lobed; flowers white, small, and fragrant; the fruit red, yellow, and sometimes black. It has appeared under many varieties, among which form, color, and tint have become as various as among all domesticated trees. It is raised from seed, which do not appear until the second year. It requires a dry rich soil, and though it will grow upon one which is moist, yet it is stunted and is covered with lichens. The seed requires to be dead ripe. These are called haws. The plant may be raised from the roots of old trees, when they require to be removed. In commencing a thorn hedge it is a common practice to make a ditch and plant seed upon its border. Burton, an ancient author, in his Five Hundred Points of Good Husbandry, is sufficiently explicit in his directions for making a hedge.

> "Go plow or delve up, advised with skill,
> The breadth of a ridge, and in length as you will,
> When speedy quickset for a fence you will draw,
> So sow in the seed of the bramble and haw."

Privet (*Ligustrum vulgare*), common privet. This is a shrub of from six to ten feet high. It is indigenous to Britain and Ireland. It grows also in this country. Its leaf is glabrous, eliptic-lanceolate; flowers in white racemes, sweet scented: fruit a berry, purple: flowers in June and July. There are several varieties, the white, yellow and green privet. Wood white, hard, and often fit for turning. It is a fine plant for hedging, easily cultivated, but does best in a rich, moist loam. It is hardy, and resists injuries which would happen to many other plants if growing under a dripping surface, as under the dropping of shady trees and buildings, walls, &c. It is a fine plant for concealing naked walls, and other places which we may wish to conceal in frequented grounds. Single trees may be formed by proper trimming, by which they acquire a handsome head.

Buckthorn (*Rhamus catharticus*), is a large shrub, or perhaps a small, low tree, attaining a height under cultivation, of fifteen feet. Its specific name, catharticus, expresses its medicinal properties. It has an ovate leaf, lightly toothed. Its fruit is a bluish-black globular berry, with four seeds, succeeding a yellowish-green flower, which appears in May and June. The seeds are ripe in October, and remain on the tree after the leaves have fallen. It is an exotic, but has become naturalized in Massachusetts and New-York, and has been cultivated principally as an ornamental shrub. It may be reared from the seed, or from cuttings and layers. The situation in which it thrives best, is a rich, moist soil, and where it may be rather shaded; but it still grows and even thrives where currants can be cultivated. It is highly recommended for hedges; and when designed for this purpose, plants one year old are set in a row, nine inches apart; this may be done in spring or autumn. The next spring, if set in autumn, the plants may be clipped within six or seven inches of the ground, for the purpose of obtaining a thick bottom. The plants require to be kept free from weeds, and to be clipped once a year. No plant bears this operation better, and it may be bent into arches for arbors, or cut into any fantastic, whimsical shape, which the ingenuity of the gardener may devise. Young plants are tenacious of life, and hence bear transplanting and transportation remarkably well. It has been trimmed in mid-winter, without sensible injury, but had better be trimmed according to the experience of Mr. Derby, in June, as then the hedge recovers its beauty in a short time.

Berberris (*Berberris vulgaris*). A prejudice prevails in regard to this plant, on the ground that it is a ge minator of rust and mildew. The prejudice is without doubt entirely unfounded and unjust. So long as it exists, however, it is a bar to its cultivation. Mr. Buckley of West Dresden, Yates county, informs us that he is satisfied from personal observation that no reason for the prejudice exists. It is unfortunate that it should, as it is a fine, valuable shrub, produces a useful fruit and is well adapted for hedges. The barberry grows from ten to twenty feet high, in many places on Long Island. It is upright in its growth, with obovate ciliate leaves, or ciliate serrate. It has a yellow blossom in May and June, on racemes, something like the currant, and in the autumn oval, red, acid berries, excellent for preserves. Varieties exist as to the plant and the fruit it bears. It may be easily propagated by seeds and suckers. It requires but little culture, and it grows rapidly, so that in six or eight years it has attained nearly its destined height. Its arrangement and culture for hedges requires no peculiar management. To produce large fruit it requires a deep rich soil, and its fruits should be thinned. It prefers a mild maritime climate, but grows tolerably well in the mountain towns of New England.

Shepherdia (*Hippophæ argentea*), buffalo tree, or bush. This is a beautiful, hardy, native shrub, of a rather unsymmetrical form in a state of nature. It attains the height of fifteen feet, with rather a narrow top; but cultivation gives it symmetry and a more rounded form, and rather pendulous branches. The leaves are long, narrow, oval and obtuse, and covered with silvery scales; male and female flowers grow on separate shrubs. Berry scarlet, subacid and pleasant. It is found as far north as Saskatchewan, according to Richardson, or latitude 54. It was found by Nutall on the borders of the La Platte and Missouri. It grows on the Genesee at Rochester, and is quite abundant in Jefferson county, on the banks of the lakes. It is cultivated on the grounds of Messrs Winship, near Boston. In this vicinity it is cultivated in hedges. It is propagated easily from seeds, or by cuttings or suckers. It bears the knife well, and is not attacked by insects or subject to disease. We deem this plant an excellent one for western or prairie hedges. If kept down by cutting, it becomes close and compact. For ornament it is well worthy of attention; its silvery green leaf and scarlet berries, give it a very pleasing appearance.

American Holly (*Ilex opaca*), is a tree, which under the most favorable circumstances may reach the height of seventy or eighty feet; but ordinarily it is not over half that height. It grows in Massachusetts, near Boston, which may be regarded as its northern limit. It is found south as far as Louisiana; preferring, it would seem, a maritime region to an inland mountainous one. It is an evergreen, with oval notched, acute leathery leaves; perhaps the leaves may be more properly termed scalloped, and spiny on their edges. Branches that are a year old bear in May and June a whitish flower, and subsequently round scarlet berries which remain till into winter. It is an ornamental tree, with hard wood, susceptible of a polish. In consequence of its maritime preferences, it is probably not well adapted to the prairies of the west.

Juniper (*Juniperus virginiana*). This tree so far as we know has been rarely if ever cultivated for hedges. It is, however, employed for borders, for which it is well adapted, as it grows thick and compact, and forms a handsome green impervious mass. It delights in dry sunny hill sides, underlaid by limestone or slate, but still grows vigorously on almost any soil, sandy, loamy, or argillaceous. When growing spontaneously by itself, it often sends out long, slightly curved branches at base, which shortens upwards, so as to terminate in a point, which form the apex of a perfect cone. Many such trees may be seen upon the Hudson, upon the dry banks near Coeymans and New Baltimore. In a landscape, the form may be too mathematical for picturesque effect; still it is a beautiful object, and is well adapted for pleasure grounds and rural scenery. It grows to the height of thirty feet and more, but belongs to the smaller class of forest trees; when young, it is less symmetrical, and the leafyness is more open and spinous than the older trees. From the seed it attains the height of two feet or thirty inches in about three years. It does not bear transplanting so well as many trees shrubs; when young, however, there is no difficulty in transplanting it. The advantages of this tree for a hedge, is that it sends out long, strong branches below, which when interwoven, form an impenetrable barrier to hogs, and all sorts of cattle.

Lombardy poplar. A writer in the September number of the Prairie Farmer, recommends this tree for hedges. It is made from cuttings set nine or ten inches apart, and as it is a tree which grows rapidly, it is supposed will form a fence in a few years, which will resist cattle. It must have been remarked, however, that this poplar appears best when young, that it is rather a weak tree or breaks easily, and is liable to early decay. Still, it may be possible to make a fence of it, we shall be glad to see it turned to some good account at last. The willow would undoubtedly form an equally good hedge, and have the same recommendation, that of growing fast. In the poplar, we suppose it is designed to plant the slips so near together, that the trunks of the future trees will become the main barrier to cattle. It then operates as strong stakes driven into the ground.

We have described very briefly in the foregoing pages the most important trees which are cultivated for hedges. As different parts of the United States differ in climate, soil, and other circumstances, it is important to ascertain what kinds may be regarded as best adapted to a given section of country. We cannot state so clearly as we wish, the facts bearing upon the matter, but observation has supplied us with a few, which may be useful to some of our readers. In New England and New York there is little necessity of planting hedges. A farmer may or he may not; materials for fencing are sufficiently abundant and accessible to supply the demands. It may, however, become a matter of taste, and hence the inquiry will arise, what plant is sufficiently hardy and at the same time ornamental to meet the case. In the first place it is proper to say, that a hedge properly grown and trimmed is really ornamental, but one imperfectly stocked and but half trimmed is no ornament at all; it is no better than hedge fence behind straggling bushes. Therefore it must be settled beforehand that a good one only is worthy of a moment's thought.

In New England and New York, leaving out of the catalogue the foreign hawthorn, the *Cratægus crus-galli*, or common thorn, and the shepherdia seem to be the best adapted to the soil and climate. To these may be added the *Ilex opaca*, for the milder and more maritime parts of New England, and the shepherdia for western New York. The privet grows well in Berkshire county and hence for ornamenting the grounds in the vicinity of dwellings, for concealing or covering naked walls, &c., may be employed at will. The shepherdia is a western plant, and one of the finest shrubs our country produces, and this we should recommend for the west as superior both for ordinary fencing and ornamental hedging. It seems to delight in rather sheltered and warm, dry exposures, on the high banks of rivers and lakes. It may be it will not do as well on the prairies as we expect. A hedge formed of the shepherdia, with the gate-ways arched and ornamented with the Michigan rose, would form one of the most perfect gardenesque landscapes possible at the season of flowering.

FRUITS OF ERIE COUNTY.

BY LEWIS FALKE.

This county lies partly upon three of the principal groups, or geological formations that stretch along through Western New York, namely: the north portion is intersected from the Niagara river, east, including Grand Island, by the Onondaga salt groups, a narrow strip of a few miles immediately adjoining this on the south, commencing at the immediate debouchure of Lake Erie into the Niagara, about four miles wide, and widening in its progess east, to six or eight miles at the county line, is of the Onondaga limestone formation, while all that portion lying south of Buffalo belongs to the Marcellus shale.

This county, too, is bordered on the west by Lake Erie, and the Niagara river its outlet; whose salubrious waters temper the atmosphere, thus retarding the early influences of a precocious spring upon the opening of our fruit buds, till the season is sufficiently advanced for their vigorous growth; and even then, protecting them by its moistened influences from the frosts that often are so fatal a few miles in the interior; and in the autumn so modifying the low temperature and sudden frosts, as to give the fullest maturity to all the fruits which flourish in this climate.

Fruit trees flourish perhaps equally well in nearly every part of the county, with proper cultivation, and the following varieties may be termed as well established: the apple, plum, cherry, pear, quince, peach, apricot, nectarine; not to mention the smaller garden fruits, as the gooseberry, the current, the raspberry, the strawberry; also the melon, and the vine.

Were I to distinguish, however, on which of the formations all of these fruits flourish in the greatest luxuriance, I should name those located on the *loamy* soils of the salt group, as first in excellence; those on the limestone formation next, and those on the shale subdivision as inferior to the others, although usually good; but such as are situated immediately within the influence of the lake and river, as decidedly superior to other localities in their respective geological divisions.

As to the *fruits* themselves, they flourish more or less, according to their kind, the particular locality on which they are placed, and the care with which they are treated; but as I presume you refer only to the *hardy* fruits of our climate, I shall confine my attention solely to such. First, then, of

The *Apple.* All the varieties which grow north of the Highlands on the Hudson river, flourish in great perfection with us. Even the Newtown pippin, which is remarked by some pomologists not to come to full maturity in western New York, ripens well on the warm soils of the salt groups, and near the Niagara. Among the most prominent and excellent of our apples, may be named in the order of their ripening, the yellow harvest, Williams' favorite, sweet bough, golden sweeting, early lustre, belle bonne, Jersey sweeting, gravensteen, rambo, Holland or fall pippin, seek-no-farther, Belmont or waxen apple, Rhode Island greening. The various family of russets, swar, Spitzenberg, Baldwin, yellow belflower, blue pearmain, Tallman sweeting, northern spy, &c., &c.

Until within five years past, our fruit has been perfectly free from worms, with which it is now sometimes infected at the core, but not to such extent as to essentially injure the crop. No fairer or finer flavored apples can be found, than those produced on the borders of our great waters, where the crop *was never known to fail* in a season of bloom, and our fruits are generally good throughout the county.

Pears flourish equally well with apples, and are subject to the same general remarks; all kinds producing well, that have been introduced—many varieties of which, are of the choicest description, from the eastern, and our local nurseries. The white doyanne, (or virgalieu,) the pear of all others, *par excellence,* to my taste, flourishes with us in the highest perfection.

The *Quince,* grows and produces well in the salt and lime groups. I have seen few which were grown on the higher and moister soils of the shale. In the deep clayey loams near the Niagara, finer specimens can hardly be found, than are there produced. The orange quince is the variety usually preferred and cultivated.

The *Plum* here riots in all the luxuriance of a favorite soil, and a genial climate, and in our strong clayey loams, when undisturbed by the curculio, its only enemy as yet, its burdens are prodigious. All the finer kinds—and they have mostly been introduced—flourish in high perfection.

The *Cherry* in all its varieties, grows luxuriantly, and produces abundant crops, of the finest developed fruit. A strong gravelly or sandy loam is its favorite soil; but it grows vigorously, and bears well in the clayey loams of the salt groups and limestone.

The *Peach*, the *Apricot*, and the *Nectarine*, are less luxuriant in their growth, and prolific in bearing, than the fruits already named. The humid and cool breezes of our lake, particularly during the night, keep the temperature too low to mature and ripen these fruits to their highest perfection. An uninterrupted summer heat is required for their *full* development, which, in this immediate locality is denied them. At Lewiston, and near Lake Ontario, some twenty-five miles north of this, and below the mountain-ridge at some 300 feet lower elevation, those fruits flourish in great perfection. With us they do tolerably well in sheltered positions. In the warm, sandy, and gravelly loam, on the north end of Grand Island, in the Niagara, are peach and apricot trees more than 20 years old, 10 inches in diameter, in perfect health, and bearing abundant crops every year, without the slighest care or cultivation. Probably a more congenial spot for the stone fruits does not exist in the same latitude, than this island affords.

The *Grape* in all its varieties grown in this latitude, thrives vigorous and healthy, but a protected and sunny position is required for ripening its fruit perfectly, owing to the same influences that affect the peach. The earlier kind usually ripen well in almost any exposure. The choicer European varieties, however, need the aid of glass, and high cultivation.

The smaller garden fruits, already enumerated, are cultivated with us in great luxuriance and perfection. Perhaps as successfully as in any other part of the United States, and by many people in great abundance, and of the choicest varieties.

Many excellent, and some extensive apple orchards now exist in the county, and in the neighborhood of Buffalo, which is a good fruit market. Very considerable plantations of the choicest fruits are in progress. Two extensive nurseries are erected within a mile of the city, containing probably in the aggregate, half a million trees of all kinds of fruit common to the climate, and of their choicest varieties.

On the whole, Erie may be called, when compared with the counties *generally* of the state, a fruit county of the *first class.*

GREAT PROFITS DERIVED FROM CULTIVATING THE SOIL.

The public mind not unfrequently becomes as much excited by the large sums of money that have been, or may hereafter be derived from "tilling the ground," as it frequently does in some flour speculation. Not many years since, very scientific as well as practical estimates were made in relation to the profits to be derived from an acre of land in the culture of silk, and that calculation determined the sum to be at least $1,300. Hence arose the fever for mulberry trees, then followed a chill, and soon a total extinction of both. Not long since, the hemp fever raged in many localities, and after throbbing for a few years the excitement subsided. And now even at this day the many annual fairs throughout the land, are bringing to light many interesting results in the labors of the farm: interesting, because any pursuit becomes interesting, when a great profit is derived from a little labor or a small expenditure. We have reports from the committees appointed at the fairs, from which we learn that 100, 120, or 150 bushels of corn has been raised upon an acre of land, followed of course by a premium. Then comes 10 or 1200 bushels of beets, or rutabagas, 5 or 600 bushels onions, &c., thereby showing that the land yields at least $50 per acre nett profit.

In the Albany Cultivator for September, of the current year, we have a statement of a still greater sum of money derived from an acre of ground, and we give the items below, as taken from that periodical.

100 bushels of	potatoes, sold at 4*s.*	$50.00
32 do	corn in the ear, 3*s.*	12.00
65 do	onions, 4*s.*	32.50
13 do	carrots, 3*s.*	4.87
8 do	parsnips, 4*s.*	4.00
7 do	beets, 3*s.*	2.62
800 cabbages, 3*cts.*		24.00
Horse radish sold for		42.00
Fruit	do	10.00
Pigs fed on refuse of garden,		26.00
		$207.99

This statement we have no reason to discredit, and those who have raised the above articles, will see what the quantity in bushels may be obtained from an acre of land in a high state of cultivation. But it must be conceded that $207 is a great return from one acre of land, with only $1.50 worth of lime applied annually. It is apparent, therefore, that the same ratio will for 100 acres of land, give the profit of $20,700.99. We will consider what influence this statement ought legitimately to have upon the farmers, relative to their mode of culture. The average number of acres embraced in the respective farms, may be put down at about 100 acres each, and say that each farm contains 60 acres under cultivation. Now by a mere possibility, one farm might be made to yield $200 per acre, but it could be by no means made to extend to all farms, even in the vicinity of Albany. The cultivated lands in this section of the country, do not average $10 per acre profit, including the expense of tilling. It is apparent, however, that the lands in this country in the farming community, are far from being in a high state of cultivation, that most of them are capable of yielding twice the quantity that they now produce. Farmers will not, however, abandon the raising of the staple articles of the country, although gardens with a smaller quantity of land, may obtain a much larger profit per acre.

Farming now has become an integral part of the commerce of the land, and the policy in tilling the ground is to make money. The object is not merely to obtain a livelihood, although that may be the primary motive, but not the engrossing one. A person who engages in the trade of making shoes has an object in that pursuit beyond supplying his own family with that article. Every business enterprise, whether professional, mechanical or agricultural, has an object in view beyond a mere daily competency, the accumulation of wealth. Speculation, however, in a spiral form, will at times creep into these pursuits, and men will be captivated by its charms. To gain in a few days what it would require years of labor and patience to obtain, is always desirable. Hence farmers at times, on seeing the wonderful success of the merchant, have sold their farms and engaged in merchandize. So merchants, mechanics and professional men have returned the compliment, and become farmers. Not all, however, for the sake of gain.

Again, the science of chemistry has in modern times disclosed some interesting facts in relation to vegetable physiology, and these new discoveries have startled that adventurous class of our fellow citizens distinguished as scientific agriculturists, and hence there has been a scrambling across lots to gain the citadel of wealth. That the organization of animals and of vegetables may be learned in the form of a science, is on all hands readily conceded. It is the anatomical science of the gardener and the herdsman. A knowledge of this science, embracing as it does the proper food for plants and animals, will beyond all doubt aid the farmer in bringing them forward as the objects of his care and interest. But his practical knowledge in these matters will be his safest guide. And although much has been said about farmers adhering to the customs of their fathers, yet we ought not to abandon the usages of past experience. Many valuable traits in husbandry have been handed down to us from our venerable ancestry. That many valuable improvements in the business of farming have of late been made, we all acknowledge The causes of bad husbandry do not arise from want of capacity or knowledge among men in that branch of industry. Most farmers have correct views of good farming, and it only wants an enterprising spirit to prevail among them to render their lands more productive. We now have two classes of farmers, the practical and the scientific; and farming will never be carried to its highest state of perfection until these two branches of elementary knowledge shall be possessed by the same individual.

A. O.

THE AGRILUS RUFICOLLIS.

BY PROF. S. S. HALDEMAN.

Pl. 1, *fig.* 1. This little insect, so hurtful to the raspberry, is about three lines long; black, minutely punctured, thorax and front brassy; front with a vertical impression; a wide shallow impression across the thorax posteriorly, and another at the base of the elytra. In this particular case, the knowledge of the appearance of the insect is not essential, as far as the means of preventing its depredations are concerned, although it is always interesting to know whence an injury proceeds.

In its larva state, Agrillus ruficollis lives at the expense of the cultivated *Rubus* (raspberry), in the heart of which the pupa may be found in the month of May, the imago appearing in June. The larva bores between the wood and bark, injuring the plant, and causing a wide, unsightly excrescence. It next penetrates to the pith, which it traverses for two or three feet, finally excavating a cavity in which it undergoes its transformations.

It is probable that the larva feeds during summer and autumn, and passes the winter in the pupa state. The diseased stems are readily recognizable, and should be cut out and burnt in autumn, or early in the spring. The perfect insect is sometimes found upon the native *Rubus villosus*, which renders it probable that this genus of plants constitutes the natural food of the larva.

DRAINING BY SMALL PIPES.

The practice which is getting into fashion of draining lands by small pipes, those of an inch bore for example, seems to us to be of questionable utility. The expense of ditching, and of securing properly the perfection of the whole work warrants the utmost care in securing the ultimate object, that of a free underground passage, which will admit of the escape of the water at all seasons, and which will not be liable to obstructions by the entrance of a mouse or some other small object, which may happen to get into the tube. When deep draining is an object, it is of still greater consequence to have a large and free passage, especially in clay lands, for in these cases the percolation of water through the passage must always, under all circumstances, be slow, and unless the rapidity of the descent of the water through the compact ground be promoted, the benefits of the drainage will not be fully obtained. Hence, while farmers are incurring the expense of a deep ditch, it is not best on economical grounds, to attempt to save a little by contracted, narrow pipes, which will be liable to be clogged by slight obstructions.

PRESERVATION OF FRUITS.

Two essential points require attention in preserving fruits: 1. An equable and cool temperature. 2. A dry atmosphere. As it regards the effects of frequent changes, experience proves that few organic bodies can resist decay under changing circumstances. A cool atmosphere is best adapted to the integrity of composition. A dry atmosphere also preserves organic bodies from decay. This is exemplified in some parts of Texas and South America, where meat is readily preserved, though the country is warm if not hot. The fluids simply evaporate, and leave the harder parts to dessicate. Such changes, however, cannot take place in fruits; their fluids undergo fermentation, which precedes decay. Hence if the atmosphere is dry it will not be sufficient to preserve them, they must be cool also, and kept below that point of temperature which favors fermentation. Apples sometimes sweat, as it is called, which is moisture condensed upon them from the atmosphere. Apples or pears wrapped in separate pieces of porous paper and placed on shelves in single layers, is undoubtedly one of the most secure methods of preserving them. The cellar ought to have a gravelly bottom, and an apartment divided off in the coolest and least frequented part, and seldom opened. If they become moist they should be wiped dry and replaced; but if wrapped as directed this will seldom occur. The importance of assorting fruits need not be dwelt upon. It is worse than useless to put up bruised fruit for winter.

EXTRACTS FROM THE JOURNALS.

SOME CHEMICAL POINTS CONNECTED WITH THE FEEDING OF CATTLE.

BY WILLIAM PROCTOR, YORK, ENGLAND.

One of the greatest physiological distinctions between the vegetable and animal kingdoms consists in the different food they respectively require for their nutrition and growth—the latter consuming organized materials for that purpose; whilst for the former division, unorganized and mineral matters effect the same end, and become converted into organic substances necessary for the support of animals. In this manner, dependent upon the property it possesses of converting inorganic material into organic food, does the vegetable prove subservient to the animal kingdom by affording it food for growth and sustenance, assimilated by the organs of plants into albumen, gluten, and casein, from carbonic acid, the refuse of animal respiration; from the nitrogen of the air, and from the minerals. A little consideration will show that the difference between the nutrient principles of plants and animals is more real than apparent; in fact that they are identical. Liebig divides the substances of which the food of man is composed into two great classes: 1. Those into which nitrogen enters as a constituent—AZOTIZED. 2. Those into the constitution of which nitrogen does not enter—NON-AZOTIZED. The individual substances, according to the above arrangement, stand thus:

I. *Vegetable Albumen* (as the kernel of nuts, &c.); *vegetable fibrin* (or gluten, as in wheat); *vegetable casein* (or legumin, in peas, beans, &c.) Exactly identical in composition are, *animal albumen* (as white of egg); *animal fibrin* (principal part of animal muscle); *animal casein* (entering largely into the composition of milk.)

II. Fat, starch, gum, various kinds of sugar, alcohol, &c.

Chemical and physiological research have shown, unquestionably, that among the above substances, the proximate principles of animals and vegetables, those alone can afford support to an animal which contain nitrogen, or belong to the first division; and that more or less of such is required for that purpose according as it is deficient or abounds in nitrogen as a constituent. It would far exceed the limits of this paper to speak in detail of the various modifications of these azotized constituents. Suffice it to say that albumen, fibrin, and casein, whether of animal or vegetable origin, are identical.

Mulder has established the existence of a proximate principle common to them all, as their basis: to this substance he applies the name *protein*—the difference between the compounds being simply in the presence of small and varying quantities of sulphur and phosphorus. For the composition of protein, Mulder gives the empirical formulæ—$C_{40}\ H_{31}\ N_5\ O_{12}$ (that is, 40 carbon, 31 hydrogen, 5 nitrogen, and 12 oxygen.) If Pr. is made to represent this substance symbolically, the following formula will give an approximation to, if not the true composition of the proximate azotized elements of nutrition:

Albumen (of blood) - - -	10 Pr.+2 S+P
Fibrin, - - - - -	10 Pr.+ S+P
Casein, - - - - -	10 Pr.+ S

In the above, S and P respectively represent sulphur and phosphorus. We now pass on to the second division, the non-azotized elements of nutrition.

For the due discharge of its various functions, it is essential that the animal body should be kept at a certain temperature under whatever varying circumstances it may be placed; this is found to be in man from 98 to 100 deg., and in cattle about 100 deg.; slight variations in the standard are found in the various grades of the animal kingdom, according to the habits of the individual and the functions it has to discharge, as well as its mode of life.

This important end is attained by respiration. Respiration in a chemical point of view, is simply the union of oxygen from the air with carbon contained in the blood. This process of slow combustion of carbon in the lungs is continual, and thus is afforded the due amount of heat to the animal economy. Despretz has shown that 1 oz. of carbon by combustion (that is, union with oxygen) evolves 14.207 deg. of heat; Boussingault takes, as a mean, the daily consumption of carbon by man to be 14 oz. Now $14\times14.207=198.898$ deg. of heat given out by man in 24 hours; and by deducting from this the loss of heat by vaporization of water through the skin and lungs, we have left about 146.380 deg. of heat for the various purposes of the animal economy (Liebig). Thus, then, it is evident that the amount of heat developed bears a simple proportion to the amount of carbon consumed by oxidation in the lungs, and this will be dependent upon many and varying circumstances. In an easy respiration the quantity of air taken into the chest of a man is about 15 or 18 cubic inches; in winter the air, being condensed, will contain, bulk for bulk, more oxygen than in summer, when the air is expanded; this remark applies with an equal degree of truth, to warm and cold climates. In addition to a numerous train of modifying causes dependent on the preceding facts regarding the consumption of oxygen, numerous others exist dependent upon peculiar circumstances under which the animal may be placed. All motion is attended with accelerated respiration, and consequently the formation of an additional amount of carbonic acid; and it has already been shown how temperature influences this process.

It is, then, to support this important function that the non-azotized elements are employed in a great measure; the residue serves another purpose, namely, the formation of fat, of which we have to speak presently. The preponderance of carbon in these proximate elements, over their other constituents would point them out as the most fit for the purposes of respiration. Their constitution is thus:

Fat : $10\,C+10\,H+O$
Starch : $12\,C+10\,H+10\,O$
Sugar : $12\,C+9\,H+9\,O$
Alcohol : $4\,C\times 6\,H+2\,O$

It remains for us now briefly to consider the chemical and physiological relations of fat.

Fat is a peculiar substance deposited in all parts of the body, in the cells of the cellular tissue, and apparently requiring no special structure for its formation. It is composed of three fatty acids, namely, stearic, margaric, and oleic acids, in combination with a peculiar organic base, (glycerine.) These acids vary in different kinds of fat; the first abounding in the hard, the second in the soft, and the third in the liquid fats and oils. Some fats contain peculiar substances, as that of the brain which contains phosphorus.

Some difference of opinion exists regarding the production of fatty material in the animal economy. The French chemists seem inclined to consider that all the fat found in the body is derived from the substances taken as food containing fat; in fact, that fat is furnished to the system ready formed. The graminivorous tribes take it in ready formed with their food, and carnivorous animals, in whom, however, it is usually very scanty, derive it from them; therefore, certainly, directly or indirectly, the fat of an animal is derived from the fats, oils, wax, &c., more or less of which exists in our vegetable food. But as it is an undoubted fact that the quantity of fat in an animal is by no means always proportional to the quantity he derives from his food, we are led to conclude that the power of producing fat, exists as well in the animal as vegetable world. While oats contain as much as 5.6 of fatty matter, turnips contain scarcely any, yet animals speedily fatten on them. Again Boussingault has shown that in the process of fattening pigs, more fat is formed than is found in their food. Mulder remarks—"The opinion that fats may readily be produced in the animal body from the food, is strongly supported by the facts that some fats are actually and necessarily produced; for instance, fats of the brain, cholesterin, cetin, and many other peculiar fats. Now, if fats are produced in the animal body, it must be either from other fats, or from other substances, such as starch. Both processes are the same, in so far as in every case there must be a rearrangement of the elements. In a scientific point of view, therefore, there is nothing unlikely in the opinion that animals are able to produce fat." Liebig is another opponent of the doctrine, and brings forward most powerful reasoning to support his view of the subject. He considers fat to be produced from the starchy and saccharine matter consumed by animals; all excess of these principles not employed in the production of heat by the combustion of the constituent carbon in the lungs, is taken into the circulation and converted into fat, being found as such in the blood, and is finally deposited in the fat cells.

This view accords, in a similar manner, with many well established facts connected with the feeding of cattle; if an animal is fed with highly azotised food, it becomes full of flesh, especially if at the same time sufficient exercise is taken to consume the carbonised materials by respiration; but if on the contrary, substances rich in starch or sugar, or other non-azotised principles, are employed for food, little flesh is acquired, but abundance of fat, and this is more particularly the case if rest is enjoined with the use of these materials, inasmuch as by such a plan of proceeding less carbon is employed in the lungs, and more left at liberty to form fat. Thus, then, by placing an individual under circumstances where he consumes less oxygen, a greater quantity of fat is developed; such circumstances are found in the stall-fed animal where deficient exercise and diminished cooling are equivalent to a diminished supply of oxygen, and less waste is consequently experienced by motion, and increased efforts to preserve the animal temperature. Another interesting fact has been pointed out by Dr. Playfair, that the lungs of the good feeding breed of cattle are of small capacity, giving us this inference, that respiration is in them reduced, as it were, to the smallest capacity.

It is impossible in short limits to follow Liebig through his abstruse but interesting course of reasoning; but it is desirable to show how readily the non-azotised principles may become fat. If, for example, we take for the purpose of illustration, starch. If from this substance we subtract one equivalent of carbonic acid, and seven of oxygen, we have left the elements of fat, thus: $C_{12} H_{10} O_{10} - (C O_2 + O_7) = C_{11} H_{10} O$; if by peculiar processes in the animal organism, fat is thus formed by a separation of oxygen and carbonic acid, then it is probable that these latter substances are not given out in the free state; in fact we know they are not; but that they meet in the system with other substances, with which they possess the property of entering into combination.

"Whatever views," writes Liebig, "we may entertain regarding the origin of the fatty constituents of the body, this much at least is undeniable, that the herbs and roots consumed by the cow contain no butter; that in hay or other fodder no suet exists; that no hog's lard can be found in the potato refuse given to swine; and that the food of geese or fowls contain no goose or capon fat. The masses of fat found in these animals are formed in their organism; and when the full value of this fact is recognized, it entitles us to conclude that a certain quantity of oxygen, in some form or other, separates from the constituents of their food; for without such separation of oxygen, no fat could be formed from one of these substances."

Great interest has lately been excited on the question of fattening cattle, in consequence of the importance which has been attached to it in connection with the question of the repeal of the malt tax. It has been argued that the agricultural interest would be materially benefitted by such repeal, as under such circumstances malt might be then advantageously used for the fattening of cattle. But before giving up a revenue of more than twenty millions dollars, afforded by the tax on malt, government determined to test the question experimentally, and accordingly employed Dr. Thompson and Dr. R. Thompson to examine the matter. Their report on the subject contains results of an extremely interesting character, both as regards the comparative value of malt and barley in the production of milk and butter in the cow, as well as the production of fat in animals.

Before a determinate conclusion can be formed of the relative value of these two substances for the preceding uses, several important facts must be understood and borne in mind respecting the relation of malt and barley to each other. 100 parts of barley dried at a temperature of 212 deg., leaves 90.54 of dry matter; that is, loses nearly 10 per cent of moisture. The dried specimen consisting of C 46.11, H 6.65, N 1.91, O 42.24, ash 3.09=100. The quantity of N (nitrogen,) would indicate about 12.25 per cent albumen.

By the process of malting, barley undergoes a peculiar change, that of germination. Barley is steeped in water, and then exposed to air in thick layers, at a moderate temperature, and frequently turned; this produces germination of the seed; the process is then checked by drying in a current of warm air as soon as the sprouts have acquired a length about equal to that of the seeds; they now constitute malt. The essential change which is caused by these processes, so far as regards our present purpose, is the production of a peculiar substance, *diastase*, in all probability at the expense of the fibrin of the grain, by which the amylaceous portion is partly converted into dextrine, (a modification of starch) and finally into sugar.

During the process there is a considerable evolution of carbonic acid, produced from the carbonaceous portions of the barley, uniting with the oxygen of the air; this consumption, and other losses during the process, by steeping, &c., cause a diminution in the weight of the grain, amounting to about 13 per cent. After malting, the two substances thus stand in relation to their proximate constituents:

	Barley.	Malt.
Gluten - - - -	3	1
Sugar - - - - -	4	16
Gum - - - - -	5	14
Starch - - - - -	88	69
	100	100

The total loss which barley sustains by malting, (Thompson is quoted,) amounts to more than 19 per cent. But as barley contains 13.1 per cent, and malt 7.06 of water, 6 parts out of the 19 per cent are water, so that there is actually only lost 13 solid matter. Thus, water, 6; saline matter, 0.41; organic matter, 12.52=19. The elementary constitution of malt, is as follows: C 44.78, H 7.06, N 1.62, O 44.76, Ash 1.77=100.

In a few words then, by malting, in reference to barley: the soluble salts are much diminished, so that a larger quantity of the former grain would be required to produce the salts necessary for animal purposes. The quantity of nitrogen is also inferior, and hence in equal weights the nutritive power of malt must be less than that of barley. The carbon is also lessened in quantity, while the starch and gum is diminished, and the sugar increased.

Having briefly considered the chemical difference which exists between malt and barley, we return to Dr. Thompson's practical experiments. These were performed on two lean bullocks, three years of age, and as near as possible the same in constitution. The weight of one bullock, A, was 9 cwt. 7 lbs.; of the other, B, 10 cwt. 106 lbs. Both were fed on the same kind of food, excepting that the same amount of barley was given to one, and malt to the other. Hay was found to be essential, for when barley and malt were given alone, the animals loathed it and left it unconsumed. In the first instance, 6 lbs. of barley were given to A, and 6 lbs. of malt to B, a quantity which was speedily raised to 9 and then 12 lbs.; a quantity beyond this couldnot be safely used. Experiments were carried on in this manner with these animals, trom the 1st to the 14th of October, and the quantity of food consumed, was, by

A of Barley, 198 lbs.; of Hay, 312.7769 lbs.
B of Malt, 198 lbs.; of " 311.75 "

Under these circumstances the increase of weight in the animals was by A 109 lbs., by 90.5 lbs. In another trial with similar conditions, A gained 55, and B 44 lbs.

Among many trials by Dr. Thompson regarding the production of milk, &c., in cows, one is peculiarly applied to our present purpose: 100 lbs. of mixed barley, hay and grass, produced 8.17 lbs. of milk, and 1.95 lbs. of butter, and the animal gained 80 lbs. in weight; but when 100 lbs. of malt and hay were given, the produce was, of milk, 7.95 lbs., of butter, 1.92 lbs., and a diminution of 42 lbs. in the weight of the cow.

These experiments (noticed in the *Gardners' Chronicle*, April 4, 1846,) show in every respect the advantage of barley over malt for feeding cattle; that it is superior, used comparatively with malt in sustaining the weight and strength of animals. This diminished power in malt is apparently to be sought for in the lessened quantity azotised and saline matter; as alluded to previously, these two classes of substances are so essential for the nourishment and reparation of the body, that without them in a due and proper proportion the system cannot be preserved in a healthy condition, and fit for the discharge of the duties it has to perform. In order to employ malt advantageously and economically for fattening, it should weight for weight show an effect decidedly superior to barley; for not only (leaning out the question of duty,) is it more expensive, on account of the cost of production from the raw grain, but the processes to which it is submitted cause a considerable diminution of weight, so that 100 parts of barley are equivalent to about 87 of malt; this loss of valuable material for our present purposes is, it is true, attended by increase of bulk, yet it is not by bulk but by weight that we must estimate for the purpose of feeding.

Dr. Thompson thus writes of malt:—"The only advantage which it seems to hold out in cattle feeding, is the relish which it gives to a mash, but as this depends entirely upon the sugar which it contains, and which has been produced from the starch of the barley, it is obvious that the same flavor may be imparted by the addition of an equivalent amount of molasses or sugar, should it be considered expedient."—*London Gardeners' Chron.*

THE POTATO DISEASE.

BY JAMES CAIRD.

As all the facts bearing upon the cause of the potato disease are interesting at the present moment, I send one or two which I think have not been previously observed A plot of early potatoes were cut over some weeks ago, before the disease had anywhere in this district reappeared, and while the shaws were perfectly green and healthy. At that time the tubers were quite sound, and continued so till a few days ago, when suddenly many of them became diseased. Another plot from which the shaws had been cut about the same time, but which were dug soon afterwards, and left on the surface to ripen. remain still perfectly sound. This seems to indicate both that the disease does not originate in the leaf or stem (for in this case the stems were entirely cut off before there was the slightest manifestation of disease in either stem or tuber), and that it originates in the tuber only under certain circumstances, for in the one case where the potatoes were left in the ground, they became diseased; and in the other, where they had been dug before the disease appeared, the disease did not develop itself. The constitution of the potato seems for a time to have become weakened; some of the tubers growing from the same set may be more predisposed to disease than others; these, under certain unfavorable circumstances of atmosphere acting upon the soil, become diseased. In this state the weakened tissues of the tuber are a fit receptacle for parasitic life, which, while it is the consequence and not the cause of the disease, by its rapid development materially hastens the decay of the plant. The fungus beginning in a single diseased or weakly tuber spreads rapidly up the stem, filling up in its progress the respiratory organs of the plant, and at the same time putting a stop to the descent and consequent formation of fibrous tissues in every tuber at the same stem. A due supply of carbon is necessary for the formation of fibrous tissue to strengthen the frame of the potato, and it is elaborated from the atmosphere and transmitted to the tuber by the healthy function of the leaves and stem. This elaboration of carbon cannot take place without the aid of sunlight, and, both last year and this, the disease made its appearance in the leaf during a continuance of, or immediately after dark and wet weather. Before this took place last year many of the tubers had arrived at a tolerably ripe state and withstood the disease, while the rest, being without their due supply of carbon or fibrous tissue, had not strength to resist it. But those which last year withstood the disease, and those even in many districts in which it did not manifest itself at all, had, from want of sunlight, received too small a supply of carbon into their system, and the seed of this season everywhere was consequently predisposed to disease. The result has been that under similar favorable circumstances of dark and moist atmosphere the entire crop of the country has now become diseased. Last year the disease was four weeks later in manifesting itself, but last year was a later season by four weeks than this; besides that, the seed used this year was, for the causes already stated, more readily affected. The fact that the disease last year did not manifest itself on some parts of a farm, while other parts of the same farm, equally exposed to sunlight, did not escape, may arise from this: that those parts which did escape (generally mossy), from their spongy and perhaps antiseptic nature, gave a drier and safer bed to the tuber, which consequently remained sound, and the stem and leaves continuing green, a longer time was given for the elaboration of carbon on the subsequent appearance of sunlight.

But even in the most favorable positions this process appears to have been imperfectly performed; for this year neither moss-lands nor the seed from moss-lands have escaped. When a partial failure takes place in any of the grain crops, the extent of it is not observed till the crop is being thrashed out; but in the case of potatoes the universal decay of the haulm causes forebodings perhaps needlessly great. Last year nearly half the crop was saved, and this year, bad though appearances are, it is hoped the loss will not be total. Next year the potato will be still more predisposed to disease, and the failure will be still greater should the season prove unfavorable. But should the season, on the contrary, be in the latter part of it clear, sunny, and dry, we may hope that the tubers will receive such an accession of strength as may restore them to their former hardiness. This country has often sustained severer losses by the partial destruction of the grain crops from unfavorable seasons than it has ever yet suffered from the ravages of the potato disease. A succession of bad grain crops has more than once been experienced, caused by dark and moist weather more readily affecting the produce of seed, which itself was never properly matured. And this predisposition to disease continued till a succession of sunny seasons for a time altogether dispelled it. The early part of this season was clear and sunny, and the crop of early potatoes, then ripening, received a due supply of carbon and were perfectly sound. But the dark moist weather which preceded the general appearance of the disease on the later crops, occurred at the time when sunlight was of the greatest consequence. Yet, notwithstanding the present unfavorable appearance of the crop, it does not follow that the potato is to disappear from the vegetable world, but on the contrary we are entitled to hope that a succession of good years will yet restore it to sound and healthy vitality.

Lime has been recommended as an antidote to the disease, but the following facts disprove its efficacy:—One field of potatoes on this farm was heavily limed immediately before the potatoes were planted; about an acre of it was limed after the shaws were a foot high. The disease appeared at the same time over the whole field. On another field lime had been applied last year, on alternate ridges, one ridge receiving about three times the ordinary dressing (at the rate of 300 bushels per acre), and the next ridge receiving none. The ridges were 30 feet wide, and 12 Potato drills were planted this spring on each. The disease manifested itself a week earlier on the limed than on the unlimed ridge, and the greater decay of the shaw on the limed ridge continues still quite evident to the eye. In all these instances the newly cut set had been dusted with quicklime when in preparation for planting. Another part of the field was planted with seed, dipped, when fresh cut, in a weak solution of sulphuric acid (1 part acid to 80 of water), according to the recommendation of Professor Johnston, but without averting the disease.

The practical conclusions I would venture to draw are these—

1st. That after the stem had blackened and decayed, the tubers do not grow larger, and should as soon as possible be raised and stored; for though the healthiest tubers might keep equally well in the soil, those which are predisposed to disease are more liable to be attacked when left in it.

2d. That cutting off the haulm does not appear in any degree to prevent the disease, whilst, so long as it remains green, the haulm is of essential consequence to the healthy functions of the plant. [Our correspondent does not appear to have tried *pulling up*.]

3d. That the soundest seed will be likely to be obtained by leaving the tubers in the ground during winter, inasmuch as thereby all the weakest will certainly be destroyed and only the strongest and healthiest left; and it may therefore be advisable to leave a portion undug, and to suffer the total loss of the partially diseased for the sake of securing the soundest tubers for seed.

4th. That the application of lime to the soil or seed seems to have no influence in averting the disease.

When the potato is taken up it is of the utmost consequence that it be properly stored; and at the risk of lengthening out a letter which has already grown too long, I beg to mention a method which I adopted last year with a diseased crop, on a considerable scale, and with perfect success. A headland of the potato field was selected, to which the potatoes were carted as they were taken from the ground; they were there piled up to a point beginning with a base of 3 feet in width, then carefully thatched over with drawn straw to a depth of 6 inches. A small drain about 6 inches deep was then dug along the entire length of both sides of the pit, into which the rain water from the thatch fell, and was by it carried away. For about three weeks after the pit was made the thatch was opened at intervals of three yards all along the sunny side of the pit, on fine days, and these openings were carefully closed again before night. On the appearance of frost the whole side of the pit most exposed to the influence of frost wind received a further covering of about six inches more thatch. This, during the last mild season, was a sufficient protection. Early in the spring when the whole pit was overhauled, the potatoes were in excellent preservation; the diseased ones very dry and firm, and the sound, to the eye, perfectly so; while there was not beyond the average of former years of completely rotten potatoes. This crop was raised from stiff coarse land, taken up in dropping weather, necessarily with much moist clay adhering to the tubers, it was pitted as it came from the ground without picking or selection, and after being pitted in the manner already mentioned, nothing farther was done till spring. In this manner I kept with safety from 200 to 300 tons of potatoes.—*Agricultural Gazette.*

ON THE MANAGEMENT OF PIGS.

There is probably no animal so much libelled, so unjustly denounced as filthy, so preposterously accused of what he is not guilty of as the pig. To say "as drunk as a pig," is an undeserved stigma upon his character for temperance. Is there alcohol left in the brewer's grains after the smallest of the small, the table and the lamen-table have been extracted therefrom? As to his proverbial dirtiness, look into his stye and see if his habits of cleanliness are not of a superior order to those of most other domestic animals. To be as "stupid," as "ignorant," &c., is contradicted by the fact that a considerable number are regularly perambulating the provinces in caravans as learned professors for enlightening the country "raws" at fairs.

To speak seriously, there is, perhaps, no animal in a domestic point of view more valuable than the pig, and after a life spent in quietude and contentment in a space of ground many animals would pine and die in, his whole carcase, even those portions which in other farm produce are thrown away or thought little of, are all rejoiced in as luxuries, and then his jolly sides form the finest and best pieces of furniture in the dwellings of a large portion of the inhabitants of this happy land.

There is in the economy of raising and feeding pigs a vast improvement required in practical management. The usual construction of the sty is bad, commonly placed so as to fill up some vacant corner, often in a situation where the eaves of some higher buildings drip into it; this with imperfect drainage from the sty, and the dung kept for days, sometimes weeks inside this place of confinement, render these dens any thing but what the animal requires.

It is the management of breeding that is most defective, there being generally no system, no order or regularity attempted. The sow is put to the boar at all seasons of the year, and the progeny often come into the world untimely. The productions of this animal might be regulated with periodical exactness, which would be beneficial to the stock, and advantageous to the feeder and breeder.

Suppose a row of sties, one sow in each, for they should be constructed small. We will begin the year in November. The boar may be put to each sow during the month (probably during the latter half of the month), the period of gestation will end in March, early in the month ; the season is then favorable for the growing progeny. After an interval of 10 weeks (a sufficient space of time, and longer than is required for the litter to get away), the boar is again put to the sow at the end of May; this second litter will fall in the next September (a good and seasonable period), and the young get away the following November, to follow out the system for another year. The advantages here are, the seasonable periods of gestation, and the growth of the young; the uniformity of coming in together affording a saving of time and labor and attendance. The food should be prepared for the different stages of the sow's requirements; in the early part of her time turneps, Swedes, grains, &c., for the November period; and green vetches, or any odds and ends of growing produce, for May and some following weeks. More generous food is required as the time of farrowing approaches; and good living, such as oatmeal, pollard, &c., when the young require nourishment.

The most remarkable contrast between this animal and the sheep, cow, &c., is in the produce of its young, for while the latter are confined to one or two, except in rare cases, the former averages when full grown not less than ten or twelve, often more. If, therefore, number be of value, the intrinsic worth of this animal is very superior to other breeding stock.

It is a common practice, but a mistaken notion as to the profitable advantage of the system, to let a young sow have but one litter, and then being fattened she is of the same age as those generally killed for bacon, and quite equal to them; this is true, but for the first litter, on account of her age, the produce is small in number; it is only upon arriving at mature age that the prolific powers of this creature are shown, and that too for a series of years; being then not equal in quality as bacon to a younger animal, but fully making up for loss in quality by size.

The aptitude to fatten is a marked peculiarity in this branch of stock, and to secure its speedy and effectual attainment, it is necessary to provide dry lodging — the advantages of a well-drained sty can only be known from practical experience; the habit of the animal, in the excrements being found in one spot, generally the lowest ground, plainly indicate that nature intended him to be cleanly to thrive, and thrive he will to a degree under such circumstances calculated to content and delight his feeder.

Perhaps one of the most interesting scenes in rural life is the working man's care of, and attention to, his pig and his sty. It is only in the Irish cabin that our hero is the principal member in the family circle, and takes his meals as such; with the English cottager he is kept in his proper station in life, and with consistent treatment. To keep a pig is to this man a point of distinction to arrive at in his sphere, it is the line of demarcation between the industrious peasant and the poor laborer between poverty and daily bread: the possession of the treasure is to him a rise in the affairs of life, it has a cheering influence upon the inmates of the cottage circle, and a commanding influence in his own private circle of friends. And when some kind neighbor leaning over the sty, asks how the pig goes on — before any inquiries are made after the family — the self-satisfied response of "Why, he's thriving" — displays a fervency of good feeling and of thankfulness. Long may thy hardy sons of toil, oh, happy England! possess this time-revered reward of their honest labors.

There is no doubt but that the object here descanted upon is one of the most valuable productions in agricultural affairs. As food it is a longer relished article, and a more general diet in this country than any other animal food, and yet the creature itself, like other useful dredges, is not looked upon by the million in a respectable comparison with his brethren of the yard and the fold; although he may be treated contemptuously while living, yet the most fastidious fancier of his vulgarity will condescend to partake of his dried haunches, and will, like the over-scrupulous Mahomedans, at length "eat up the hog."—*Agricultural Gazette.*

THE ABSORBENT POWERS OF DIFFERENT EARTHS.

BY PROF. LESLIE.

[On looking over some old papers communicated for the *Annals of Philosophy*, for 1801, we stumbled upon an interesting paper on the absorbent power of earths, by the celebrated Prof. Leslie. We were perhaps more interested than we should have been, had we not recently been engaged in experiments of a similar character. We were pleased to find Prof. Leslie's observations of clays and soils which have been ignited, to agree with our own.—*Editor.*]

Mr. Leslie, who is deservedly known to the world by his photometer and hygrometer, has applied the latter instrument to some investigations hitherto neglected by those who have studied the affections of different bodies to humidity.

Having discovered that animal and vegetable matters, like the saline and deliquescent substances, attract humidity by a force altogether distinct from capillary absorption, he was induced to try whether the earthy bodies under the same circumstances, would not exhibit analogous properties. These experiments, of which we shall give a short account, led to the conclusion, that *all earths and stony bodies eminently attract moisture from the air, and this with different degrees of force, modified also by temperature, which affects the measure of all combinations.*

The experiments were made in the following manner: the earths to be examined, grossly pounded, were dried thoroughly before a good fire, and afterwards kept secluded in phials from the air and moisture, till they were perfectly cool. They were then spread upon a saucer, in which was placed a hygrometer, and the whole covered with a small receiver. In a few minutes the instrument marked the highest degree of dryness produced; whence was deduced the desiccating power of the included earth, or its attraction for humidity. In this mode the following results were obtained, at the temperature of 16 deg. Centigrade:

Freestone, - - - - -	37 deg.
Fine sea-sand, - - - - -	40
Marble, - - - - - -	47
Common clay, - - - - -	68
Sea-sand lately cultivated, - -	72
Sandy schist, - - - - -	75
Bog earth, - - - - -	77
Rotten whinstone, - - -	78
Garden mould, - - -	80

Marble and quick-lime, Mr. Leslie observes, produce nearly the same effect, and in general no difference was observed between the simple earths and their carbonates. The argillacious and silicious earths differ widely in their absorbent powers, but the cultivated soils appear to possess this property in the highest degree. Sea-sand, which gives only 40 deg., is by a few years' tillage, capable of producing a dryness of 72 deg , and garden mould that of 80 deg., an effect not ascribable, as Mr. Leslie observes, to the action of manure, as the effect of this substance alone, when examined, was inferior to most of the earths. Speculating on these facts, Mr. Leslie observes, that manures may perhaps be considered rather as stimulants in the process of vegetation; the atmosphere may afford the carbonaceous matter or food of the plants, whilst the earth affords expansion to the fibrils of the roots, and supplies them with the aqueous element.

Torrification appears to diminish considerably the powers of the earth to absorb humidity. Clay roasted in a strong fire, from 68 deg. gave only 35 deg. by the hygrometer, and being urged by the heat of a blacksmith's forge, gave no more than 8 deg. The same was observed with regard to whinstone, an effect which cannot, Mr. Leslie says, be ascribed to an incipient vitrification, for sandstone which had undergone violent ignition, shewed a similar change of property. The affections of the simple earths for moisture present some curious results. They are presented by Mr. Leslie, as follows, the temperature at the time of observation as before:

Carbonate of strontian, - -	23 deg.
Carbonate of barytes, - -	32
Quartz, - - - -	40
Marble, - - - - - -	70
Carbonate of Magnesia, - -	75
Alumine, - - - - -	84

The great difference between the dessicating power of strontian and that of the other earths, is very singular, and affords another proof, if such were wanting, of its being a distinct and independent earth.

It might be expected, that mixtures of the simple earths would produce intermediate effects; which is not, however, the case. Equal parts of silex and clay gave as much as the latter singly. Bet the *quantity* of absorption must be distinguished from the *intensity*. Strontian, barytes, and silex, are quickly saturated with moisture, whilst magnesia and alumine continue to imbibe it for a long time. Their effects in mixture depend on these qualities combined, the alumine still attracting moisture after the silex has ceased to act.

The effects of the compounds of the simple earths are, however, still more remarkable, since they surpass greatly that of their ingredients, and clearly demonstrate that the affections of these bodies for moisture depend less on their peculiar nature than on their mechanical condition. Thus sea-sand gives 70 deg., whinstone 80, though it consists one-half of silex, and the other of alumine and oxide of iron, in nearly equal parts.

Whatever tends to *harden* them diminishes their effect, and the contrary. Thus quartz urged in a forge gives only 19 deg., but the same powder, after being soaked a week in water, gave 35 deg. The process, says Mr. Leslie, by which nature gradually softens, divides, and disposes stony bodies to absorb moisture, is beautifully illustrated in the instance of whinstone or basalt. A piece of solid whinstone gave 80 deg. by the hygrometer; another piece, rotten and crumbling, gave 86 deg.; but another portion of the same rock, already reduced to mould, gave 92 deg. The ameliorating effects of culture are exemplified in sea-sand. Fine sand caused a dryness of 70 deg., and collected from a sheep walk near the beach, 78 deg.; the same sand lately brought into cultivation, 85 deg.; still these effects are inferior to garden mould, which amounts to 95 deg., and to which decomposed whinstone approaches the nearest.

Mr. Leslie insures a plentiful and easy harvest to such as may be inclined to pursue these investigations, which from their importance and application to rural economy merit particular attention. It is to be hoped they will be resumed and prosecuted with that success which has hitherto distinguished the researches of the author of the preceding enquiries.—*Nicholson's Journal*, 1801.

OPERATION OF SEPTON ON PLANTS AND ANIMALS.

BY DR. SAMUEL L. MITCHELL.

[Opinions of 1796, as promulgated by Dr. Samuel L. Mitchell, on septon (azote) and its compounds, as they operate on plants as food, and on animals as poison; by which it is manifest that the Doctor has forestalled many of the popular and scientific doctrines of the day, and for which due credit ought to be awarded. It is in the form of a letter from Dr. Mitchell to the Rev. Dr. Henry Muhlenberg, of Lancaster, Pa., dated New York, Oct. 24, 1796. The letter to be sure is rather long, but it is well worth reading, and many of our subscribers may not be able to procure the work in which it is published. We therefore give the communication as published in the transactions of the old State Agricultural Society of New York, for 1798, vol 1, p. 245.]

The letter which you wrote me from Lancaster, on the 5th of June, would not have remained unanswered so long, had I not been engaged in making a tour through the state of New York, by an appointment of an agricultural society, which I was prevailed upon to accept. You observe that gypsum has been found in Pennsylvania near Lake Erie, in large quantity; and I have the satisfaction to inform you, I have received beautiful speciments of transparent lamellated gypsum, said to be found plentifully in Onondaga county, in the state of New York. The powder of gypsum does wonders in the interior part of our country; for I know not whether I should be extravagant if I told you that the proper use of it *doubled* the *productions* of the land.

But I am not disposed, at this time, to discus the subject of gypsum with you. There is another manure, which, though exceedingly abundant and active, has been strangely overlooked by most persons. On account of its connection with the life and health of plants, and the diseases and death of animals, it merits an eminent share of attention. Some observations and reflections on this subject, which occurred to me during my late expedition, shall form the remaining part of this reply to your last.

In my letter to Chancellor Livingston, of February, 20, 1796, an attempt was made to shew that plants had the power of destroying pestilential fluids, and of rendering the atmosphere, which had been contaminated by them, healthy. It was stated, that the septon (azote) was taken up as a nutrient material, and retained in the vegetable economy: while the oxygene was discharged, and, in company with caloric and light, renewed the respirable portion of the atmosphere.

I shall now prosecute the inquiry a little further, and go into some practical details relative to this sort of manure. This task I the more readily undertake, as I find the experienced and accurate Mr. Kirwan, a copy of whose valuable production has been sent us from the British board of agriculture, has made no mention whatever of the septous principle (azote) as a manure. (The manures most applicable to the various sorts of soils, &c. London, 1766.) This letter, then, may be considered as a supplement to Mr. Kirwan's pamphlet.

What I have to remark will be comprised under three heads: 1. That animal manures contain septon (azote.) 2. That plants nourished by such manures, contain it also; and, 3. That hence may be derived a principle elucidating the use and operation of such manures.

1. The whole history of decaying animal substances tends to prove the abundance of septic (azotic, nitric) ingredients they afford. The urine and excrements of neat cattle and sheep, the soakings of dunghills, the earth of horse stable and cow houses, the soil of graves, and generally speaking, animal relics, and putrefying carcasses of all kinds, afford every one of them septic (nitric) acid. This acid is composed of septon (azote) and oxygene. Water aids the formation of this acid, by promoting intestine motion among the decaying materials, and by its own decomposition furnishing any quantity of the principle of acidity which may be wanted. And, when formed, water acts as a vehicle to convey and apply it to the various substances it meets with.

Accordingly, this product of animal decomposition being yielded plentifully by the materials collected in yards and along streets, filters through the earth in cities, and taints the waters of their wells, most of which, especially in large and long settled spots, are found, by experiment, to contain it, either separate or combined with fixed vegetable alkali, in the form of a *septite of potash* (nitre). It must be hence apparent, that the water of such wells ought not to be employed for the domestic use of washing, cooking or drinking; but that, in well regulated societies, aqueducts should be constructed for bringing water to towns from springs or sources considerably distant. This branch of public economy, which was so diligently attended to by the ancient Romans, is considered, by American municipalities, as of small importance. They had rather offer a yearly sacrifice of hundreds of citizens to the demon of pestilence, than make the most easy and obvious of all public provision for withering away such pollution. I have often thought the fixed labor of a great deity of antiquity very applicable to the considerable towns in the United States, which may be considered as so many Augean stables, requiring the waters of a river to be poured through in order to cleanse them.

In like manner, *stagnant lakes* are vitiated (Bergman *Analys. Aquar.* § 4.) by animal and vegetable products; while *ponds, marshes* and *puddles*, are still more highly impregnated with similiar extractive and septic matter. The fertilizing effect of such waters on plants, as far *septic principle* is concerned, may be easily observed, in meadows moistened by these fluids, where grass and other plants possess great luxuriance. The unhealthy operation of such exhalations on animals is observable, when, after the evaporation of these waters, too great a proportion of septic vapor rises for the neighboring plants to decompose. Our unditched morasses, and undrained swamps, reeking occasionally with pestilential flames, would remind me, if I had a disposition to indulge classical allusion, of the need there is of another *Hercules* to overcome another *Achelous.*

The connection there is between malignant distempers and dirtiness has been already remarked by Tiffot, (*Avis au peuple, &c. ch. ii., § 7 and* 8) and among the peasantry of Europe. Septic substances, the offal of slaughtered animals, the refuse of housekeeping, are when mingled in due quanties with the soil, justly ranked among the best fertilizers. The impregnation of land around houses and barns long occupied with such materials, is the acknowledged cause of its superior productiveness. While these manures are mixed with earth in such quantity as to promote and not overpower vegetable life, their noxious effluvia are repressed, or their virulence counteracted by the mediation of plants. The instrumentality of these classes of animated beings seems to be intended to keep the great balance of nature in equipoise, and prevent either scale being overloaded with materials destructive of animal life. But it nevertheless sometimes happens, that in cellars, and around country dwellings, in pigstyes and cow-pens near the house, there are accumulated great quantities of excrementitious and corrupting substances, which, if seasonably carted away, tend eminently to fertilize the fields, and promote the growth of vegetables; while, at the same time, by remaining, they render the house foul and unhealthy, by the extrication of *septic vapors.* Neatness and elegance are thus found to be as conducive to good health as to good husbandry. On considering the matter, it appears evident, that the effluvia from the neighborhood of dirty cottages and mean huts, in the country, are of a like nature with pestilential fumes which insinuate themselves into foul and unventilated tenements in cities; and the reason is apparent, wherefore, as penury is generally associated with ignorance and nastiness, and often with indolence, these distempers rage with such tremendous violence among the poor.

When I see a farmer permit such unwholesome substances to collect around his habitation, I cannot help reflecting on the danger which awaits him. The manure, which ought to have been carried away and spread over his lots, serves, as it lays, but to make his family sickly, to disable his laborers, and lead him to the dubious and expensive routine of physic; and as in common life, as well as in logic, one blunder leads to another, the want of crops, and the consequent failure of income, drive him to mortgages, judgments and executions, those fatal expedients of law.

In like manner do I lament the indiscretion of tenants contending in our cities, which of them shall obtain, at a high rent, from the distant landlord, a *pestilential stand for business!*

With the view of bettering themselves, they venture, at all hazards, amidst the poisonous exhalations of the neighborhood. By and bye they are visited by distempers; and as they are honest and sober citizens, having no uneasy conscience to reproach them for their sins, they piously consider the affliction as a monition from heaven to try their virtue. Their sense of constancy and firmness forbids them to fly from the scourge of the Lord, and thus they religiously stick to the infected spot! What is the true interpretation of such conduct, but that both the farmer and the trader, obstinately persisting in the means of self-destruction, are guilty of a sort of suicide?

It is a fact, long ago established, that great cities are the graves of the human species. It is a truth of almost equal importance, that the foul habitations of country people are nurseries of pestilential distempers. The street manures of cities consist of pretty much the same materials with the yard manure collected about farm houses. But are unhealthy for a similiar reason. The costly exertions of the cit, to amass septic materials of all kinds, and from all quarters, to found his building upon, amounts to the same thing with the supineness of the rustic sluggard, who neglects to remove them from his door.

If further proof was wanting of the real nature of these manures, it would be easy to state, that, besides the affinity of septic compounds with water, they have a strong attraction for other bodies. With potash and soda, of which large quantities are daily poured into the streets with the soap suds employed in washing, and from other sources, the septic acid for the septites of potash, (common salt-petre) and of soda (cubic nitre). With lime, which, from measuring, carting and building, is sprinkled plentifully along the streets, as well as in the mortar of walls and the cielings of rooms, it form the septic of lime (calcarious nitre). And with clay it forms the septite of argil, (nitrite of alumine). By these several ways are pestilential vapors kept down and prevented from exercising their deadly effects upon animals, except in cases where they are produced in quantity too great for the enumerated substances, and others with which they have a proneness to combine, to attach and neutralize.

2. There will be no great difficulty in showing, that septon (azote) is one of the component materials of certain vegetables. If it can be made evident what plants especially abound with it, we shall be furnished with a clue, leading us to the true use of the manures containing it. From an analysis of plants we have become acquainted with several of their component parts, and thence are enabled to form some judgment concerning the qualities of the manure best adapted to such and such particular kinds. There is good reason to believe, that particular manures ought to

contain ingredients of the same nature and quality with those which the plants so manured, are found by analysis to consist of. By proceeding in this manner, there can be rarely a mistake made in the application of manure. It is observable in the order of creation, that certain vegetable bodies approach more than others towards animal nature. The presence of septon (azote) is the circumstance in the composition of organized being, which particularly denotes animality, or the approximation to it. Septic manures, being of animal derivation, ought therefore, if they entered into the constitution of plants, to make such as are nourished by them, take on somewhat of an animal nature. Let us now examine how this principle accords with facts. A familiar example may be taken from *wheat.* Wheat is most benefitted by manures that contain septon. *Street manure, door dirt,* and *well mixed barn yard compost,* all of which abound with septen, are among the best manures for that vegetable. And the efficacy of wood ashes in making ground capable of producing great crops of that grain, is probably owing, if modern conjecture is true, to the septon (azote) composing a part of the alkali it contains. Some of the *swamp manures* will also produce good harvests of wheat; but others of them, though they cause a sufficient growth of straw, fail to fill the seed in the ear. The straw is large and heavy enough, but the grain is scanty and light. The reason appears to be this: Where the swamp manures happen to be charged with the septic matters, derived from animals, or from vegetable substances that approach toward animal nature, they will produce plentiful crops of wheat; but when they consist merely of decayed plants, they are incapable of elaborating the grain in the head. The cause of this can easily be investigated by attending to the analysis of wheat. Mr. Parmentier, (Le Farsait Boulanger, &c. page 26,) assures us of the presence of septon in the *mucous* parts of meal; and he affirms, that the *glutinous*portion affords products quite similar to animal substances. (Ibid. p. 24.) If, then, the land upon which wheat grows, contains a scanty quantity of seption, the seed will be poor and light in proportion to the deficiency of that article of food in the soil. Yet, in this very ground, the roots of turnips and radishes may thrive exceedingly; and so may other plants that do not employ septon as an article of their diet.

The same views of the subject inform us why *funguses* grow up on dunghills and in pasture grounds when the excrementitious discharges of animals are dropped. That they are nourished by septon, appears from their analysis; which proves them to contain it.

Although these considerations might appear conclusive as to this point, the evidence does not rest here. Facts of a very striking nature present themselves relative to the growth of plants on nitrous (septic) soils. In general, vegetables growing in such soils, are remarked to become very large, and to get ripe early. And as they are soon ripe, they are soon rotten. *Tobacco*, in such situations, is very luxuriant, and quickly matures, but is very apt to rot on its passage from America to Europe; and too much seption in it seems to give it the bad quality of going out very readily after it is set on fire for smoking. *Potatoes* grow rapidly and large, but will keep only for a short time; *sugar canes* grow very rank, and are soon fit for cropping, but must be manufactured speedily, or they spoil, and even with the earliest care and best attention, afford, under such circumstances, sugar and molasses of a quality below middling. (Stubbs. 3 Lowthorp's Abridgement, p. 554.) *Cabbages*, for the same cause, ripen too soon, corrupt in the head, and last not long enough for winter use.

What *Pliny* relates on the cultivation of the Helvanic vine, (Nat. Hist. lib. xvi. de gener. Vitium,) confirms the same principle. "There is no vine," says he "which is less accommodated to the soil of Italy; the grape which it bears is clear, small and very apt *to rot;* and the wine it affords will not last longer than a year; but the e is no plant that thrives better in poor land."

If these ideas are just, then the d cay of such vegetable substances ought to be attended, under certain circumstances, with the production of septic or pestilential fluids. This too is the fact. *Cabbages*, putrefying in a cellar, have been known to render a house unhealthy. Corrupted *coffee* has been charged with emitting pestilential effluvia enough to desolate a neighborhood. The like may happen from rotten *flax*, *hemp*, *potatoes*, *onions*, and in short, all other plants which have de.ived septon, or the principle of putridity, from the soil in which they grew. It is probable, that rotten wheat contributed, with other causes, to render the vicinity of a certain store in New York, during the pestilence of 1795, peculiarly unwholesome. The dispute, whether pestilential effluvia proceed from animal or vegetable putrefaction, seems thus reduced to its proper principle. When vegetables, containing septon, go into putrefactive decay, mischievous gasses may exhale from them, having the qualities of animal productions. When this is not the case, collections of putrescent vegetable matter, as in peat mosses and bogs of turf, emit no particularly offensive miasma to vitiate the surrounding air; but, on the contrary, the water draining from such places is often potable and good.

3. There now occurs an obvious explanation of one of the operations of lime as a manure, when mingled with dung and soil. The common opinion has been, that it promoted the putrefactive

process of animal and vegetable matters, and thus made them more fit for absorption and nutrition. This may be the case: but there is yet another effect which has not been generally attended to. Calcarious earth combines with the septic acid into a septite of lime (calcarious nitre), and thus becomes a very valuable manure; and at the same time, by its attractive power, it prevents the evaporation of that fluid in the form of pestilential steam. I believe, likewise, it has a further use in retaining the septic substances longer on the land, and thereby lengthening out their fertilizing effect. Old walls and rubbish, abounding with the septite of lime, frequently answer valuable purposes, as manures. Lime, in its simple state, destroys vegetation. Before it is fit to promote the growth of plants, it must be combined with some neutralizer. Its combination with carbonic acid (fixed air), is the most frequent; but in dunghills, and heaps of manure, a more common compound is formed with the septic (nitric) acid. By this connection, both the lime and the acid are deprived of their causticity, and preserved upon the land a sufficient duration of time, to undergo that gradual decomposition, by the vegetable economy and other causes, which favors the production and growth of other plants.

How far the other septites may be operative as manures, is not wholly ascertained. Doubtless they possess no inconsiderable activity. It seems to be agreed among the learned, that the word translated *nitre* in the Bible (Prov. xxv., 20; Jer. ii., 22), does not mean the saltpetre of the moderns, but the mineral alkali (soda). Yet some ambiguity besets the text of Virgil (I. Georg. v., 194), as to the precise thing he meant by the *nitro* sometimes employed with the lees of oil, as a steep to prepare seed for sowing. The following facts will render it probable that septic or pestilential fluids are sometimes very abundant in the atmosphere, and disposed to combine readily with such substances as have an attraction for them; and that consequently in both the cases just referred to, the *nitre* might have been a *septite.*

"Nitre," says Querlon, *Not. ad Plin. Nat. Hist.*, lib. xxi., ch. 10), "is a salt belonging to all the parts of the terrestrial globe, inhabited by men, by animals, or by *insects;* for I have often extracted very pure saltpetre from the little holes in walls which served as lurking places for *spiders.* Animal exhalation seems to be the means employed by nature to produce nitre, which, on that account, is never produced either far below or above the surface of the earth; and usually has for its matrix rotten plaster, similar calcarious matters, &c."

In many parts of the state of New York, much of the fixed vegetable alkali is extracted from wood ashes. The interior country, as well as the capital, is occasionally severely afflicted with pestilential distempers, as was the case in the summer and autumn of the current year. At some of the potash works, such was the amount of septic fluids in the surrounding air during this season, that the alkali concreting on the outsides of the leach tubs, from the leakage through the staves, attracted enough of them to convert it to saltpetre. Such a fact is of the utmost weight and importance, and of itself establishes the basis of most interesting deductions.

From the copiousness of septic products, it is apparent, they incommode animal life wherever they are sufficiently concentrated; they become incorporated with metallic, earthy and saline bodies, wherever they can find them; and they extend their influence to unknown limits over the vegetable creation.

Here, however, I must conclude with soliciting your assistance to ascertain some points which appear to me of no inconsiderable importance, both when considered as speculations in science, and as viewed in connection with the practical arts of agriculture and medicine. What are the effects wrought upon plants by the septites of potash (common nitre), clay (alumen nitrosum), and soda (cubic nitre) considered as manures?

As I offer to join heart and hand with you in pursuing these inquiries, and have made some arrangements on my farm for the purpose, it is almost superfluous in me to observe, that I remain with unabated esteem, Yours, &c.

STATE OF PHARMACY IN MEXICO.

In the 13th Number of Travels and Descriptions of Countries, by Widenmann and Hauff-Cotta (1837, p. 67,) are contained, a few observations on the state of medicine in Mexico. In reading these through, and more especially in perusing the description of the proceedings of the government against quacks and unlicensed vendors of medicines, every honest pharmaceutist must wish to see this class of men treated in the same way in every other country as in Mexico.

The medical authorities in Mexico, are annexed to the Ministère de l'Intérieure. The *Protomedicat,* as it is termed, consists of a president, a dean, a fiscal, and five members, all doctors of medicine, with a secretary and an usher.

Their duties consist in superintending the examinations in medicine; in the inspection of the conduct of all medical men; to see they confine themselves to the legal limits of their profession; in the direction of medical studies; in the inspection or visitation of the apothecary shops; in the direction of the medico-political measures in case of epidemics; in putting the laws into execution against quacks and unlicensed vendors of medicines of every description, who are to be rigidly prosecuted, and, in case of conviction, punished with fines, banishment, or imprisonment with hard labor;* lastly, in sending in monthly reports of the state of health of the previous month to the government, the reports being themselves founded on the observations and notes to be forwarded by all medical men in actual practice to the Protomedicat on the subject.

The medical men are arranged under the usual heads of physicians and surgeons, (the two classes being rigidly distinct,) accoucheurs and apothecaries.

Physicians must be graduated doctors of medicine, but before they are permitted to practice, they must pass an examination (state examination) before the protomedicat. If they are found duly qualified, they are bound by their oath to act in every case according to the best of their abilities and their consciences; to abstain from the performance of all surgical operations, unless they have passed the examination in surgery and not to prepare or dispense† medicines, much less to keep an apothecary shop; further, not to take their own relations—even the most distant—under their treatment; to attend the poor gratis; to be content with moderate remuneration from the rich; and lastly, to promote the fulfilment of all religious duties on the bed of sickness and death, or they subject themselves to a fine of 10,000 maravedis (about $32) for each case, in which one of their patients, by their neglect, dies without having received the sacrament. The law holds them, moreover, responsible for every culpable neglect of the duties of their profession.

The apothecaries are, in the first place by law, subjected to a rigid examination, and then to a periodical visitation of their shops, beyond the precincts of which no medicines are allowed to be prepared.

They are bound to reject all prescriptions not signed by a legal practitioner, to abstain from all medical and surgical practice, and never to quit their shops without leaving an approved and duly qualified substitute.

All their assistants must be acquainted with Latin, and capable of compounding medicines accurately and quickly, according to prescription and the directions of the Spanish Pharmacopœia. No one is permitted to open a shop or to take one, in a place where his father or father-in-law, son or son-in-law, are established in medical or surgical practice.—*Chem. Gazette.*

* A plan which would answer very well in all other countries.

† Then there are no dispensaries in Mexico! Happy land.

SENNA.

BY X. LANDERER.

The senna plant is chiefly indigenous in Ethiopia, Arabia Felix, Abyssinia, Nubia, and Senaar. The Arab tribes who occupy themselves with this branch of commerce pay not the slightest attention to the cultivation or management of the plants. The senna plant attains the height of eight or ten feet, and affords some protection from the heat of the sun to the inhabitants of the desert and to the caravans. The harvest of senna begins about the end of September. The Arabs then cut nearly all the branches off the tree, leaving the stems bare, and allow them to lie exposed until the leaves begin to fade. The branches are now collected in bundles and exposed on high ground or rocks that the air and sun may dry them as quickly as possible. When the leaves are dry the branches are laid in heaps and beaten with sticks to shake the leaves off. The leaves obtained by this process are not damaged, and consequently fetch the highest price, amounting to about double the sum given in the bazaars for the broken senna. As all the leaves are not separated from the twigs by this process, the branches are, in some parts of Nubia, placed on a clay floor and camels are driven over them to effect the total separation of the leaves, which are by these means broken into pieces and found mixed with small portions of the twigs.

Another variety of senna, characterized by the large size of the leaves and their green color, is brought from the interior of Africa. It is sold at a high price by the name of *Mekka senna.*

The senna (*sinamiki*) collected in various parts of Africa, is packed in linen sacks on camels and conveyed by camels to the shores of the Nile, where it is transferred to the boats, and thus brought to Cairo and Alexandria. In these two capitals there are sinamiki magazines, to which the bales are conveyed to be unpacked and again carefully sorted.

Within the last two years the senna trade has been thrown open, but it has latterly again become a government monopoly. The refuse and dust generated by the sorting of the leaves is not met with in the European markets, as it is kept for home consumption. An intentional adulteration of senna with other leaves in their native country is out of the question, for the slightest adulteration is there punished as a capital crime. The small pods, which are rarely found mixed with the leaves because they are carefully picked out, are in very general use in the countries where the senna grows. In the bazaars of Constantinople and Smyrna two varieties are met with — an Egyptian and a Tripolitan variety.—*Pharm. Journ. from Rep. für dic. Pharm.*

PREPARATION OF HYPOSULPHITE OF SODA.

BY M. V. LEGRIP.

The author gives the following as a good and cheap process for the preparation of hyposulphite of soda, now so extensively employed in taking Daguerreotype images:—

Take of Subcarbonate of soda - -	730	parts
Sulphur - - - - - - - -	45	"
Water - - - - - - - -	1500	"

Mix the sulphur first, with a small quantity of the water, and then add the soda dissolved in the remainder of the water. Introduce the mixture into two two-necked bottles, which shall not be more than two-thirds filled, then,

Take of Clean iron filings - - - -	1,500	parts
Sulphuric acid, (sp.gr. 1.845)	3,000	"

Put these into a flask capable of holding two or three times the above quantity. Allow the mixture to cool, and the first portion of disengaged hydrogen to escape, then place the flask on a sand-bath, and by means of tubes of rather large diameter, convey the gas, first into a washing bottle, and then through the two-necked bottles containing the solution. The heat appplied to the flask should be gradually increased, so as to produce a regular, but not too rapid evolution of gas.

The process having continued thus for ten or twelve hours, may be stopped. The solutions contained in the two bottles are to be mixed together, filtered, and evaporated, so as to yield crystals of hyposulphite of soda.

The flask will contain sulphate of iron, which may be dissolved out and crystallized.—*Ib. from Journ. de Chimie Med.*

DUFLOS' METHOD OF PURIFYING CRUDE HYDROCHLORIC ACID.

MM. Hensler and Riegel have tried this method, and found it to answer well.

Mix fifteen pounds of crude hydrochloric acid with five pounds of water and one ounce of sulphate of iron; expose the mixture to the air for some time, and when clear pour it into a retort, and distil, at a moderate heat, three-fifths or three-fourths.

The product of distillation is clear, colorless, of a proper degree of concentration, and quite pure. In the neck of the retort a yellowish white sublimate will be observed.—*Ib. from Pharm. Central Blatt.*

MISCELLANY.

CONULARIA *Vernuelia. n. s. Emmons.*

Description.—Quadrangular, tapering, forming a pyramid with an oblique base; sides and angles unequal; the four angles equally grooved or sulcated; triangular faces or planes undulating and marked in the middle by a faint sulcus; faces ornamented by close papillated ridges, distinct upon the middle and basal extremity, but obsolete towards the apex; papilla hollow, and slightly elongated longitudinally, equal; cuticle formed of two coats; inferior closely grooved, but papillæ indistinct or wanting; linear ridges parallel, in two sets upon each, slightly convex; convexity towards the base, forming at the middle of each face a single undulation, which marks the place of the facial sulcus.

Observations.—This conularia is nine inches long, and three inches broad at base; the broadest face is two inches, and the narrow, one and a quarter wide at base. The small end is three fourths of an inch wide, and nearly flat. It is in the form of a compressed, oblique angled pyramid, with two obtuse and two acute alternating angles. It appears to be destitute of septæ, and the cuticular covering extremely thin, and the papillæ indistinct to the unassisted eye; the faces appear finely lined.

Fig. 1.

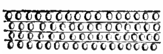


Fig. 2.

Geological Position and Locality.—Carboniferous limestone of the river Desmoines, Iowa.

Fig 1, shows the appearance of the papillated lines towards the basal extremity, and slightly magnified. Fig. 2, the lines as the papillæ are becoming obsolete towards the apex. It appears quite probable that this change is due to age, or it may arise from accident, as friction, etc.

THE LAUREL AND THE PLUM.

A writer (Mr. J. I. Thomas) in the first No. of the *Horticulturist*, p. 34, remarks that the laurel (*Kalmia latifolia*) will not flourish on a limestone soil, and that this has been proved by an eminent horticulturist of this state. He goes on to state that this plant will not flourish in soils containing carbonate of lime. Acting on this belief, soil was procured from ravines which it was supposed were free from this substance by filtration, which it had been subjected to for centuries. Plants of the laurel being placed in this earth were found to grow and flourish remarkably well.

In regard to this matter, though we have never found our friend D. Thomas practically in error, yet in this case he is theoretically so. We were furnished with a specimen of this artificial soil, and found about the same proportion of carbonate of lime as exists generally in western soils.

The difficulty in cultivating the kalmias and rhododendrons lies in the nature of the root, which spreads widely in a loose soil abounding in vegetable matter. In transplanting, the roots are usually injured, and are set in a soil too compact and too poor in vegetable matter, and if exposed to the sun it invariably dies. The difficulty in cultivating kalmias then is not so much the presence of carbonate of lime, as in the want of a proper quantity of loose vegetable matter to absorb and retain sufficient water naturally. A deeply shaded location is another requisite to success.

It is a mistaken opinion too, that the soluble matters filter out of soils when covered by forests. It is one of the beneficial influences of forest trees and wild shrubs, to maintain soluble matter near the surface.

Again, a correspondent of the *Horticulturist*, p. 132, (Mr. John M. Ives) remarks, in speaking of the black wart on the branches of the plum tree, that he has cut out at least fifty excrescences, and has not been able to detect a single worm or insect. And in another place farther on, "My opinion now is, that it is *caused by a diseased state of the sap*," and illustrates the remark by reference to the excrescences on the Azalea in the spring, which he attributes to extravasation of sap. Now the probability is, the writer has not looked for insects at the right season. He will find the larva of an insect in the excrescence of the plum in September. It is then mature or nearly so, and may always be found in the excrescence which has been formed during the preceding summer. There is no question, then, as it regards the cause of the black wart upon plum trees, neither is there as it regards the juicy excrescence upon the Azalea; both result from the perforation of insects. In the dry black excrescence the insect has escaped; in the fresh one at the proper season it may always be found.

ANALYSIS OF MINERAL WATERS.

A few bottles of water from a spring in Saratoga was recently brought to us for analysis. Having made the necessary qualiative tests, we were satisfied that it was worthy of a careful examination. By the most approved processes we found it contained the following substances:

	Pint.
Chloride of sodium, - - -	33.712
Bicarbonate of soda, - - - - -	3.856
Bicarbonate of lime, - - -	17.728
Bicarbonate of Magnesia, - - -	5.248
Hydriodate of soda, - - - -	1.500
	52.044

Specific gravity, 1.039.

The most remarkable fact brought out by this analysis is the large quantity of iodine it contains, amounting, as will be seen, to 12 grains in a gallon. We were able to obtain a decisive test of its presence in one ounce of water. This spring is also free from iron. Tincture of nutgalls, after standing twenty-four hours produced merely a green color, of the solution, and the salt when evaporated is perfectly white. This spring, it seems to us, is quite an accession to the mineral waters of Saratoga. It has a remarkably pleasant saline taste, in which iodine or something like it may be perceived. For bottling it is equal if not superior to the Congress spring—remaining perfectly transparent, a brown ferruginous sediment never appearing. It will also be found an excellent remedy for scrofula, and indeed as we understand has proved decidedly useful in several cases. This is explained by the iodine of the water. As the water is so excellent, especially for bottling, we advise the owners to call the spring *New Congress Spring.*

It is situated a few rods north of the Iodine spring. The water retains its carbonic acid a much longer time than either of the springs of Saratoga, and hence remains quite pungent two days after the corks have been drawn from the bottles. For this reason we have no doubt the salts, as represented above, are in the state of bicarbonates. We understand that Mr. George Dexter of this place (Albany) keeps a supply of this water on sale.

[Will our exchange papers copy the above.—*Ed.*]

ADDISON COUNTY, VERMONT, AGRICULTURAL FAIR.

Through the kindness of Messrs. William S. Goodrich and E. R. Wright, the secretaries of the day, I am enabled to forward you some account of this fair, which was held on the 18th October, inst. Many things were exhibited to give interest to the occasion, without application for premiums. The following is a list of animals entered in competition for premiums, namely, one 7 year old bull, two 3 year old, two 2 year old, seven 1 year old, and one 6 months calf; total, 13 bulls. Twelve dairy cows, two cows and calves, six 2 year old heifers, and nine yearling heifers; total cows and heifers, 29, and calves 2. One pair of 7 year old oxen, six 5 year old, six four year old; seven 3 year old steers, and five two years old; total 50. Total horned cattle, 94.

Besides these, not offered for premium, one pair of beautiful cherry-red fat oxen exhibited by Mr. Sanford of Cornwall, I believe, and one mammoth ox, very superior for size, by Mr. Barnes of Addison.

There were exhibited for premiums, five pairs of matched horses, and three stallions; seventy-one breeding mares and colts, four breeding mares, fourteen 3 year old colts, sixteen 2 year old, thirteen 1 year old, and five sucking colts; in all of horses 107. There was but a small exhibition of swine, probably from the difficulty of getting them on to the ground. There was one very superior boar pig 6 months old, from Bridport, exhibited by H. Hamilton, for which a gratuity of one dollar was given, as he was too young to come within the rules for competition.

There were two specimens of winter wheat exhibited, one a specimen of Gen. Harmon's white flint, and the other was said to weigh 70 lbs. per bushel. One specimen of the multicaule rye, of very superior quality. A great number of varieties of seed corn, among which I noticed a superior kind of garden corn, called the calico corn, said to make flour that cannot be distinguished from wheat flour, either by the eye or taste; one other variety of field corn, eight-rowed, that is said to yield greatly, having five ears on a stock, and very early.

Under the head of miscellaneous articles were squashes, pumpkins, sugar beets, carrots, potatoes, Alabama mustard, watermelons, specimens of cocoons, geese, fowls, hats, onions, and withal Mr. J. M. Weeks' perfect apiary. Two valuable merinoes were also examined by the committee of this department; making a total of 55 varieties, besides many others not entered for premiums.

The number of sheep was not so large this year from the consideration that the managers offered no premiums for lots of one hundred ewes and lambs, as they did last year; so that at the last year's fair there were exhibited about two thousand sheep; this year not so many, but a very superior selection, as follows: Merino bucks, 27; Merino lambs, 87; Merino ewes in pens of 5 each, 65; Merino ewes in pens of 25 each, 125; Merino lambs in pens of 25 each, 125; making a total of merinos of 304. Saxony and grade bucks, 12; lambs, 45; total 57. Saxony and grade ewes in pens of 5 each, 40; do. in pens of 25 each, 75; total, 115. Lambs in pens of 25 each, 50. Total Saxony, 222. Making the total of sheep, as reported by the secretaries, 526. In addition to these, as I happen to know, there was exhibited about 40 superior sheep by Mr. Prosper Ellthorp of Bridport, both merinoes and Saxony, and Saxony grades, that through mistake were not reported; making the total of sheep entered for premium, 566.

There were five plows, two harrows, two cultivators, and two one-horse wagons entered. Five lots of butter, two of cheese, eight boxes of superior honey from Weeks' perfect apiary, and four lots of maple sugar, in which more especially the mountainous parts of Vermont abound, so that as a state it falls short of only one state in the Union in the quantity of sugar manufactured, and that is Louisiana.

In the rooms fitted for the exhibition of household manufactures, there were exhibited upwards of fifty specimens. This barely showed what might be done in that department, and if all the ladies that were there would the next year bring something themselves, and not come as mere spectators, there would surely be a rich display of household manufactures.

There were 17 lots of fruit, including 30 varieties of apples, 7 of pears, 1 of quinces, and a great variety of excellent grapes, principally from Mr. Smith's garden in Whiting, where a choice variety of fruit trees, of all kinds, and almost every variety of grape may be procured, by such as wish to engage in horticulture.

I have now given you a slight view of what was presented at the fair for competition. It appears that $301.10 were awarded for premiums; $102 on sheep, $86 on horned cattle, $46 on horses, $15 on swine, $18 on household manufactures, and $14 on butter, cheese, maple sugar and honey. The towns that were most successful in competition at this fair, are the following: Bridport took the highest amount of premiums, being $58.50, and excelled in sheep, $38.50 of the above being for sheep; of which Mr. Prosper Ellthorp received $19.50, more than any other man for sheep or anything else; and the greater share of $13, which another man took was for the stock of Mr. Ellthorp's stock buck. Shoreham came next to Bridport, receiving $48.60, and excelled in sheep also, receiving $31.50 of the above on sheep.

Addison excelled in working oxen and steers, taking almost all the premiums, and $5 for the five best yoke of oxen, from that town. Cornwall excelled in swine, and took most of the premiums on the few that were presented. The sucking colts in Bridport, the stock of Black Hawk, took both the first and second premiums; since which the one that took the first premium, belonging to Mr. Hill, has been sold into central or western New York, for $110, though badly marked, the purchaser remarking that he would have given $200 had he been free from any white. He purchased two other sucking colts of the same stock; one of D. W. Jewett, for $100, and the other of Mr. Hill for $65. A cow belonging to Mr. Solomon Allen, of Panton, kept on grass two weeks in June, produced 35 lbs. of butter. Another in Whiting produced 29 lbs. 3 oz.; and another in Bridport 28½ lbs. The field crops are reported at the first of January, and premiums awarded thereon at the annual meeting, so that this is but a part of the year's operations of our County Agricultural society. The subject is taking a deeper hold of public confidence. The society has recently held its third annual fair, and never were there so many of all classes out to witness the exhibition. Four years ago, our legislature appropriated a certain sum to the encouragement of agricultural societies, to be distributed among the counties, on condition that they would organize an agricultural society and raise a sum equal to their share given by the state. Most of the counties have gone into the measure, and there is a fair prospect that the agricultural interests of the state will be greatly subserved.

Yours, &c. D. L.

Life and Vigor returning to the Buttonwood.—The buttonwood in this vicinity exhibits signs of returning vigor, and many which seemed to be nearly dead will recover.

Potato Fungi.—We have received from our friend Dr. Fitch a pair of fine fungi which grew in a potato hill, and which resemble potatoes so closely that they were so considered. We may figure and describe them in a future number.

Unripe and Worthless Fruit in the Albany Market.—The fruits which have appeared this season in this market, have been generally unripe. Peaches, until they had been in market three weeks, were generally unfit to eat.

NOTICES OF BOOKS.

The Horticulturist and Journal of Rural Art and Rural Taste. Edited by A. J. Downing; Proprietor, Luther Tucker, Esq.

This work we regard as a valuable addition to our stock of periodicals. Its appearance indicates, and the support it receives proves the progress of good taste, and greater interest in the ornamental branches of husbandry.

Resumption of the Annals of the New York Lyceum.

We are happy to see this excellent publication revived. The papers which are contained in the last numbers are valuable contributions to science. This, together with the *Journal of the Philadelphia Academy of Natural Science*, and the *Transactions of the Boston Natural History Society*, form a great body of American scientific matter. *Silliman's Journal* is more general and more popular in its aims, and fills of course a wider field. It is published with great regularity, and contains all foreign discoveries which it gives in admirably condensed forms.

The following is a list of our standard monthlies, which are received in exchange. *Albany Cultivator, American Agriculturist, Boston Cultivator, New York Farmer and Mechanic, Spirit of the Times, Genesee Farmer, Prairie Farmer, Ohio Cultivator, Farmer's Cabinet, Southern Agriculturist, Horticulturist, American Journal of Insanity.* Several other periodicals which we should be happy to exchange with.

Books Received.

Brown's Forest and Fruit Trees of América.

American Herd Book, by L. F. Allen.

Randall's Incentives to the Study of Geology.

Annals of the Lyceum of Natural History of New York, Nos. 4, 5, 6, 7.

Molusques Vivants et Fossiles, 1 livraison.

Paleontologie Universal des Coquilles, etc., 1r liv., par Alcide D'Orbigny.

ADULTERATION OF IODINE.

M. Herberger draws attention to the fact that with the present high price of iodine sophistications are uncommonly frequent. Thus he found in one sample native sulphuret of antimony. But the adulteration with artificial graphite is far more deceptive; it may, however, be readily detected by driving off the iodine at a gentle heat, and subsequently raising the temperature with access of air. In one instance the author found no less than 51 per cent. of graphite.—*Pharm. Journ.*